Final Supplemental Watershed Plan No. 1 - Environmental Assessment

United States Department of Agriculture

Natural Resources Conservation Service

Central Sonoma Watershed - Matanzas Creek Dam Rehabilitation Project

Sonoma County, California

Sponsoring Local Organization: Sonoma County Water Agency

Lead Agency: Natural Resources Conservation Service (NRCS)

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Appendix D - Investigation and Analysis Report

Appendix D. Investigation and Analysis Report

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Appendix D.1. Technical Memoranda

The technical memoranda prepared for this watershed plan are summarized in the following sections.

D.1.1 Existing Conditions

A summary of the existing conditions of the dam, spillway, and outlet works is provided in TM001. The report includes general information on the dam, review of available records, and a summary of the topographic survey, dam inspection, geotechnical investigation, geologic features, and sediment survey. The dam inspection included a video assessment of the outlet conduit, dam drains, and concrete riser. Still photos from the inspections are included in the report. The full videos are available in the project files of the NRCS, the Sonoma Water, and AECOM.

D.1.2 Geologic Investigation Report

The Geologic Investigation Report (TM002) summarizes preliminary subsurface investigations that were performed to obtain geologic data and information to evaluate static and seismic stability of the dam, investigate the mapped Matanzas Creek Fault, evaluate stability of the mapped landslide at the left abutment, and to evaluate erodibility of the existing earthen auxiliary spillway.

D.1.3 Soil Mechanics Report

The purpose of the Soil Mechanics Report (TM003) is to present and analyze the results of the geotechnical laboratory testing program, document material characterization and geotechnical engineering analysis results, and provide geotechnical recommendations for required dam improvements and/or further study. The document summarizes the site-specific probabilistic seismic hazard analysis, deterministic seismic hazard analysis, seepage, filter compatibility, slope stability, and seismic stability analyses of the existing dam embankment. In addition, a slope stability analysis was completed of the mapped landslide on the left abutment.

D.1.4 Hazard Classification

TM004 provides the dam breach analysis and hydrologic hazard analysis that were conducted to determine the NRCS and California DSOD hazard classifications of Matanzas Creek Dam. Peak breach flows and breach hydrographs were determine using guidelines found in TR-210-60 (NRCS 2019). The three failure modes included in the dam breach analysis were hydrologic failure, static failure, and seismic failure, which correspond to a reservoir pool elevation at the peak reservoir level during the Freeboard Hydrograph, auxiliary spillway crest, and principal spillway crest, respectively. The reservoir elevation at the time of breach, the reservoir storage at the time of breach, and the peak breach flows for each of the failure modes are summarized in Table D-1.

Table D-1. Matanzas Creek Dam Peak Breach Flows

Failure Mode (TR-210-60)	Reservoir Elevation[1] at Time of Breach (feet)	Reservoir Storage at Time of Breach (acre-feet)	Peak Breach Flow (cfs)
Hydrologic	422.77	2,215	173,546
Static	412.63	1,445	122,692
Seismic	377.63	88.9	20,247

[1] NAVD88 vertical datum

The dam breach hydrographs were hydraulically modeled using the U.S. Army Corps of Engineers River Analysis System (HEC-RAS version 5.0.7). In general, the breach flows pass through Santa Rosa and eventually drain towards the Laguna de Santa Rosa floodplain.

The population at risk (PAR) for each failure model was determined using county parcel and structure data, the hydraulic modeling results, and the "PAR Computation Worksheet" spreadsheet. The failure and risk indexes were calculated using the "Evaluation of Potential Rehabilitation Projects" spreadsheet. Both mentioned spreadsheets were developed and provided by the NRCS. Table D-2 summarizes the results of the dam breach analysis.

Table D-2. Failure Index, Risk Index, and PAR

Scenario	Load Factor	Response Factor	Failure Index	Fatality Rate	PAR	Risk Index
Static	1	92	92	0.007	16,938	10,908
Hydrologic	--	--	116	0.007	28,680	23,288
Seismic	1.0	25	25	0.007	184	32
		Total	**233**		**Total**	**34,228**

Using a fatality rate of 0.007, the potential loss of life for a hydrologic breach is 200 persons. Therefore, it is recommended that Matanzas Creek Dam retain its NRCS High Hazard classification and its California DSOD Extremely High Hazard classification. TM004 also includes dam breach inundation maps.

D.1.5 Existing Hydrology Analysis

A hydrologic analysis (TM005) of Matanzas Creek Dam includes an evaluation of the existing dam and any needed improvements needed to bring the dam into compliance with NRCS and California DSOD guidelines. NRCS TR-210-60 established minimum requirements for earth dams, which includes an evaluation of the principal spillway hydrograph (PSH), auxiliary spillway hydrograph (ASH), and freeboard hydrograph (FBH; NRCS 2019). California DSOD's *Inspection and Reevaluation Protocols* outlines minimum hydrologic requirements (California DSOD 2018).

The hydrologic analysis included a delineation of the dam's watershed, development of the ARCII Curve Number (CN), and determination of appropriate lag time and transform methods. Precipitation data were determined by Hydrometeorological Report No. 58/59 (NOAA 1999) and acquire from NOAA Atlas 14 precipitation data (NOAA 2017). A calibration of the hydrologic parameters was completed using Santa Rosa Creek and Matanzas Creek stream gage data and reservoir level data for a February 2016 storm event. The calibration resulted in a CN of 71.4 and a lag time of 1.8 hours. The existing stage-storage-discharge relationships for the dam were also evaluated and updated for the analysis.

Based on the results of the analysis, Matanzas Creek Dam meets all NRCS and California DSOD hydrologic requirements with two exceptions: first, the dam cannot route the PSH without activating the earthen auxiliary spillway hydrograph; and second, the dam does not have sufficient sediment storage capacity for another 50-year design life.

D.1.6 Spillway Stability and Integrity Analysis

A SITES stability and integrity analysis was conducted per TR-210-60 guidelines to evaluate the erodibility of the current spillway. Auxiliary spillway surface conditions and material characteristics were approximated based on findings summarized in TM002. TR-210-60 requires the use of the 6-hour ASH auxiliary spillway discharge for the stability analysis. This storm event, however, does not engage Matanzas Creek Dam's auxiliary spillway; therefore, the dam passes the spillway stability criterion.

For the integrity analysis, TR-210-60 requires evaluation of the spillway's ability to resist erosion during the 6-hour and 24-hour FBH. The auxiliary spillway passes the integrity analysis for the 6-hour FBH but fails the analysis (spillway breaches) for the 24-hour FBH.

Geologic data for the auxiliary spillway was limited for this analysis. Therefore, a range of parameters were considered to complete a sensitivity analysis. Based on favorable geologic parameters, the spillway would pass the 24-hour FBH integrity analysis. However, without additional geologic investigations being completed to confirm the favorable parameters, the unfavorable parameters were used to conclude that the existing auxiliary spillway cannot pass TR-210-60 integrity requirements.

For more information on this analysis, see TM006.

D.1.7 Alternative Development and Hydraulic Design

Alternatives considered for Matanzas Creek Dam include the No Action, decommissioning of the dam, non-structural, and structural rehabilitation alternatives. This section focuses on the development of structural alternatives.

A total of 17 structural rehabilitation alternatives were considered to bring Matanzas Creek Dam into compliance with federal and state requirements and to provide flood protection to downstream infrastructure. Several of the structural alternatives were dismissed because they either 1) did not bring the dam into compliance with NRCS and California DSOD requirements, or 2) there was another more cost-effective rehabilitation alternative versus the one being dismissed. After several review meetings with the NRCS and Sponsor, three alternatives where selected for consideration in the Plan-EA.

Alternative 1 involves converting the earthen auxiliary spillway to a structural auxiliary spillway. The structural spillway would consist of a labyrinth weir being constructed near the existing auxiliary spillway crest and constructing a concrete spillway channel to a stilling basin near the downstream valley floor. This alternative does not require the crest of the dam to be raised. The structural auxiliary spillway crest would be raised to 417.88 feet, which is the highest possible raise without needing to raise the crest of the dam. At this crest elevation, the dam would be able to route the 25-year 24-hour storm event without activating the auxiliary spillway, which matches the existing dam's capability.

This alternative resolves the PSH deficiency because the PSH can be routed through a structural auxiliary spillway per TR-210-60 guidelines (NRCS 2019). The structural spillway also resolves the integrity concern of the earthen spillway.

The conceptual design for Alternative 2 consists of raising the crests of both the dam and the earthen auxiliary spillway. The minimum auxiliary spillway crest elevation of 420 feet (a total raise of approximately 7.4 feet) is required to route the PSH through the principal spillway without activating the earthen auxiliary spillway. The auxiliary spillway crest would be able to route the 50-year 24-hour storm event without activating the auxiliary spillway; this would require a dam crest raise to elevation 431 feet (a total raise of approximately 3.4 feet) to meet all NRCS and California DSOD requirements. The dam crest raise would be completed by importing additional fill material on the upstream slope of the embankment.

In addition to the auxiliary spillway crest raise, the earthen spillway would need to be regraded with a more consistent slope and spillway width to meet spillway stability and integrity requirements. Near the crest of the auxiliary spillway, armoring of the spillway with roller compacted concrete and construction of a cutoff wall would be required to meet spillway integrity requirements.

Alternative 3 is very similar to the design concept of Alternative 2. The difference is the earthen auxiliary spillway crest and dam crest will be raised to 424 feet (a total raise of approximately 11.4 feet) and 435

feet (a total raise of 7.4 feet), respectively. This additional raise of the crest is to increase the dam's flood storage and routing capabilities to the 100-year 24-hour storm event. This means the 100-year event could be routed solely through the principal spillway, which minimizes the peak flow and flooding downstream of the dam. In contrast, a 100-year storm event for Alternative 2 would route floodwaters through the principal spillway and engage the auxiliary spillway. Although Alternative 3 produces the highest reservoir water surface elevation for the 100-year event, it satisfies the requirement of NRCS Circular 390-21-1 and does not induce flooding upstream infrastructure during the 100-year event.

For more information regarding the development of each considered alternative for Matanzas Creek Dam, see TM007.

D.1.8 Conceptual Drawings

The structural rehabilitation alternatives were evaluated to approximately a 30 percent design level. Design drawings were generated to help communicate the geospatial locations and conceptual design details of the project elements and aid in cost estimating. TM007 contains the set of 30 percent design drawings for Alternatives 1, 2, and 3.

D.1.9 Probable Cost

The probable cost of each project element was estimated by considering 30 percent design quantities, past and present unit costs, and engineering experience. TM007 contains detailed quantities, unit cost, and total project element costs. A summary of the cost for Alternatives 1, 2, and 3 is shown in Table D-3.

Table D-3. Alternative Probable Cost Summary

Structural Rehabilitation Alternative	Construction Cost	Engineering Cost	Administration/ Permitting Cost	Real Property & Easements Costs	Total Probable Cost
Alternative 1	$38,727,000	$4,149,000	$830,000	$0	$43,706,000
Alternative 2	$26,029,000	$2,788,000	$830,000	$0	$29,647,000
Alternative 3	$27,860,000	$2,985,000	$830,000	$350,000	$32,025,000

D.1.10 Frequency Flood Routing

Hydrologic and hydraulic modeling was completed for the routing of frequency-based floods to determine the flood impacts upstream and downstream of the dam for all alternatives considered. The recurrence-interval floods to be included in the flood routing are the 10-year, 25-year, 50-year, 100-year, 200-year, and 500-year 24-hour storm events.

The hydrologic parameters for Matanzas Creek Dam's watershed were determined in TM005. Parameters for downstream and adjacent watersheds were completed for the broader Central Sonoma Watershed project (ESA 2022).

Routing of the frequency-based floods was completed using the U.S. Army Corps of Engineers River Analysis System (HEC-RAS version 6.2). The HEC-RAS model for the broader Central Sonoma watershed was also provided by ESA. The received model was a 1-dimensional and 2-dimensional model.

Depth rasters and inundation boundaries from the hydraulic modeling results were exported to create inundation maps. The depth rasters were then intersected with available parcel data, building footprints, and other GIS data to assign flood depths to various types of infrastructure downstream of the dam.

For more information on the frequency flood routing, see TM008.

D.1.11 Economic Analysis

Economic feasibility was determined by comparing the average annual benefits to the average annual costs. An economic analysis was performed to quantify the benefits and costs of each action alternative. The No Action Alternative was considered to be the baseline condition, which assumes the existing maintenance activities continue but no major changes are made to the dam. Benefits and costs over the period of analysis were annualized to allow for a direct comparison of average annual benefits to average annual costs. The benefits and costs were evaluated using a 2022 price level and were evaluated over a 52-year period of analysis (24 months of construction and 50-year evaluation period) using a 2.5 percent discount rate. The analysis uses inundation models for six flood recurrence intervals, which are the 10-percent (10-year), 4-percent (25-year), 2-percent (50-year), 1-percent (100-year), 0.5-percent (200-year), and 0.2-percent (500-year) annual-probability flood events, to estimate future damages from flooding within the study area. Average annual benefits were compared to the average annual costs to generate a benefit-cost ratio for each project alternative.

The benefit categories evaluated were: 1) residential and nonresidential structure, automobile damages avoided; 2) reduction in debris removal costs; 3) infrastructure (roads, bridges, etc.) damages avoided; 4) recreation; 5) agriculture; and 6) construction and operations and operation and maintenance costs avoided. The average annual structure-related damages for each action alternative were compared with that of the No Action Alternative. The differences were counted as the structure-related benefits (damages avoided).

Average annual costs associated with the action alternatives include costs for construction, real property, easements, and operations and maintenance.

Table D-4 summarizes the benefit-cost ratio for Alternatives 1, 2, and 3.

Table D-4. Benefit-Cost Analysis Summary

Category	Alternative 1	Alternative 2	Alternative 3
Costs			
Average Annual Construction Costs	$1,541,000	$1,045,000	$1,129,000
Average Annual O&M Costs	-$130,000	-$124,000	-$123,000
Total Average Annual Costs	**$1,411,000**	**$921,000**	**$1,006,000**
Benefits			
Total Average Annual Damages Avoided	$14,000	$19,000	$22,000
Total Average Annual Benefits	**$14,000**	**$19,000**	**$22,000**
Evaluation			
Average Annual Net Benefits	**-$1,397,000**	**-$902,000**	**-$984,000**
Benefit-Cost Ratio (BCR)	**0.01**	**0.02**	**0.02**

Note: 2022 price level, 52-year period of analysis, and 2.5% discount rate. All $ values rounded to the nearest thousand.

For additional detail on the economic analysis, see TM009.

D.1.12 Statement of Limitations

This document represents Jones & DeMille Engineering's professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practicing under similar conditions. No warranty, express or implied, is made.

D.1.13 References

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Appendix D.2. PR&G Report

PR&G Report

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1.0 Introduction

Current policy dictates that the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies (PR&G) be used as a common framework for evaluating USDA water resources investments. This PR&G analysis supplements and complements the NEPA analysis prepared for the subject Watershed Plan. The intent of the PR&G analysis is to ensure that environmental effects are monetized and quantified to the extent possible and that alternatives adequately reflect the Federal Objective and Guiding Principles.

The Federal Objective "specifies that federal water resource investments shall reflect national priorities, encourage economic development, and protect the environment;" the Guiding Principles are Healthy and Resilient Ecosystems, Sustainable Economic Development, Floodplains, Public Safety, and Watershed Approach.

The ultimate intent of the PR&G analysis is to ensure that consideration is given to the economic, social, and environmental effects of a potential water-related activity, using appropriate techniques that capture more than just the monetized benefits of a project. The level and scale of analysis must be commensurate with an activity's cost and impact.

2.0 Planning and Evaluation Process

This analysis will use the following planning and evaluation process based on an ecosystem services framework. The process consists of the following eight steps:

2.1 Identify Problems and Opportunities

The Federal Objective specifies that federal water resource investments shall reflect national priorities, encourage economic development, and protect the environment by:

1. Seeking to maximize sustainable economic development;
2. Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
3. Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

Based on the Federal Objective, the following problems and opportunities were identified for potential federal investment:

The Matanzas Creek Dam was constructed in 1964 to mitigate potential damages from future flood events and to capture sediment. The auxiliary spillway crest elevation was originally designed to allow for routing of the 100-year 24-hour storm event solely through the principal spillway; however, recent assessments indicate that the flood storage capacity of Matanzas Creek Dam is limited to routing the 25-year 24-hour storm event solely through the principal spillway. Because the dam does not route the principal spillway hydrograph (PSH) through its existing principal spillway without operating the auxiliary spillway, the dam was determined to be out of compliance with TR-210-60 requirements. The dam also does not meet the NRCS PSH criteria, nor does it meet NRCS and California Division of Safety of Dams (DSOD) requirements for seismic stability. These deficiencies increase the risk of a dam breach and flooding of the properties below the dam. In general, dam breach flows would be conveyed through the

City of Santa Rosa and eventually drain towards the Laguna de Santa Rosa; there is a high risk for loss of life as well serious damage to dwellings, roads, and critical facilities.

The PR&G study area considered the 49,445-acre Central Sonoma Watershed (which consists of the HUC 12 Upper Santa Rosa Creek [180101100702] and Lower Santa Rosa Creek [180101100703] subwatersheds within the Russian Watershed) and areas that hydraulic modeling indicated would be impacted by flooding. The boundaries of the study area are shown on Map C-1 in Appendix C of the Plan-EA. This area is large enough to identify cause and effect relationships among affected resources both onsite and offsite, upstream and downstream of the dam. Stakeholders were identified through the NEPA scoping process for the project.

2.2 Inventory Existing Resources and Conditions

The resources listed in the National Watershed Program Manual (501.24.B), as well as any additional resource concerns identified during scoping, were considered for their role in the ecosystem and possible services provided. Ecosystem services that are likely to meaningfully change as a result of the project are described below.

2.2.1 Provisioning Services

Provisioning services are tangible goods provided for direct human use and consumption, such as food fiber, water, timber, or biomass.

- Water: This service will be considered through the analysis of water quality.

2.2.2 Regulating Services

Regulating services maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe such as flood, disease, and climate change.

- Urban flood damage reduction. This service will be considered through the analyses of floodplain management and public health and safety.

2.2.3 Supporting Services

Supporting services are underlying processes that maintain conditions for life on Earth, including nutrient cycling, soil formation, and primary production.

- No supporting services were identified for this project.

2.2.4 Cultural services

Cultural services make the world a place in which people want to live, and include recreational use, spiritual, aesthetic viewsheds, or tribal values.

- No cultural services were identified for this project.

2.3 Forecast Future Conditions

The existing resources and conditions that are likely to meaningfully change as a result of the project are projected into the future to establish a benchmark against which alternatives can be evaluated; this

benchmark is known as the future without federal investment (FWOFI). The FWOFI is considered as the No Action Alternative in the NEPA analysis.

2.3.1 Provisioning Services - Water

- Water Quality: The dam currently captures approximately 3.8 acre-feet of sediment per year. Based on these rates and modeling analysis, there is adequate sediment storage capacity for approximately 23 more years. At that point, sediment would no longer be impounded by the dam but would route through the principal spillway and be conveyed downstream. Dam failure would also impact water quality. Depending on the mode and severity of failure, the dam may no longer capture sediment, and the current sediment load could be flushed downstream. Breach inundation flows may increase erosion and sedimentation downstream of the dam, and could transport pollutants from flooded areas into surface waters.

2.3.2 Regulating Services - Urban flood damage reduction

- Floodplain Management: Floodplain management would not immediately change under the FWOFI; the dam would continue to operate as a high hazard dam and would continue to be at unchanged risk of failure. In the event of failure, the dam would no longer provide flood protection for the City of Santa Rosa. The flood insurance rate maps (FIRMs) for the area would no longer be accurate, as the floodplain mapping considers that the dam controls flows and reduces the floodplain associated with the channel downstream of the structure (see Map C-3 in Appendix C of the Plan-EA). Reassessment of the floodplain without the dam would likely show existing infrastructure within the flood inundation area.
- Public Health and Safety: The FWOFI would present a risk to public health and safety from flooding. Flood storage capacity would continue to be limited to routing the 25-year 24-hour storm event without activating the earthen auxiliary spillway. In the event of a dam breach, the flood flows would pass through the City of Santa Rosa and drain towards the Laguna de Santa Rosa floodplain. Breach flood depths would be expected to range from 0.5 feet to greater than 5 feet through residential neighborhoods and commercial buildings. The risk of flood could affect the security of human life or health for an estimated 28,680 people within the potential inundation area (see Map C-5 in Appendix C of the Plan-EA). Flooding could also jeopardize essential public services for the larger service area due to infrastructure failure or flooding of public safety facilities and roadways. After failure of the dam, the frequency of flooding would increase for infrastructure within the flood inundation area.

2.3.3 Risk and Uncertainty in Projections

Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, economic, and social situations. Risk represents variability that can be quantified based on probabilistic analysis using well-known and accepted methods. Uncertainty represents variability that cannot be quantified in the numerical sense and is evaluated subjectively in relative terms.

The impacts of climate change may vary over the period of analysis. According to the California Climate Adaptation Strategy (State of California 2024), increasing temperatures in California have resulted in “more frequent and severe heat waves and wildfires, more variable precipitation, and a succession of droughts.” Events are anticipated to worsen as temperatures continue to increase.

There is some risk and uncertainty inherent in the assumptions made in engineering and economic analyses. The assumptions made to develop hydrologic modeling parameters such as land cover and soil conditions could change in the future due to weather patterns, a fire, or other natural processes. The geotechnical analysis was based on the limited data available from previous reports and field data collected as part of the study. Development in flood risk areas and property value fluctuations may result in changes to property values and potential damages due to flooding conditions. In all cases, the best available data was used to complete the analyses and make reasonably conservate assumptions following widely accepted practices and methods.

2.4 Develop Array of Alternatives

A range of possible alternatives were developed by the project team based on the ability to address the problems and opportunities, and were formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability.

2.4.1 Alternatives Considered but Eliminated from Detailed Study

Non-structural Removal of Population Downstream of the Dam

The non-structural alternative considered project measures that would not require rehabilitation of the existing structure; this alternative would consist of acquiring or relocating all properties within the extents of the dam breach inundation area and modifying the zoning ordinances to prevent future development within this area. This alternative would require that approximately 4,100 residential homes, 10 school buildings, and eight critical buildings (e.g., hospitals, assisted living buildings) be acquired or relocated. Considering the 4,100 residential structures alone and assuming an average structure and property value of $400,000, the Non-structural Alternative would cost at least $1.6 billion dollars. Based on the high implementation cost and the social impacts associated with acquisition or relocation of such a large number of structures, this alternative was determined to be inefficient and unacceptable and was eliminated from further study.

Decommissioning of the Dam

Decommissioning considered eliminating the storage function of the dam by removing a section of the embankment and providing for dry floodproofing, acquisition, or relocation of downstream structures to maintain the level of flood protection that the dam currently provides. Based on the anticipated high implementation cost, inefficiency of flood protection and sediment capture, and the social impacts associated with acquisition, relocation, or dry floodproofing of such a large number of structures, this alternative was determined to be inefficient and unacceptable and was eliminated from further study.

Design Configurations for Full Dam Rehabilitation

Several design configurations were considered for full dam rehabilitation that were ultimately eliminated from detailed consideration based on hydraulic and flood protection conditions. Of the 14 configurations considered, 7 would not meet the purpose and need for the project, 5 would not be favorable to California DSOD, and the remaining 2 would provide less benefits at higher costs. Based on these factors, these configurations were determined to be variously incomplete, ineffective, inefficient, and unacceptable, and were eliminated from further study.

2.4.2 FWOFI (No Action)

The FWOFI will serve as a baseline against which other alternatives are evaluated. This alternative would not include technical or financial assistance through the Watershed Protection and Flood Prevention Program for implementation of any part of the proposed project; there would be no federally funded project measures implemented. For analysis purposes, the dam is assumed to fail and not be subsequently rebuilt.

2.4.3 Locally Preferred Alternative

The Locally Preferred Alternative was identified by the project Sponsor to be rehabilitation of the dam with a dam crest raise to 435 feet (Alternative 3). This alternative would provide the greatest amount of flood storage capacity.

2.4.4 Rehabilitate the dam with a Structural Auxiliary Spillway (Alternative 1)

Alternative 1 would bring the dam into compliance with current standards by constructing a structural auxiliary spillway and structural concrete lining over the existing auxiliary spillway and installing upstream and downstream earthen embankment stabilization buttresses.

2.4.5 Rehabilitate with a dam crest raise to 431 feet (Alternative 2)

Alternative 2 would bring the dam into compliance with current standards by raising the dam crest by 3.4 feet, raising the auxiliary spillway crest by 7.4 feet, and installing upstream and downstream earthen embankment stabilization buttresses.

2.4.6 Rehabilitate with a dam crest raise to 435 feet (Alternative 3)

Alternative 3 would bring the dam into compliance with current standards by raising the dam crest by 7.4 feet, raising the auxiliary spillway crest by 11.4 feet, and installing upstream and downstream earthen embankment stabilization buttresses.

2.5 Evaluate Effects of Individual Alternatives

The Federal Objective is represented by the first three Guiding Principles: Healthy and Resilient Ecosystems; Sustainable Economic Development; and Floodplains. Each of the reasonable alternatives identified in the previous step is evaluated for their contributions to the Federal Objective and Guiding Principles.

2.5.1 Healthy and Resilient Ecosystems

A primary objective of the PR&G analysis is the identification of alternatives that would protect and restore the functions of ecosystems.

2.5.1.1 FWOFI (No Action)

The FWOFI or No Action Alternative would not protect or restore the functions of natural systems. The dam would continue to capture approximately 3.8 acre-feet of sediment annually; however, the sediment storage for the dam would be expended in approximately 22.6 years and sediment would then

be released through the principal spillway. Dam failure would also impact water quality. Depending on the mode and severity of failure, the dam may no longer capture sediment, and the current sediment load could be flushed downstream. Breach inundation flows may increase erosion and sedimentation downstream of the dam, and could transport pollutants from flooded areas into surface waters.

2.5.1.2 Alternative 1 (Rehabilitate the dam with a Structural Auxiliary Spillway)

Alternative 1 would continue to benefit water quality downstream of the dam by capturing sediment and debris after storms; the dam would continue to capture approximately 3.8 acre-feet of sediment annually for the sediment storage design life of 50 years. This alternative would permanently disturb approximately 48.2 acres.

2.5.1.3 Alternative 2 (Rehabilitate with a dam crest raise to 431 feet)

Alternative 2 would continue to benefit water quality downstream of the dam by capturing sediment and debris after storms; the dam would continue to capture approximately 3.8 acre-feet of sediment annually for the sediment storage design life of 50 years. This alternative would permanently disturb approximately 48.2 acres.

2.5.1.4 Alternative 3 (Rehabilitate with a dam crest raise to 435 feet)

Alternative 3 would continue to benefit water quality downstream of the dam by capturing sediment and debris after storms; the dam would continue to capture approximately 3.8 acre-feet of sediment annually for the sediment storage design life of 50 years. This alternative would permanently disturb approximately 48.2 acres.

2.5.2 Sustainable Economic Development

Alternatives for resolving water resources problems should improve the economic well-being of the Nation for present and future generations. The PR&G analysis considers the effects of alternatives on both water availability and water quality to evaluate the sustainability of economic activity and ecosystem services. Water use or management factors that provide improved sustainability or reduced uncertainty should be identified in alternatives.

2.5.2.1 FWOFI (No Action)

The FWOFI or No Action Alternative would not improve the economic well-being of the Nation for present and future generations. Flooding can directly damage economic facilities such as businesses or farms. Flood damage repair would be paid for with funds that would otherwise be spent on economic or social development. Business disruptions could result in reduced employment opportunities and incomes.

2.5.2.2 Alternative 1 (Rehabilitate the dam with a Structural Auxiliary Spillway)

Implementation of Alternative 1 would improve the economic well-being of the Nation for present and future generations by reducing the risk of flood-associated impacts to economic structures in and around Santa Rosa City. This alternative would provide the least flood storage capacity of the action alternatives.

2.5.2.3 Alternative 2 (Rehabilitate with a dam crest raise to 431 feet)

Implementation of Alternative 2 would improve the economic well-being of the Nation for present and future generations by reducing the risk of flood-associated impacts to economic structures in and

around Santa Rosa City. This alternative would provide more flood storage capacity than Alternative 1, but less than Alternative 3.

2.5.2.4 Alternative 3 (Rehabilitate with a dam crest raise to 435 feet)

Implementation of Alternative 3 would improve the economic well-being of the Nation for present and future generations by reducing the risk of flood-associated impacts to economic structures in and around Santa Rosa City. This alternative would provide the greatest flood storage capacity.

2.5.3 Floodplains

The PR&G seeks to avoid unwise use of floodplains and flood prone areas. Alternatives should avoid investments that adversely affect floodplain function, such that the floodplain is no longer self-sustaining. The PR&G evaluation must be consistent with Executive Order 11988, as amended.

2.5.3.1 FWOFI (No Action)

The FWOFI or No Action Alternative would not immediately adversely affect floodplain function. Flooding risk would be unchanged in and around Santa Rosa City. Development within the FEMA-mapped floodplain would continue to be regulated according to the FIRMs as currently printed. In the event of failure, the dam would no longer provide flood protection for Santa Rosa City. The flood insurance rate maps (FIRMs) for the area would no longer be accurate, as the floodplain mapping considers that the dam controls flows and reduces the floodplain associated with the channel downstream of the structure. Reassessment of the floodplain without the FRS would likely show existing infrastructure within the flood inundation area.

2.5.3.2 Alternative 1 (Rehabilitate the dam with a Structural Auxiliary Spillway)

Alternative 1 would not affect floodplain function, but would reduce flooding risk in Santa Rosa City and support current floodplain management.

2.5.3.3 Alternative 2 (Rehabilitate with a dam crest raise to 431 feet)

Alternative 2 would not affect floodplain function, but would reduce flooding risk in Santa Rosa City and support current floodplain management.

2.5.3.4 Alternative 3 (Rehabilitate with a dam crest raise to 435 feet)

Alternative 3 would not affect floodplain function, but would reduce flooding risk in Santa Rosa City and support current floodplain management.

2.5.4 Public Safety

An objective of the PR&G is to reduce risks to people, including life, injury, property, essential public services, and environmental threats concerning air and water quality.

2.5.4.1 FWOFI (No Action)

The FWOFI or No Action Alternative would not reduce risks to people. The dam would continue to operate as a high hazard dam, and would continue to be at unchanged risk of failure. Flood storage capacity would continue to be limited to routing the 25-year 24-hour storm event without activating the earthen auxiliary spillway. In the event of a dam breach, the flood flows would pass through the City of Santa Rosa and drain towards the Laguna de Santa Rosa floodplain. The risk of flood could affect the

security of human life or health for an estimated 28,680 people within the potential inundation area. Flooding could also jeopardize essential public services for the larger service area due to infrastructure failure or flooding of public safety facilities and roadways. After failure of the dam, the frequency of flooding would increase for infrastructure within the flood inundation area.

2.5.4.2 Alternative 1 (Rehabilitate the dam with a Structural Auxiliary Spillway)

Alternative 1 would reduce risks to people by reducing the risk of dam failure and increasing the level of flood protection. The dam would continue to operate as a high-hazard dam and would provide flood storage capacity to route the 25-year 24-hour storm event without activating the auxiliary spillway.

2.5.4.3 Alternative 2 (Rehabilitate with a dam crest raise to 431 feet)

Alternative 2 would reduce risks to people by reducing the risk of dam failure and increasing the level of flood protection. The dam would continue to operate as a high-hazard dam and would provide flood storage capacity to route the 50-year 24-hour storm event without activating the auxiliary spillway.

2.5.4.4 Alternative 3 (Rehabilitate with a dam crest raise to 435 feet)

Alternative 3 would reduce risks to people by reducing the risk of dam failure and increasing the level of flood protection. The dam would continue to operate as a high-hazard dam and would provide flood storage capacity to route the 100-year 24-hour storm event without activating the auxiliary spillway.

2.5.5 Watershed Approach

A watershed approach must be used when completing a PR&G analysis. This approach recognizes that there may be upstream and downstream impacts of a water resources activity that may be outside of the applicable political or administrative boundaries. A watershed approach is a broad, systems-based framework that explicitly recognizes the interconnectedness within and among physical, ecological, economic, and social/cultural systems. A watershed approach enables examination of multiple objectives, facilitates the framing of water resources problems, incorporates a broad range of stakeholders, and allows for identification of interdependence of problems and potential solutions.

Ideally, the area of analysis should represent a geographical area large enough to ensure plans address cause and effect relationships among affected resources, stakeholders, and investment options, both upstream and downstream of an investment site.

2.5.5.1 FWOFI (No Action)

The FWOFI or No Action Alternative considers a watershed approach. The analysis area is large enough to identify cause and effect relationships among affected resources both upstream and downstream of the dam, particularly the downstream floodplain.

2.5.5.2 Alternative 1 (Rehabilitate the dam with a Structural Auxiliary Spillway)

Alternative 1 considers a watershed approach. The analysis area is large enough to identify cause and effect relationships among affected resources both upstream and downstream of the dam, particularly the downstream floodplain.

2.5.5.3 Alternative 2 (Rehabilitate with a dam crest raise to 431 feet)

Alternative 2 considers a watershed approach. The analysis area is large enough to identify cause and effect relationships among affected resources both upstream and downstream of the dam, particularly the downstream floodplain.

2.5.5.4 Alternative 3 (Rehabilitate with a dam crest raise to 435 feet)

Alternative 3 considers a watershed approach. The analysis area is large enough to identify cause and effect relationships among affected resources both upstream and downstream of the dam, particularly the downstream floodplain.

2.6 Compare Alternatives

2.6.1 Risk and Uncertainty

There is uncertainty in estimating environmental and social costs associated with each alternative because the values, judgments, and opinions held by interested and affected parties and the community in general may shift over time. Best estimates of these effects were based on observation of past trends, current master planning assumptions, and the limited input received during project scoping opportunities.

There is no unusual risk or uncertainty associated with the assumption that the proposed measures would provide the intended benefits for the planned life of 50 years. The risks associated with hydrologic events used to formulate and evaluate alternatives have been calculated and are described in Appendix D and the technical memoranda in Appendix E of the Plan-EA.

During the planning process, decisions are made with information that is uncertain, including assumptions of project costs and with the estimation of economic benefits from alternative measures. The benefits and costs were evaluated using a 2022 price level and were evaluated over a 52-year period of analysis (24 months of construction and a 50-year evaluation period) using a discount rate of 2.5 percent. Values were based on the national averages using data sources identified in TM009 – Economic Analysis in Appendix E of the Plan-EA. For flooding impacts, actual damages occurring from a specific storm event could realistically be slightly higher or significantly lower, depending on watershed conditions and land use at the time of the event. The prevailing belief is that climate change will result in more frequent and intense flood events.

The Sponsor currently owns or has easements on most of the property that would be affected by construction and operation of the alternatives that were considered, and they are confident in their ability to acquire the land rights and permits needed to implement any of the alternatives.

There is uncertainty in estimating environmental and social costs associated with each alternative because the values, judgments, and opinions held by interested and affected parties and the community in general may shift over time. Best estimates of these effects were based on observation of past trends, current master planning assumptions, and the input received during project scoping opportunities.

2.6.2 Alternative Trade-offs

Alternative trade-offs and ecosystem services are summarized in Table 2-1.

Table 2-1. Alternative Trade-offs Table

Alternatives		No Action (FWOFI)	Alternative 1	Alternative 2	Alternative 3
Brief description		No federal investment; assume eventual failure	Dam rehabilitation with a structural auxiliary spillway	Dam rehabilitation with a dam crest raise to 431 feet	Dam rehabilitation with a dam crest raise to 435 feet
Locally Preferred					X
Environmentally Preferable					X
Non-structural		X			
Total Project Investment (average annual costs)		$214,000	$1,411,000	$921,000	$1,006,000
Monetized Net Benefits (average annual net benefits)		$0	-$1,397,000	-$902,000	-$984,000
Guiding Principles	Healthy and Resilient Ecosystems		X	X	X
	Sustainable Economic Development				X
	Floodplains		X	X	X
	Public Safety				X
	Watershed Approach	X	X	X	X
Evaluation Framework (Ecosystem Services)add	**Provisioning Services** – tangible goods provided for direct human use and consumption, such as food, fiber, water, timber, or biomass.				
	Water	Continued sediment capture of 3.8 acre-feet per year for up to 23 years	Continued sediment capture of 3.8 acre-feet per year for up to 50 years	Continued sediment capture of 3.8 acre-feet per year for up to 50 years	Continued sediment capture of 3.8 acre-feet per year for up to 50 years
	Regulating Services - maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe – examples include flood and disease control, water filtration, climate stabilization, or crop pollination.				
	Urban flood damage reduction	Risk of dam breach remains unchanged; flood storage capacity up to the 25-year	Reduced risk of dam breach; flood storage capacity up to the 25-year 24-	Reduced risk of dam breach; increased flood storage capacity up to the 50-year	Reduced risk of dam breach; increased flood storage capacity up to the 100-

Alternatives		No Action (FWOFI)	Alternative 1	Alternative 2	Alternative 3
		24-hour storm event	hour storm event	24-hour storm event	year 24-hour storm event
	Supporting Services - underlying processes maintaining conditions for life on Earth, including nutrient cycling, soil formation, and primary production.				
	NA – supporting services were not identified for this project				
	Cultural Services – make the world a place people want to live (recreational use, spiritual, aesthetic viewshed, or tribal values)				
	NA – cultural services were not identified for this project				

2.7 Identify Recommended Alternative

Alternative 3 is the locally preferred alternative and best addresses the PR&G guiding principles and ecosystem services. The No Action Alternative is the least desirable alternative because it provides the fewest ecosystem services and does not address the problem or take advantage of the opportunities to meet the Federal Objective. When comparing Alternatives 2 and 3, the Sponsor believes that the lower net economic benefits for Alternative 3 are offset by the increased flood storage capacity and associated benefits to sustainable economic development and public health and safety.

2.8 Implement and Evaluate

Implementation will be dependent upon completion of the NEPA process for the Plan-EA and completion of final design, as well as funding availability.

3.0 References

State of California. 2024. Summary of Projected Climate Change Impacts on California. https://climateresilience.ca.gov/overview/impacts.html. Accessed 4-16-2024.

Appendix D.3. USFWS IPaC Species List

United States Department of the Interior

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

In Reply Refer To: 04/11/2025 15:37:42 UTC
Project Code: 2022-0006095
Project Name: Matanzas Creek Dam Rehabilitation

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

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

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

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

This species list is provided by:

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

PROJECT SUMMARY

Project Code: 2022-0006095
Project Name: Matanzas Creek Dam Rehabilitation
Project Type: Dam - Maintenance/Modification
Project Description: Rehabilitation of Matanzas Creek Dam
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.4331706,-122.63621953807491,14z

Counties: Napa and Sonoma counties, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 21 threatened, endangered, or candidate species on this species list.

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

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

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

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

MAMMALS

NAME	STATUS
Salt Marsh Harvest Mouse *Reithrodontomys raviventris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/613	Endangered

BIRDS

NAME	STATUS
Northern Spotted Owl *Strix occidentalis caurina* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1123	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: East Pacific DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Northwestern Pond Turtle *Actinemys marmorata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

AMPHIBIANS

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (CA - Sonoma County) There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.	Proposed Threatened

NAME	STATUS
Species profile: https://ecos.fws.gov/ecp/species/9743	

FLOWERING PLANTS

NAME	STATUS
Burke's Goldfields *Lasthenia burkei* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4338	Endangered
Clara Hunt's Milk-vetch *Astragalus clarianus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3300	Endangered
Kenwood Marsh Checker-mallow *Sidalcea oregana ssp. valida* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1622	Endangered
Loch Lomond Coyote Thistle *Eryngium constancei* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5106	Endangered
Many-flowered Navarretia *Navarretia leucocephala ssp. plieantha* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2491	Endangered
Pitkin Marsh Lily *Lilium pardalinum ssp. pitkinense* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/570	Endangered
Sebastopol Meadowfoam *Limnanthes vinculans* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/404	Endangered
Showy Indian Clover *Trifolium amoenum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6459	Endangered
Sonoma Alopecurus *Alopecurus aequalis var. sonomensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/557	Endangered
Sonoma Spineflower *Chorizanthe valida* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7698	Endangered
Sonoma Sunshine *Blennosperma bakeri* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1260	Endangered
White Sedge *Carex albida* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3063	Endangered

NAME	STATUS
Yellow Larkspur *Delphinium luteum* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3578	Endangered

CRITICAL HABITATS

There are 3 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
California Red-legged Frog *Rana draytonii* https://ecos.fws.gov/ecp/species/2891#crithab	Final
California Tiger Salamander *Ambystoma californiense* https://ecos.fws.gov/ecp/species/2076#crithab	Final
Northern Spotted Owl *Strix occidentalis caurina* https://ecos.fws.gov/ecp/species/1123#crithab	Final

IPAC USER CONTACT INFORMATION

Agency: Natural Resources Conservation Service
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State: UT
Zip: 84701
Email jenna.j@jonesanddemille.com
Phone: 4358935203

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Natural Resources Conservation Service

Appendix D.4. Summary of Existing Environmental Conditions

MATANZAS CREEK DAM WATERSHED REHABILITATION

SUMMARY OF EXISTING ENVIRONMENTAL CONDITIONS

Prepared for

Jones & DeMille Engineering and the Natural Resources Conservation Service

May 2021

AECOM

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List of Acronyms

BSA	Biological Study Area
CAA	Clean Air Act
Cal-IPC	California Invasive Plant Council
CDFG	California Department of Fish and Game (now CDFW)
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO_2	carbon dioxide
CSG	California Sea Grant
CWA	Clean Water Act
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR	Federal Register
GHG	greenhouse gas
HA	Hydrologic Area
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
IPaC	Information, Planning, and Consultation System
JDE	Jones & Demille Engineering
MCV	Manual of California Vegetation
$\mu g/m^3$	micrograms per cubic meter
NAAQS	national ambient air quality standard
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
PCI	Prunuske Chatham, Inc.
Plan ED	Supplemental Watershed Plan and Environmental Document
PM	particulate matter
$PM_{2.5}$	particulate matter with aerodynamic diameter less than 2.5 microns
PM_{10}	particulate matter with aerodynamic diameter less than 10 microns
ppb	parts per billion
ppm	parts per million
PFMC	Pacific Fishery Management Council
SCAPOSD	Sonoma County Agricultural Preservation and Open Space District
SFBAAB	San Francisco Bay Area Air Basin
SIP	State Implementation Plan
Sonoma Water	Sonoma County Water Agency
TAC	toxic air contaminant
TMDL	Total Maximum Daily Load
USFWS	United States Fish and Wildlife Service

1 INTRODUCTION

The purpose of this report is to provide an assessment of baseline environmental conditions in support of the Natural Resources Conservation Service's (NRCS's) Watershed Rehabilitation Program, and specifically to support the Supplemental Watershed Plan and Environmental Document (Plan ED) for Matanzas Creek Dam in Sonoma County, California. The report has been prepared for the NRCS by AECOM biologists and environmental scientists, under subcontract to Jones & Demille Engineering (JDE), and with limited input from Prunuske Chatham, Inc. (PCI). The information in this report has been compiled from existing databases and readily available information, some of which was provided by the NRCS and the Sonoma County Water Agency (Sonoma Water), the project sponsor. Professional opinion was applied to the existing information, combined with additional site knowledge gained during a general biological reconnaissance visit, to make informed conclusions about the presence or potential presence of biological resources in a potential project footprint at Matanzas Creek Dam. Because project alternatives have not yet been developed, this report does not include an alternatives or impact analysis but may be used to inform such an analysis in the Plan ED. This report is also intended to inform discussions with the NRCS, Sonoma Water, and other project stakeholders (e.g., natural resources permitting agencies) regarding the potential need for additional biological studies or surveys.

Prior to initiating database searches and background information review, AECOM defined a Biological Study Area (BSA) that was intended to capture a potential project footprint at Matanzas Creek Dam as well as the maximum potential inundation area upstream of Matanzas Creek Dam. The BSA includes the likely maximum extent of direct impacts anticipated from a range of potential project alternatives, from removal of Matanzas Creek Dam to raising the dam. The areas that may be disturbed by construction of a potential project at Matanzas Creek Dam were identified in coordination with AECOM and JDE engineers, and a boundary was drawn around the entire area (including the dam, the principal and auxiliary spillways, and immediately downstream). That boundary was then merged with the maximum allowable inundation behind the dam, or the area that could be subject to periodic inundation if the elevation of the auxiliary spillway was raised to provide additional flood protection. This entire area was then buffered by 250 feet to create the perimeter of the BSA shown in several figures in this report, including Figure 1. As project alternatives are developed, it is likely that the severity of potential project effects will be greatest in areas directly affected by a potential construction project, or near the dam and its spillways, and will diminish in an upslope and upstream direction.

In preparation for the reconnaissance visit, AECOM biologists reviewed databases and background documents to understand soils, vegetation, and habitat types in and around the BSA; previous vegetation and wildlife survey efforts in the area; and special-status species and habitats that could be present. On January 19, 2021, AECOM biologists Jonathan Stead, Joseph Broberg, and Katie McLean conducted a 1-day reconnaissance visit to Matanzas Creek Dam and Reservoir. Anne Crealock with Sonoma Water joined the team in the field for a portion of the reconnaissance visit to discuss existing information and facilitate information sharing. The reconnaissance visit focused on the dam, spillways, and lower reservoir inundation area, but also included accessible portions of the upper reservoir inundation area and Matanzas Creek upstream of the current reservoir extent. The biologists also visited Matanzas Creek downstream of Matanzas Creek Dam and upstream of Bennett Valley Golf Course, where Bennett Valley Road crosses Matanzas Creek. The entire BSA could not be surveyed during the 1-day reconnaissance visit, and areas of the BSA containing dense vegetation were surveyed from a distance. Following the reconnaissance visit, in late February 2021, PCI biologist Jennifer Michaud spent two days in the field conducting a California red-legged frog (*Rana draytonii*) site assessment. Ms. Michaud shared additional hydrology, plant, and wildlife observations, which were considered by AECOM during preparation of this report. AECOM biologists compiled the background information and reconnaissance visit observations on vegetation and habitat types in the BSA and made assessments of the potential for special-status species and habitats to occur in the BSA.

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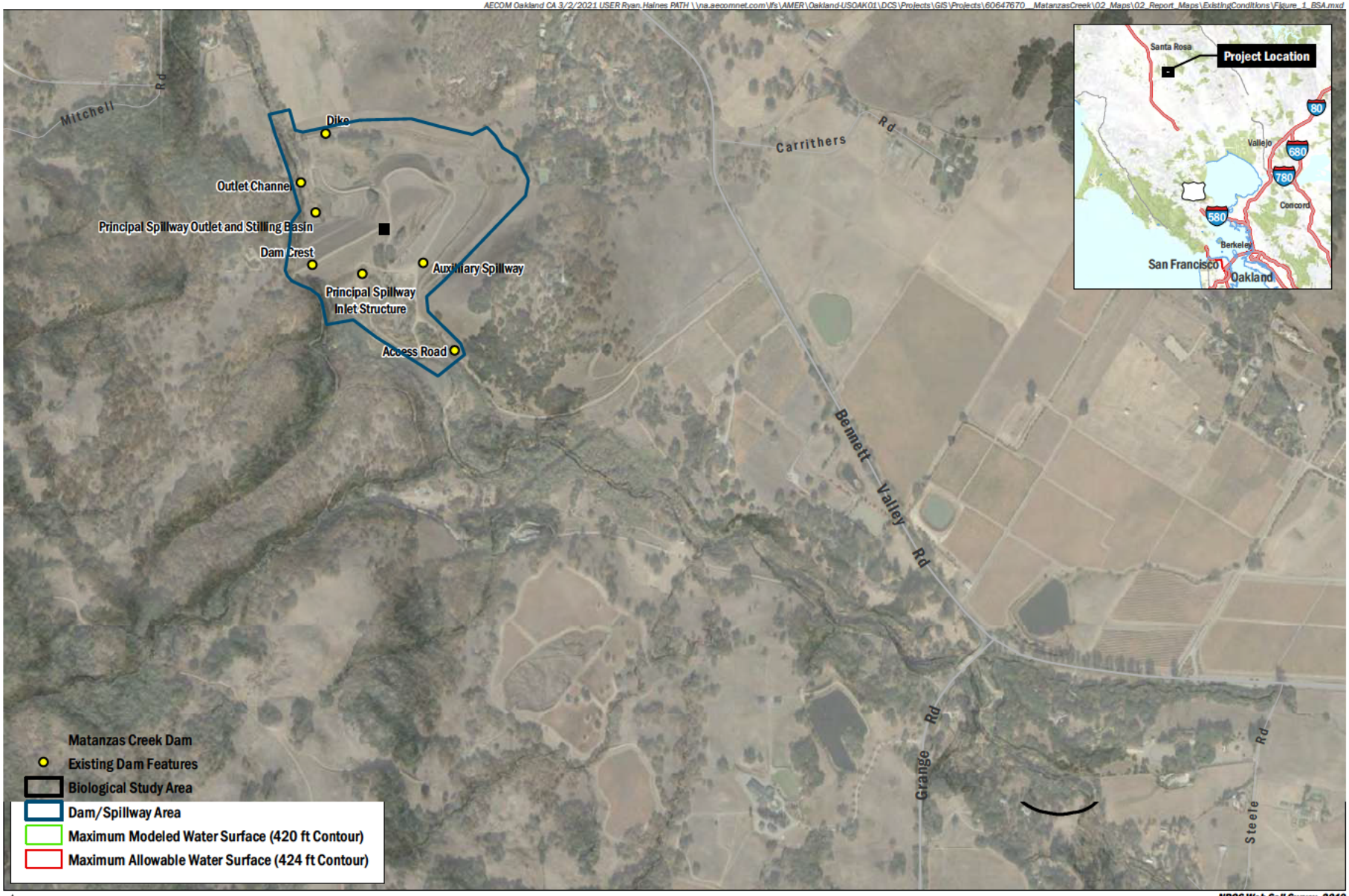

NRCS Web Soil Survey, 2019
Sonoma Vegetation Database, 2020
AECOM, 2020
ESRI Basemap, 2016
ESRI World Imagery, 2021

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Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 1

Biological Study Area

2 ENVIRONMENTAL SETTING

Matanzas Creek Dam and the BSA are in Bennett Valley, approximately 2 miles southeast of the city of Santa Rosa in Sonoma County. Bennett Valley is bordered by Taylor Mountain to the west and Bennett Mountain to the east. Daily average temperatures between 1971 and 2021 at the nearby Santa Rosa Station ranged from 48.3 degrees Fahrenheit (°F) in December to 67.5°F in August (NRCS 2021a, Table 1). Average precipitation ranged from 0.04 inch in July to 5.63 inches in January.

Table 1 Climate Data for Santa Rosa, California Station (1971 – 2021)

Month	Average Daily Temperature (°F)	Average Precipitation (inches)
January	48.4	5.63
February	51.5	5.73
March	53.8	4.38
April	56.7	1.89
May	60.9	1.09
June	65.6	0.17
July	67.2	0.04
August	67.5	0.08
September	67.1	0.36
October	62.6	1.70
November	54.0	4.02
December	48.3	5.51

Notes and Abbreviations:

°F – degrees Fahrenheit

Matanzas Creek's headwaters are south of the BSA near Sonoma Mountain. Two headwater streams, Matanzas Creek and South Fork Matanzas Creek, meet between Sonoma Mountain Road and Grange Road upstream of the BSA. From that confluence, Matanzas Creek flows northwest until it reaches Matanzas Creek Reservoir and Matanzas Creek Dam. The watershed drainage area upstream of Matanzas Creek Dam is 11.5 square miles (USGS 2016). Downstream of Matanzas Creek Dam, Matanzas Creek flows north through Bennett Valley, then turns west and flows through the city of Santa Rosa to its confluence with Santa Rosa Creek. Santa Rosa Creek continues west to its confluence with Laguna de Santa Rosa, which flows north for a short stretch before meeting Mark West Creek, a tributary to the Russian River.

2.1 SOILS

The NRCS Soil Survey maps 14 soil types in the BSA (NRCS 2021b). The locations of these soil types in the BSA, as mapped by the NRCS, are depicted on Figure 2. These soil types can be broadly categorized into six soil series: Goulding, Haire, Los Robles, Spreckels, Toomes, and Yolo. Descriptions of these soil series[1] are included below.

[1] Soil series descriptions are taken from the NRCS Official Soil Series Descriptions (NRCS 2021b), unless otherwise noted.

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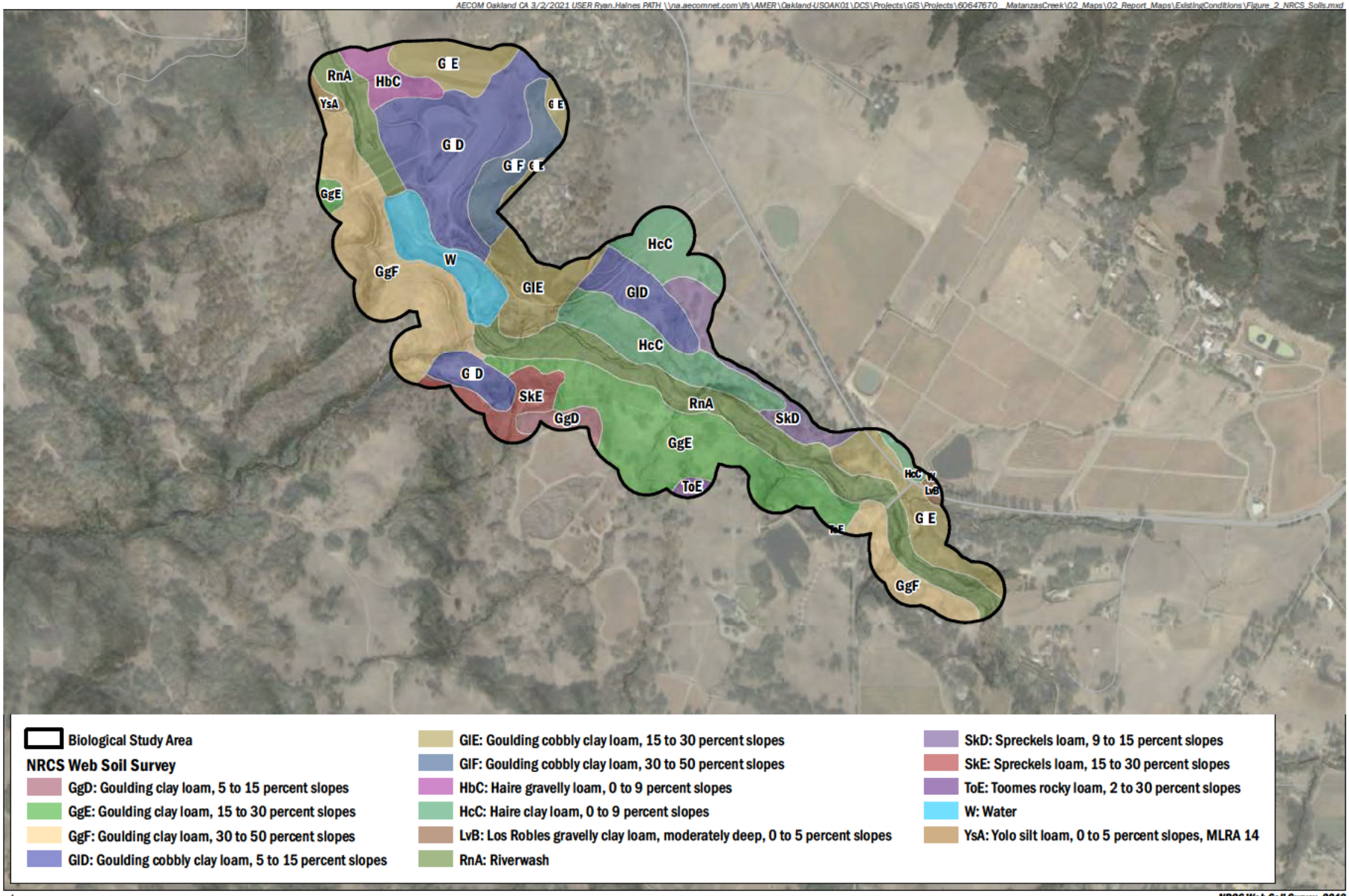

NRCS Web Soil Survey, 2019
Sonoma Vegetation Database, 2020
AECOM, 2020
ESRI Basemap, 2016
ESRI World Imagery, 2021

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FIGURE 2

Soils in the Biological Study Area

2.1.1 GOULDING SERIES

Goulding series soils are shallow, somewhat excessively drained soils formed in material weathered from metavolcanics or metasedimentary rocks. Goulding series soils are on hills and mountains and have slopes ranging from 5 to 75 percent. They have medium to very rapid runoff and moderate permeability. Goulding series soils cover the majority of the BSA.

2.1.2 HAIRE SERIES

Haire series soils are generally clayey and are moderately well drained with slow to rapid runoff and very slow permeability. They are found on nearly level to moderately steep hills at elevations of 20 to 2,400 feet. In the BSA, Haire gravelly loam occurs at the downslope terminus of the auxiliary spillway, and Haire clay loam occurs in the central and eastern portions of the BSA north of Matanzas Creek.

2.1.3 LOS ROBLES SERIES

Los Robles series soils are deep, well-drained soils formed in material weathered from volcanic parent materials such as basalt and andesitic rocks. They have slopes ranging from 0 to 15 percent. They are well drained, with slow to medium runoff and moderately slow permeability. In the BSA, there is only one small area of Los Robles gravelly clay loam at the eastern end of the BSA, along Bennet Valley Road.

2.1.4 SPRECKELS SERIES

Spreckels series soils are fine, well drained, and have slow permeability and medium runoff. They occur on sloping to hilly uplands of tuffaceous (derived from volcanic ash) sediments, at elevations of 100 to 800 feet. Two areas of Spreckels loam occur in the central portion of the BSA, one north and one south of Matanzas Creek.

2.1.5 TOOMES SERIES

Toomes series soils are shallow, well to somewhat excessively drained, volcanic derived soils formed in residuum weathered from tuff breccia, basalt, andesite, or latite. They are generally on ridges and plateaus of volcanic flows and on foothills of volcanic uplands. Slopes are from 2 to 75 percent. Toomes rocky loam occurs in one small area at the southeastern end of the BSA, south of Matanzas Creek.

2.1.6 YOLO SERIES

Yolo series soils consist of very deep, well-drained soils that formed in alluvium from mixed rocks. They are on alluvial fans and floodplains. Slopes range from 0 to 20 percent but are typically 0 to 2 percent. They have slow to medium runoff and moderate permeability. A small area of Yolo silt loam occurs at the northern end of the BSA.

2.1.7 RIVERWASH

Riverwash is not a soil series but is mapped in the BSA along the Matanzas Creek channel. Riverwash is composed of mixtures of gravel, rocks, and sand typical of creek beds.

2.1.8 WATER

Water is mapped in the BSA on the NRCS web soil survey included on Figure 2, at the base of Matanzas Creek Dam. However, no standing water was observed there during the reconnaissance visit conducted on January 19, 2021. This mapped water is likely a relic of when Matanzas Creek Dam was operated with the low-level outlet closed and water was regularly stored behind the dam. Currently, the outlet is kept open; water accumulation behind the dam is intermittent and more closely linked to precipitation events and wet periods with stream flow.

2.2 VEGETATION

Fine-scale vegetation communities and habitats were mapped across Sonoma County as part of the Sonoma County Vegetation Mapping and LiDAR Program (SCAPOSD 2019). This body of work, described in the Sonoma Vegetation and Habitat Map Final Report and with spatial data available for download, is known as the Sonoma Veg Map. Development of the Sonoma Veg Map began with the California Native Plant Society (CNPS) and California Department of Fish and Wildlife (CDFW) Vegetation Classification and Mapping Program countywide vegetation surveys, which were conducted in 2013 and 2014. Data from these surveys and other vegetation surveys conducted by CDFW and CNPS were used to create a vegetation classification system specific to Sonoma County. High-density LiDAR and aerial imagery were collected countywide in the fall of 2013, and therefore the Sonoma Veg Map represents landscape conditions at that time. A lifeform map was created using the LiDAR and aerial imagery data, and countywide field data were used to train automated machine learning algorithms to produce a fine-scape vegetation map from the lifeform map. The fine-scale map was manually edited and validated through subsequent field data collection and was finalized after incorporating input from two advisory groups. Accuracy assessment plot data collected from 2016 to 2018 found the overall accuracy of the final fine-scale vegetation and habitat map to be 79 percent.

The Sonoma Veg Map shows 16 unique vegetation communities in the BSA (Figure 3). These vegetation communities were generally mapped in the BSA at the alliance level (consistent with the National Vegetation Classification system), and sometimes at the group or macrogroup level. A description of each of these vegetation communities is included in Table 2, primarily from the Sonoma Veg Map, but with relevant observations from the reconnaissance visit. Based on AECOM's observations during the reconnaissance visit, the Sonoma Veg Map vegetation communities data were mapped in the BSA at a level of accuracy sufficient to inform an alternatives analysis and impact assessment for the National Environmental Policy Act, but additional ground-truthing and mapping in the footprint of direct project effects may be required to support permitting, especially permitting with CDFW. Three of the vegetation alliances mapped in the BSA by the Sonoma Veg Map and confirmed as present in the BSA during the reconnaissance visit are classified as sensitive natural communities by CDFW (see Section 3.3.1 for a discussion of sensitive natural communities).

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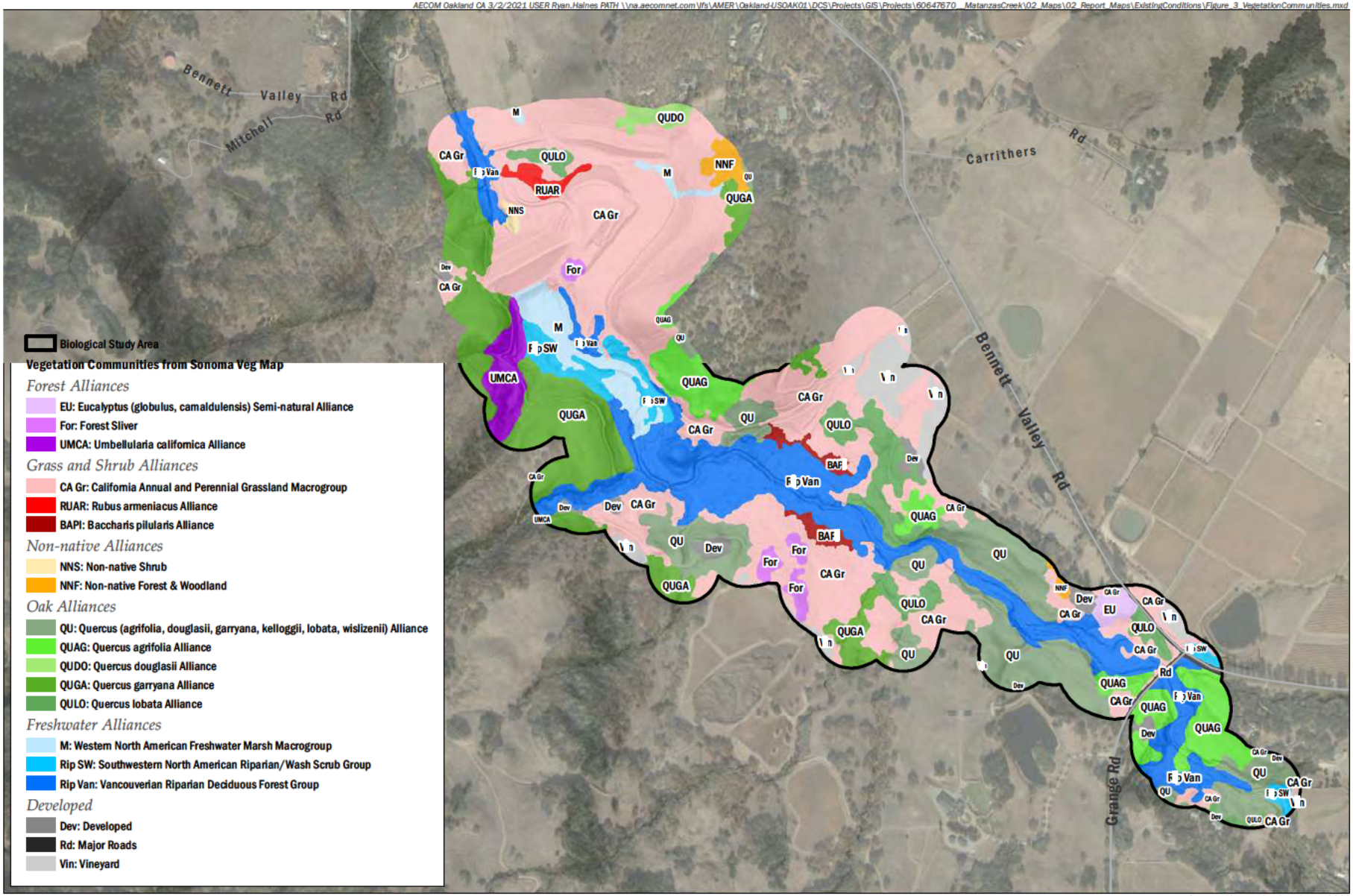

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FIGURE 3

Vegetation Communities in the Biological Study Area

Table 2 Vegetation Communities in the Biological Study Area

Sonoma Veg Map Class Common Name	Map Code	Description	Location in the BSA
California Annual and Perennial Grassland Macrogroup NA	CA Gr	This is a grassland vegetation classification that is a catch-all for many grassland types, both native and nonnative. Grasslands observed in the BSA during the reconnaissance visit found that grasslands in the BSA were generally dominated by nonnative annual and perennial species (see Section 2.4).	This classification is found throughout the BSA, on the dam face, spillway, and in gaps between forest and woodland communities.
Baccharis pilularis Alliance Coyotebrush Alliance	BAPI	This alliance consists of shrubland dominated by coyote brush.	This alliance is found in the central part of the BSA, on both sides of Matanzas Creek.
Umbellularia californica Alliance California Bay Laurel	UMCA	This alliance consists of forest and woodland dominated by California bay. It is a CDFW sensitive natural community (see Section 3.3.1) and has a California state rank of S3.	This alliance is found on one slope extending south from the base of the upstream side of the dam, west of Matanzas Creek.
Eucalyptus (*globulus*, *camaldulensis*) Semi-Natural Alliance Eucalyptus (Blue Gum, River Red Gum) Semi-Natural Alliance	EU	This is a nonnative forest community dominated by *Eucalyptus* spp.	This community is found in one small polygon mapped adjacent to Bennet Valley Road at the southeastern end of the BSA.
Forest Sliver NA	For	This community consists of small forested areas not identified by dominant species in the Sonoma Veg Map. The Sonoma Veg Map defines these areas as between ½ and 1 acre in size, surrounded by nonforested map classes. During the reconnaissance visit, the forest sliver mapped near the eastern end of the dam was dominated by coast live oak (*Quercus agrifolia*); other forest slivers in the BSA are also likely oak-dominated.	This community is found in one polygon near the eastern end of the dam and three polygons south of Matanzas Creek in the central portion of the BSA.
Rubus armeniacus Alliance Himalayan Blackberry Alliance	RUAR	This alliance consists of blackberry patches dominated by the highly invasive Himalayan blackberry (see Section 2.4).	One small polygon of this community occurs in the BSA toward the downslope end of the spillway.
Nonnative Forest and Woodland NA	NNF	This is a broad category for forest and woodland communities dominated by nonnative species. These areas were not visited during the reconnaissance visit, so the dominant species in these polygons in the BSA was not determined.	Two small polygons of this type occur in the BSA—at the northeastern end, on the slopes above the spillway, and at the eastern end near Bennet Valley Road.
Nonnative Shrub NA	NNS	In the BSA, this mapping unit is composed of the highly invasive Spanish broom (*Spartium junceum*) (see Section 2.4).	One small polygon of this community occurs on the bank of Matanzas Creek at the base of the dam outlet.

Sonoma Veg Map Class Common Name	Map Code	Description	Location in the BSA
Quercus (*agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni*) Alliance Oak (California Live, Blue, Oregon White, California Black, Valley, Interior Live) Alliance	QU	This alliance consists of forest and woodland in which multiple oak species are co-dominant.	This alliance is prevalent in the eastern half of the BSA, along both sides of Matanzas Creek.
Quercus agrifolia Alliance California Live Oak Alliance	QUAG	This alliance consists of forest and woodland dominated by coast live oak.	This alliance is scattered throughout the BSA in several polygons.
Quercus douglasii Alliance Blue Oak Alliance	QUDO	This alliance consists of forest and woodland dominated by blue oak.	This alliance is found in one small polygon at the northern end of the BSA,
Quercus garryana Alliance Oregon White Oak Alliance	QUGA	This alliance consists of forest and woodland dominated by Oregon white oak. It is a CDFW sensitive natural community (see Section 3.3.1) and has a California state rank of S3.	This alliance is prevalent throughout the BSA, particularly on north-facing slopes south of the Matanzas Creek corridor.
Quercus lobata Alliance Valley Oak Alliance	QULO	This alliance consists of forest and woodland dominated by valley oak. It is a CDFW sensitive natural community (see Section 3.3.1) and has a California state rank of S3.	This alliance is prevalent throughout the central and eastern end of the BSA.
Southwestern North American Riparian/Wash Scrub Group NA	Rip SW	This is a general vegetation type in which a variety of riparian shrubs or small trees are dominant. Deciduous riparian trees lacked leaves during the reconnaissance visit and could not be identified, and riparian vegetation communities could not be distinguished. Finer scale vegetation mapping would result in more detailed alliances and may result in refining the riparian vegetation boundaries on Figure 2.	This alliance is found primarily in the Matanzas Creek floodplain on the upstream side of the dam, surrounding the area mapped as marsh. Two small polygons are also present in the far eastern end of the BSA.
Vancouverian Riparian Deciduous Forest Group NA	Rip Van	This is a general vegetation type dominated by large riparian trees such as alders (*Alnus* sp.) or Pacific willow (*Salix lasiandra*). Deciduous riparian trees lacked leaves during the reconnaissance visit and could not be identified, and riparian vegetation communities could not be distinguished. Finer scale vegetation mapping would result in more detailed alliances and may result in refining the riparian vegetation boundaries on Figure 2.	This type is found throughout the Matanzas Creek floodplain.

Sonoma Veg Map Class Common Name	Map Code	Description	Location in the BSA
Western Northern American Freshwater Marsh Macrogroup NA	M	This group consists of marshes and wet meadows dominated by silverweed (*Potentilla* spp.), sedge (*Carex* spp.), rush (*Juncus* spp.), water parsley (*Oenanthe sarmentosa*), bulrush (*Schoenoplectus* spp. and *Scirpus* spp.), and cattail (*Typha* spp.)	This group is found in the reservoir inundation area from the Matanzas Creek Dam to approximately 0.25 mile upstream of the dam.
Developed NA	Dev	This classification consists of man-made developed areas greater than 0.2 acre. Areas were considered developed if they contain significant man-made impervious cover or are highly altered by man. This includes lawns, heavily landscaped garden and patio areas, bocce and tennis courts, horse riding areas, baseball and soccer fields, swimming pools, and playground areas.	Small developed areas are scattered around the BSA, primarily near the outer perimeter of the BSA
Major Roads NA	Rd	This classification consists of major paved roads, including highways and some major arterial roads. Minor paved roads and dirt roads are not included.	This classification includes portions of Bennett Valley Road and Grange Road that intersect with the BSA.
Vineyard NA	Vin	This classification consists of vineyards, as observed in the fall 2013 imagery.	Vineyards are found in several areas near the outer perimeter of the BSA, including along the western edge of the BSA and along Bennett Valley Road on the eastern edge of the BSA.

Notes and Abbreviations:

BSA – Biological Study Area
CDFW – California Department of Fish and Wildlife
NA – Not Applicable

State rank S3 – vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making the species vulnerable to extirpation.

2.3 WILDLIFE

The BSA contains a variety of habitat types that support both native and nonnative plant and wildlife species. Vegetation communities described in Section 2.2 were grouped into wildlife habitat categories based on descriptions from the Sonoma Veg Map and on observations of communities in the BSA that have similar structure and may therefore have similar functions and value for wildlife species. This grouping facilitates description of potential wildlife habitat use of the BSA in Section 3.2 and may facilitate the upcoming alternatives analysis or evaluation of potential project effects for a preferred alternative. These wildlife habitat groupings are indicated in Table 3 and shown on Figure 4. Wildlife species observed during the reconnaissance visit are listed in Attachment A. There are also reports and observations of various invasive species and some special-status species occurring in or near the BSA. These occurrences are discussed in Sections 2.4 and 3.2, respectively.

Table 3 Wildlife Habitats in the Biological Study Area

Sonoma Veg Map Name	**Wildlife** Habitat Type
California Annual and Perennial Grassland Macrogroup	Grassland
Baccharis pilularis Alliance	Scrub
Nonnative Shrub	
Umbellularia californica Alliance	Woodland
Quercus (*agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni*) Alliance	
Quercus agrifolia Alliance	
Quercus douglasii Alliance	
Quercus garryana Alliance	
Quercus lobata Alliance	
Forest Sliver	
Rubus armeniacus Alliance	Riparian Scrub
Southwestern North American Riparian/Wash Scrub Group	
Vancouverian Riparian Deciduous Forest Group	Riparian Woodland
Western Northern American Freshwater Marsh Macrogroup	Freshwater Marsh
Eucalyptus (*globulus*, *camaldulensis*) Semi-Natural Alliance	Eucalyptus
Nonnative Forest and Woodland	Residential/Park
Developed	Developed
Major Roads	
Vineyard	Vineyard

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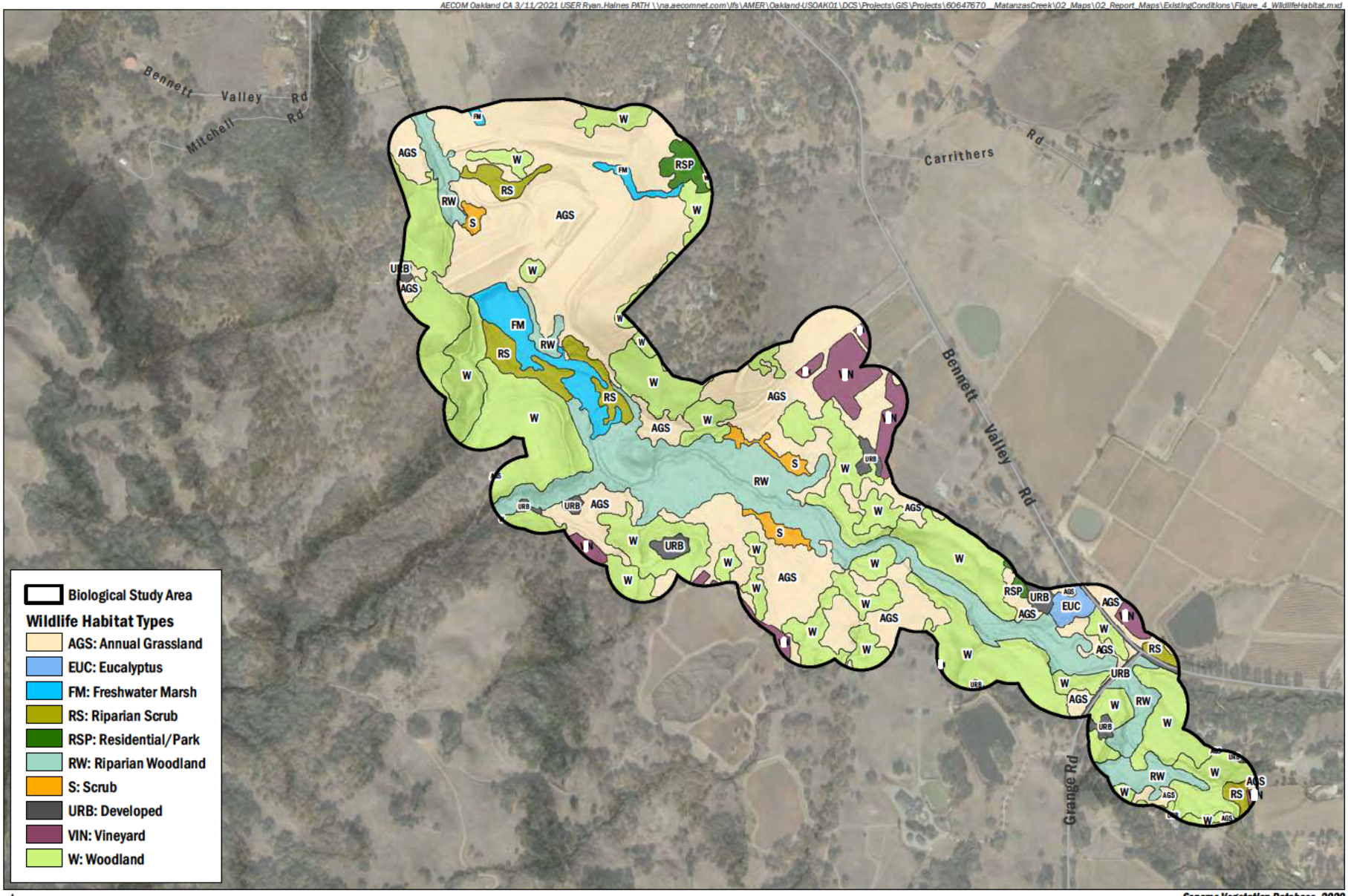

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FIGURE 4

Wildlife Habitat Types in the Biological Study Area

2.4 INVASIVE SPECIES

Nonnative and invasive plant and animal species are now a common component of California's landscapes. The Sonoma Veg Map indicates the presence of vegetation communities that include or are dominated by nonnative or invasive plant species in the BSA (Figure 3, Table 2), including the California Annual and Perennial Grassland Macrogroup, *Rubus armeniacus* Alliance, Nonnative Forest and Woodland, Eucalyptus Semi-Natural Alliance, and Nonnative Shrub. Nonnative and invasive plants were also observed in the BSA during the reconnaissance visit. Eleven invasive plant species observed during the reconnaissance visit have a California Invasive Plant Council rating of moderate or high (Cal-IPC 2021), indicating that they have substantial to severe ecological impacts (Table 4). In addition to the vegetation communities associated with nonnative and invasive plant species shown on Figure 5, several clusters of invasive plant species were noted in the field during the reconnaissance visit. These too are shown on Figure 5.

If project alternatives include extensive ground disturbance, it may be important to understand the location of invasive species so that the spread of such species may be prevented following construction and restoration of disturbed areas. The reconnaissance visit was not a comprehensive survey and was conducted when many plant species were dormant or otherwise not identifiable. Therefore, additional mapping or consideration of invasive plant species may be appropriate during detailed design.

Table 4 Invasive Plant Species Observed in the Biological Study Area

Common Name	Scientific Name	Cal-IPC Rating	Location
yellow star thistle	*Centaurea solstitialis*	High	This species was observed in disturbed areas and grassland areas on the dam and spillway.
bull thistle	*Cirsium vulgare*	Moderate	This species was observed scattered throughout the BSA.
poison hemlock	*Conium maculatum*	Moderate	This species was observed in disturbed areas and in the marsh at the base of the dam.
artichoke thistle	*Cynara cardunculus*	Moderate	This species was observed in one patch on the berm of the lower spillway (Figure 5).
medusa head	*Elymus caput-medusae*	High	This species was observed in disturbed areas and grasslands on the dam and spillway.
fennel	*Foeniculum vulgare*	Moderate	This species was observed in one patch on a bank of Matanzas Creek, immediately above the dam outlet (Figure 5).
wild mustard	*Hirschfeldia incana*	Moderate	This species was observed scattered throughout the BSA in disturbed areas.
Pennyroyal	*Mentha pulegium*	Moderate	This species was observed in marsh and wetland areas.
Harding grass	*Phalaris aquatica*	Moderate	This species is dominant in grassland areas on and around the dam and spillway, and throughout the BSA. It forms nearly monotypic stands in some areas.
Himalayan blackberry	*Rubus armeniacus*	High	A large patch of this species was observed north of the dam, between the dam and spillway (Figure 5). It was also observed scattered throughout the BSA in riparian areas.
Spanish broom	*Spartium junceum*	High	This species was observed in one patch on a bank of Matanzas Creek, immediately above the dam outlet (Figure 5).

Notes and Abbreviations:

BSA – Biological Study Area
Cal-IPC – California Invasive Plant Council

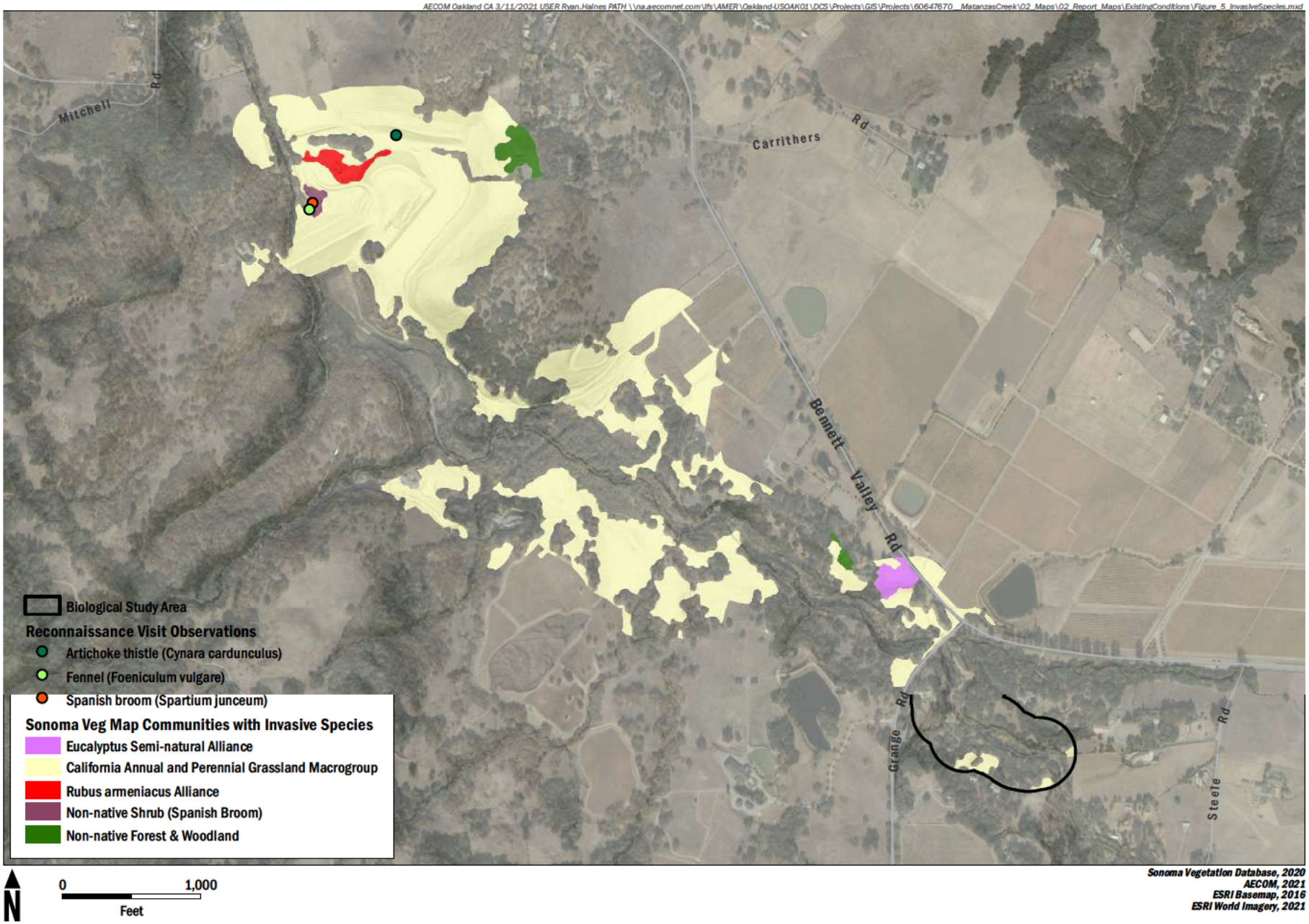

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FIGURE 5

Invasive Species in the Biological Study Area

Invasive wildlife species are also present in and near the BSA. Crayfish (either *Pacifastacus leniusculus* or *Procambarus clarkia*) and smallmouth bass (*Micropterus dolomieu*) were observed during habitat typing surveys in Matanzas Creek downstream of the Bennett Valley Golf Course in 1997 (CDFG 2006). Small numbers of green sunfish (*Lepomis cyanellus*), bluegill (*L. macrochirus*), fathead minnow (*Pimephales promelas*), largemouth bass (*Micropterus salmoides*), and bullhead (*Ameiurus* sp.) were captured during fish sampling efforts in Matanzas Creek from E Street to just upstream of Hoen Frontage Road from 2005 to 2007 (Chase 2010). American bullfrogs (*Lithobates catesbeianus*) and fathead minnow were observed in Matanzas Creek upstream of Matanzas Creek Dam (Sonoma Water 2010). During wildlife surveys conducted in support of past sediment removal projects at Matanzas Creek Reservoir, American bullfrogs, bullhead, western mosquitofish (*Gambusia affinis*), largemouth bass, smallmouth bass, bluegill, and green sunfish were observed in Matanzas Creek Reservoir (Sonoma Water 2005). However, these surveys were conducted when reservoir operations included maintenance of a permanent pool immediately upstream of Matanzas Creek Dam, in Matanzas Creek Reservoir. Since then, operations have shifted. The low-level outlet (or primary spillway) is now left in the open position so that a pool is only present under flood conditions, and the suitability of habitat for aquatic invasive species that favor warm, lentic environments has likely been diminished. Current operation of the reservoir does not provide permanent lentic habitat for these species in the reservoir, although they are established in the watershed and may opportunistically be present in the BSA. During the January 19, 2021, reconnaissance visit, standing water was present at the outlet or bottom of the primary spillway, immediately downstream of Matanzas Creek Dam. A crayfish claw was observed at the edge of this pool, confirming the presence of at least one invasive wildlife species, and the pool also appeared suitable to support American bullfrog and western mosquitofish. During the wet season, Matanzas Creek in the BSA could support invasive fish and bullfrogs that move from permanent water upstream and downstream into the BSA.

2.5 WATER QUALITY

This section describes existing water quality conditions in the BSA and vicinity, for surface water and groundwater.

2.5.1 SURFACE WATER

Section 303(d) of the federal Clean Water Act (CWA) requires states to identify waters where the permit standards, any other enforceable limits, or adopted water quality standards are still unattained. The CWA requires states to develop Total Maximum Daily Loads (TMDLs) to improve the water quality of impaired water bodies. TMDLs are the quantities of pollutants that can be safely assimilated by a water body without violating water quality standards. TMDLs are developed for impaired water bodies to maintain beneficial uses, achieve water quality objectives, and reduce the potential for future water quality degradation. National Pollutant Discharge Elimination System permits for water discharges must consider the pollutants for which a water body is listed as impaired.

The project site is in an area that has been split into two water bodies for purposes of the CWA Section 303(d) list:

1. Russian River Hydrologic Unit (HU), Middle Russian River Hydrologic Area (HA), Santa Rosa Hydrologic Sub-Area (HSA), mainstem Santa Rosa Creek; and

2. Russian River HU, Middle Russian River HA, Santa Rosa HSA, tributaries to Santa Rosa Creek.

Both the mainstem Santa Rosa Creek and the tributaries to Santa Rosa Creek water bodies are on the CWA Section 303(d) list for sedimentation, indicator bacteria, and temperature, based on water quality samples collected between 2001 and 2008. TMDLs have not yet been developed.

2.5.2 GROUNDWATER

Bulletin 118, "California's Groundwater," published by the California Department of Water Resources (DWR 2020a), defines the recognized groundwater basins and subbasins throughout the state. The project site is not in a defined groundwater basin (DWR 2020b). Groundwater in the mountains and foothills of the Sonoma Mountains (which are part of the larger Coast Ranges), including the project site, is not held in large "pools" in the underground rock strata as it is in valley floors where alluvial deposits are present; rather, groundwater is held in small pores and fractures in the bedrock. This makes it difficult to gauge how much water is available, or the depth at which it may be encountered where levels are sufficient to provide enough flow for well usage. The project vicinity is rural, and residences are served by private groundwater wells, for which no data are available. The project site is not in a United States Environmental Protection Agency (EPA) sole source aquifer (EPA 2021).

2.6 AIR QUALITY

This section describes the regulatory setting guiding air quality and greenhouse gas (GHG) management relevant to a project at Matanzas Creek Dam, and then describes the existing air quality conditions.

2.6.1 REGULATORY FRAMEWORK

2.6.1.1 CRITERIA AIR POLLUTANTS

The primary legislation that governs federal air quality regulations is the Clean Air Act (CAA), first enacted in 1970 and with the most recent amendments by congress enacted in 1990. The act delegates primary responsibility for clean air to EPA. EPA develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. EPA has identified six air pollutants as being indicators of ambient air quality: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and particulate matter (PM). PM is further differentiated as PM with aerodynamic diameter less than 10 microns (PM_{10}) and PM with aerodynamic diameter less than 2.5 microns ($PM_{2.5}$). Because the ambient air quality standards for these air pollutants are regulated using human health and environmentally based criteria, they are commonly referred to as "criteria air pollutants."

Federal air quality standards, referred to as the national ambient air quality standards (NAAQS), have been established for the criteria air pollutants by EPA. The purpose of the NAAQS is two-tiered: primary standards are set to protect public health, and secondary standards are set to prevent degradation to the environment (i.e., impairment of visibility and damage to vegetation and property). NAAQS are reviewed on a legally prescribed frequency and revised as new health and welfare effects data warrant. Each standard is based on a specific averaging time over which the concentration is measured. Different averaging times are based on protection of short-term, high-dosage effects or longer-term, low-dosage effects.

The CAA also requires each state to prepare an air quality control plan, referred to as a State Implementation Plan (SIP). The federal CAA Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional agencies. EPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and to determine whether implementing them will achieve ambient air quality standards. If EPA determines a SIP to be inadequate, a federal implementation plan that imposes additional control measures may be prepared for the nonattainment area.

2.6.1.2 TOXIC AIR CONTAMINANTS

In addition to criteria air pollutants, EPA regulates hazardous air pollutants, also known as toxic air contaminants (TACs). TACs may be emitted by stationary, area, or mobile sources. Common stationary sources of TAC emissions include gasoline stations, dry cleaners, and diesel backup generators, which are subject to the requirements of local air districts' permits. The other, often more substantial, sources of TAC emissions are motor vehicles on freeways, on high-volume roadways, or in other areas with high numbers of diesel vehicles, such as distribution centers. Off-road mobile sources, such as construction equipment or nonroad transportation, are also major contributors of TAC emissions.

TACs collectively refer to a diverse group of air pollutants that can cause chronic (i.e., long-duration) and acute (i.e., severe but short-term) adverse effects on human health, including carcinogenic effects. Human health effects of TACs include birth defects, neurological damage, cancer, and mortality. There are hundreds of different types of TACs, with varying degrees of toxicity. The health risks of individual TACs vary greatly; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

TACs can be separated into carcinogens and noncarcinogens, based on the nature of the effects associated with exposure to the pollutant. For regulatory purposes, carcinogens are assumed to have no safe threshold below which health impacts would not occur. Any exposure to a carcinogen poses some risk of contracting cancer. Noncarcinogens differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

2.6.1.3 GREENHOUSE GAS EMISSIONS

The Supreme Court of the United States ruled on April 2, 2007, that carbon dioxide (CO_2) is an air pollutant as defined under the CAA, and that EPA has the authority to regulate emissions of GHGs. On September 22, 2009, EPA released its final GHG Reporting Rule. The GHG Reporting Rule is a response to the fiscal year 2008 Consolidated Appropriations Act (House of Representatives Bill 2764; Public Law 110-161), which required EPA to develop "…mandatory reporting of GHGs above appropriate thresholds in all sectors of the economy…." The GHG Reporting Rule applies to most entities that emit 25,000 metric tons or more of CO_2 equivalents per year. Since 2010, facility owners have been required to submit an annual GHG emissions report with detailed calculations of the facility's GHG emissions. The GHG Reporting Rule also mandates compliance with recordkeeping and administrative requirements to enable EPA to verify annual GHG emissions reports.

On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- **Endangerment Finding:** The current and projected concentrations in the atmosphere of the six key GHGs—CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorinated chemicals, and sulfur hexafluoride—threaten the public health and welfare of current and future generations.

- **Cause or Contribute Finding:** The combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to GHG pollution, which threatens public health and welfare.

Most recently, the Council on Environmental Quality (CEQ) has put forth GHG guidance over the past several years to help agencies with the requirement to disclose and consider climate impacts in their reviews of environmental effects associated with proposed projects. Initial guidance was drafted in 2014 and finalized in 2016. It was subsequently withdrawn in 2017 and its proposed replacement , "Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions" (2019 Draft GHG Guidance) was never finalized. Most recently, on January 20, 2021, President Biden issued Executive Order 13990, "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," of which section 7(e) directs CEQ to rescind the 2019 Draft GHG Guidance and review, revise, and update its 2016 GHG Guidance. In accordance with this executive order, CEQ rescinded the 2019 Draft GHG Guidance. The withdrawal of this guidance does not change any law, regulation, or other legally binding requirement. Until CEQ provides its review of and any revisions and updates to the 2016 GHG Guidance, agencies are directed to consider all available tools and resources in assessing GHG emissions and climate change effects of their proposed actions, including, as appropriate and relevant, the 2016 GHG Guidance.

2.6.2 EXISTING AIR QUALITY CONDITIONS

Matanzas Creek Dam and the BSA are part of the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. The Coast Range splits in the Bay Area, creating a western coast gap, the Golden Gate; and an eastern coast gap, the Carquinez Strait. This allows air to flow in and out of the Bay Area and the Central Valley. The region's meteorological conditions are predominantly cool and dry in the summer months and mild and moderately wet in the winter. Air quality in Bennett Valley is influenced by terrain and the ocean breezes that travel through the valleys. Bennett Valley is bordered by Taylor Mountain to the west and Bennett Mountain to the east. Consistent marine influence defines this cool-climate region. A depression in the coastal mountains known as the Petaluma Wind Gap allows early morning fog and cool marine breezes to pour into the valley through Crane Canyon on a regular basis. Prevailing winds can transport nonlocally and locally generated air pollutants into the valley, trapping and concentrating the pollutants under stable atmospheric conditions. During rainy periods, ventilation (rapid horizontal movement of air and injection of cleaner air) and vertical mixing (an upward and downward movement of air) are usually high, so pollution levels tend to be low (i.e., air pollutants are dispersed more readily into the atmosphere rather than accumulated as they do under stagnant conditions). During the winter, frequent dry periods do occur, during which mixing and ventilation are low and pollutant levels build up.

Concentrations of criteria air pollutants are measured at several monitoring stations in the SFBAAB. Table 5 summarizes the air quality data for the most recent 3 years of complete data (2017 through 2019) from the California Air Resources Board monitoring station at Sebastopol, 103 Morris Street, the station closest to the project area. EPA uses monitoring data to designate areas according to attainment status for criteria air pollutants.

Table 5 Ambient Air Quality Monitoring Data (2017-2019)

	2017	2018	2019
Ozone			
Maximum concentration (ppm) [1]	0.071*	0.053	0.059
Number of days standard exceeded (2015 standard) [2]	1	0	0
Carbon Monoxide[3]			
Not Available			
Nitrogen Dioxide			
Maximum concentration (1-hour, ppb)	34.5	65.1	31.9
Number of days standard exceeded	0	0	0
Sulfur Dioxide[3]			
Not Available			
Fine Particulate Matter ($PM_{2.5}$)			
Maximum concentration ($\mu g/m^3$) [1]	81.8*	175.3*	28
Number of days standard exceeded (measured/estimated) [4]	4.0/4	13.1/13	0.0/0
Respirable Particulate Matter (PM_{10})			
Maximum concentration ($\mu g/m^3$) [5]	155.5*	259.1*	85.6
Number of days standard exceeded (measured/estimated) [4]	1.1/1	2.1/2	0.0/0

Notes:

* indicates that the measurement exceeds a national ambient air quality standard

[1] Measured at Sebastopol, 103 Morris Street monitoring station.

[2] The 8-hour national ozone standard was revised to 0.075 ppm in March 2008 and then again to 0.070 ppm in October 2015.

[3] Carbon monoxide and sulfur dioxide are not currently monitored at any station in the San Francisco Bay Area Air Basin.

[4] Measured days are those days when an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Estimated days are the estimated number of days when a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

[5] Measured at Healdsburg, 133 Matheson Street monitoring station.

$\mu g/m^3$ – micrograms per cubic meter
$PM_{2.5}$ – particulate matter with aerodynamic diameter less than 2.5 microns
PM_{10} – particulate matter with aerodynamic diameter less than 10 microns
ppb – parts per billion
ppm – parts per million

Source: CARB 2021

EPA uses this type of monitoring data to designate areas according to attainment status for criteria air pollutants published by the agencies. The purpose of these designations is to identify areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. An “attainment” designation for an area signifies that pollutant concentrations did not exceed the established standard. In most cases, areas designated or redesignated as attainment must develop and implement maintenance plans, which are designed to ensure continued compliance with the standard. A “nonattainment” designation indicates that a pollutant concentration has exceeded the established standard. To identify the severity of the

problem and the extent of planning and actions required to meet the standard, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (e.g., moderate, serious, severe, or extreme). Lastly, an unclassified designation indicates that insufficient data exist to determine attainment or nonattainment. Sonoma County is designated as moderate nonattainment for $PM_{2.5}$ and marginal nonattainment for ozone (EPA 2021).

3 SPECIAL-STATUS RESOURCES

This section includes a description of resources afforded some protection or special consideration under federal, California, or local regulations, including wetlands, special-status species, and special-status habitats.

3.1 WETLANDS

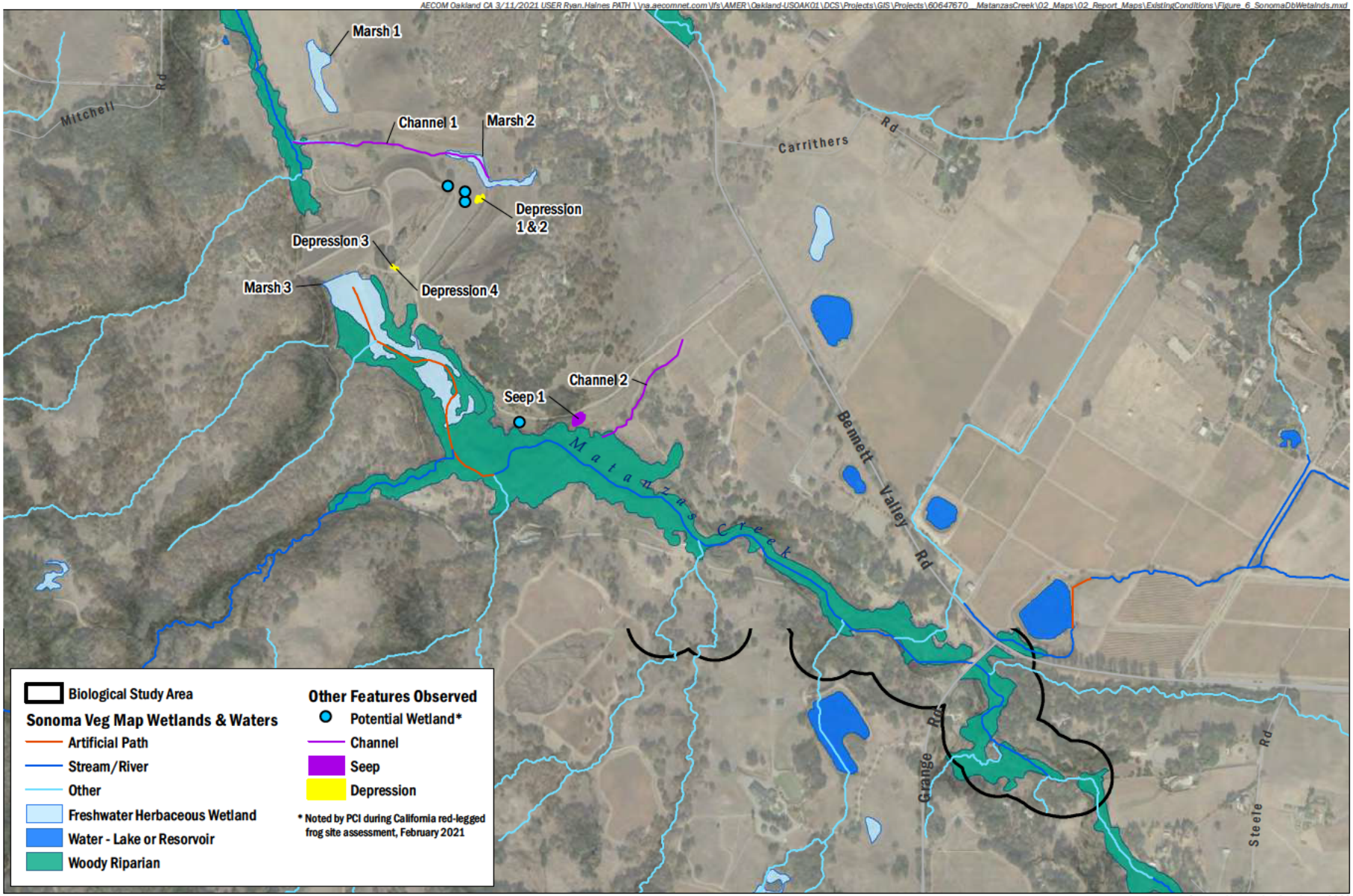
Prior to the reconnaissance visit, spatial data describing existing wetlands and aquatic resources in the BSA were plotted on maps and reviewed (SCAPOSD 2019, USGS 2020, USFWS 2021). All features identified in national datasets were duplicated in the Sonoma Veg Map (and not vice versa), so AECOM focused on the Sonoma Veg Map as the most useful dataset available for wetlands and waters in the BSA. In addition to the features included in the Sonoma Veg Map, several potentially jurisdictional wetlands or waters were observed in the BSA during the reconnaissance visit; these features are not included in any of the existing datasets. Additional potential wetlands were evident and were noted by PCI biologist during the California red-legged frog site assessment in late February. These aquatic resources are shown on Figure 6.

Features shown on Figure 6 should all be considered potential jurisdictional wetlands or other waters of the United States (or State) for planning purposes and alternatives analysis. A formal wetland delineation that confirms the boundaries of these features and describes them in detail will be needed in the footprint of a proposed project to support permit applications if any of these features would be directly impacted. Figure 6 shows "Woody Riparian," one of several sensitive habitats mapped by Sonoma Veg Map (SCAPOSD 2019). Although this map class likely includes potentially jurisdictional wetlands, based on preliminary observation, its boundaries also encompass areas that may not exhibit all of the characteristics of a jurisdictional wetland (wetland boundaries in the BSA will be evaluated further during the wetland delineation planned for spring 2021). Features shown on Figure 6 that did not appear in the field as indicated on the Sonoma Veg Map or that were not included in the Sonoma Veg Map are listed and described below, from downstream to upstream. A formal wetland delineation is being planned in portions of the BSA for spring 2021, during which time these features will be investigated further.

Marsh 1: This feature is at the northern end of the BSA and extends north from the northern side of the berm that contains the auxiliary spillway. It was mapped as a freshwater herbaceous wetland in the Sonoma Veg Map but was not clearly identifiable as such, to the extent that the feature and its vegetation could be observed from the berm during the reconnaissance visit. Historic aerial imagery shows inundation and wetland signature in this area during wetter periods.

Channel 1: This feature is a small channel approximately 1 to 2 feet wide that flows from east to west down the lower portion of the auxiliary spillway. It was not included in the Sonoma Veg Map in its entirety, although portions of it overlap with wetland and water features that are shown in the Sonoma Veg Map. It starts in Marsh 2 (described below), flows downslope through a small grove of valley oaks (*Quercus lobata*), and then joins Matanzas Creek at the northern end of the BSA. This channel was mostly dry and unvegetated on January 19, 2021. In some places the mostly unvegetated channel supported limited growth of wetland indicator vegetation but was sometimes obscured by Harding grass growing beside the channel.

Marsh 2: This feature, mapped as a freshwater herbaceous wetland in the Sonoma Veg Map, lies at the bend in the auxiliary spillway. It begins upslope, above and east of the auxiliary spillway, and



AECOM

Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 6

Potential Wetlands & Waters in the Biological Study Area

continues down into the auxiliary spillway. The Sonoma Veg Map shows the feature as terminating on the floor of the spillway. However, during the reconnaissance visit, AECOM biologists observed a previously unmapped channel (Channel 1; described above) that drained from this feature down to Matanzas Creek, downstream of the dam. During the reconnaissance visit, no wetland or marsh vegetation was observed in the downslope (western) half of this feature, but the upslope (eastern) half contained wetland species such as rushes (*Juncus* sp.) and appeared wetter (although standing water was not present). AECOM biologists speculated that construction of the auxiliary spillway interrupted a natural seep or drainage feature that historically may have included Marsh 1, Marsh 2, and Channel 1 (or some version of these features), and what was observed in the field is a combination of remnants of these historical features, combined with drainage and surface runoff through the spillway.

Depression 1: Four seasonally ponded depressions were observed on the cut surface that forms the floor of the auxiliary spillway. None of these features are included in the Sonoma Veg Map. Two of these features, Depressions 1 and 2, did not contain standing water during the reconnaissance visit on January 19, 2021. However, these two depressions were identifiable based on the presence of saturated soils and distinct, low-growing vegetation (that could not be identified due to the timing of the visit). Depression 1 is a small, rectangular depression surrounded by dense stands of Harding grass. Depression 1 and the other three seasonally ponded depressions in the auxiliary spillway are not naturally occurring pools. Rather, they occur on a cut surface that was graded to create the auxiliary spillway and may have developed or may persist in part as a result of cattle activity (Depressions 1 and 2) and vehicle activity (Depressions 3 and 4).

Depression 2: This feature is adjacent to Depression 1 and is similar in shape and composition. During the reconnaissance visit, it also contained saturated soils and low-growing vegetation that was different from the surrounding Harding grass.

Potential Wetland (various points): These points represent several locations noted as potential wetlands during the California red-legged frog site assessment in late February. The site assessment was conducted not long after substantial rainfall, when the ground was saturated and hydrology indicators of potential wetlands were strong. The potential wetlands include several small, isolated depressions on the auxiliary spillway that may fluctuate in size with trends in precipitation and drought. A dry area with wetland indicator species was also observed alongside the access road near Seep 1 (described below); this area may be fed by a seep that is activated later in the season or during wetter periods.

Depression 3: This feature and Depression 4 are immediately northeast of the Matanzas Creek Dam access road, at a location commonly used for parking during site visits and other activities at the dam. Vehicular activity in this occasional parking area and the creation of the slightly elevated, gravel roadbed appears to have contributed to the formation of both features because the roadway edge forms part of the boundary of each depression. Vegetation surrounding Depression 3 is nonnative annual grassland and coast live oak (*Quercus agrifolia*) woodland (mapped as Forest Sliver on Figure 3). The feature is bounded to the north by a rocky knoll with coast live oak trees. During the reconnaissance visit on January 19, 2021, the feature contained roughly 2 or 3 inches of standing water, and saturated soils surrounded the water.

Depression 4: This feature is adjacent and very similar to Depression 3. During the reconnaissance visit, it contained approximately 1 inch of standing water, and saturated soils surrounded the water. Vegetation surrounding Depression 4 is nonnative annual grassland.

Marsh 3: This marsh, as mapped in the Sonoma Veg Map, comprises the area at the upstream base of Matanzas Creek Dam, in the area that was formerly inundated when the primary spillway was kept closed. It also includes an old access road. Sediment removal projects and the updated reservoir operations that include maintaining the primary spillway at the base of Matanzas Creek Dam in the open position have presumably resulted in changes to the aquatic resources present at this location since 2013, when the Sonoma Veg Map was created. The area is believed to be in transition from a permanent open-water and marsh habitat to a habitat characterized by intermittent hydrology. Habitat in this area appeared to be disturbed and was dominated by nonnative species such as rabbitsfoot grass (*Polypogon monspeliensis*). Smaller areas in the marsh polygon are still dominated by obligate wetland species such as cattails (*Typha* sp.) and water plantain (*Alisma* sp.). Although the hydrology, substrate, and vegetation in this area may be in the latter stages of transition or may show signs of disturbance as a result of sediment management, it is in the channel and riparian corridor of Matanzas Creek and would likely be considered jurisdictional regardless of changes in hydrology or vegetation.

Seep 1: This feature, not included in the Sonoma Veg Map, is in the central part of the BSA, on the downslope side of the main access road, in the understory of mixed oak forest. This area is dominated by a species of sedge (*Carex* sp.) and may be a seep wetland.

Channel 2: This drainage channel on the southern side of the access road from Bennett Valley Road is more apparent in older aerial photographs than was observed in January 2021. However, there is a culvert where this channel crosses under the southern branch of the access road; wetland indicator vegetation and several pools were observed along this route, downstream of the culvert, in February 2021.

3.2 SPECIAL-STATUS SPECIES

For this report, special-status species include species with the following designations:

- Federally listed as endangered, threatened, or proposed for federal listing under the Endangered Species Act (ESA) (50 Code of Federal Regulations [CFR] 17.12 [listed plants]); 50 CFR 17.11 (listed animals); and various notices in the Federal Register (FR) (proposed species);
- Federal candidates for possible future listing as threatened or endangered under the ESA (73 FR 75176, December 10, 2008);
- State listed as endangered or threatened, proposed for State listing, or State candidate for listing (14 California Code of Regulations 670.5);
- CDFW fully protected (California Fish and Game Code Sections 3511 [birds], 4700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish]);
- Species designated as rare by the CNPS (CNPS rankings of 1B and 2B); and
- CDFW Species of Special Concern.

Database searches and a literature review were conducted to identify special-status species that could potentially occur in the BSA. Databases searched included the California Natural Diversity Database (CNDDB); the United States Fish and Wildlife Service's (USFWS's) Information, Planning, and Consultation System (IPaC) resource list; the National Marine Fisheries Service's (NMFS's) California Species List Tool; and eBird, an online database of bird observations made by birdwatchers.

Habitat conditions in the BSA and suitability for special-status species were assessed during the January 19, 2021, reconnaissance visit. Following the reconnaissance visit, the potential for each special-status species to occur in the BSA was evaluated according to the following criteria:

- **None.** The BSA is outside of the species' range, or habitat in the BSA is clearly unsuitable for the species (e.g., cover, substrate, elevation, hydrology, plant community, site history, or disturbance regime are incompatible with the species' requirements).

- **Low.** Few of the habitat components required by the species are present, and/or the majority of habitat in the BSA is unsuitable or of very poor quality. The species is not likely to be found in the BSA.

- **Moderate.** Some of the habitat components required by the species are present, and/or only some of the habitat in the BSA is unsuitable. The species has some potential to be found in the BSA.

- **High.** All habitat components meeting the species requirements are present and/or most of the habitat in the BSA is suitable. The species is likely to be found in the BSA.

- **Present.** The species was observed during the reconnaissance visit or has been recorded (e.g., in CNDDB) in the BSA.

Special-status species' regulatory status, habitat requirements, nearby occurrences, and potential to occur in the BSA are summarized in Attachment B. Select special-status species, primarily those with moderate or higher potential to occur or that otherwise warrant additional consideration, are discussed below (with the exception of CDFW Species of Special Concern with no other special status which are not discussed further in this report). The discussion includes five fish and wildlife species, several vernal pool plant species, and three plant species known from woodland or grassland habitats.

3.2.1 FISH AND WILDLIFE

In addition to the summary provided in Attachment B, this section includes additional information for steelhead, California red-legged frog, tricolored blackbird, golden eagle, and white-tailed kite.

3.2.1.1 STEELHEAD - CENTRAL CALIFORNIA COAST DPS

The Central California Coast Distinct Population Segment (DPS) of steelhead (*Oncorhynchus mykiss*) was listed as federally threatened in 1997 (62 FR 43937), and the listing was revised in 2006 to clarify and expand the DPS boundaries (71 FR 833). The DPS includes naturally spawned anadromous *O. mykiss* below natural and man-made impassable barriers from the Russian River south to and including Aptos Creek in Santa Cruz County, including the drainages of San Francisco and San Pablo Bays eastward to Chipps Island (71 FR 833). Although steelhead, the anadromous form of the species, likely cannot access the BSA due to fish passage impediments downstream of the BSA, the resident form of *O. mykiss* (rainbow trout) is present in Matanzas Creek. Resident rainbow trout are not protected by the federal ESA, but their presence in Matanzas Creek and the historical presence of anadromous steelhead in Matanzas Creek warrants further discussion.

Anadromous steelhead are known to occur in the Russian River (CDFW 2018) and in Santa Rosa Creek (NMFS 2008, City of Santa Rosa 2014, CDFW 2021), which is the tributary that Matanzas Creek joins prior to downstream confluences that connect it to the Russian River. Anadromous steelhead have also historically occurred in Matanzas Creek (CDFG 2002, CDFG 2006, Sonoma Water 2003, NMFS 2008, City of Santa Rosa 2014). However, a long culvert routes Matanzas Creek

under Sonoma Avenue, the Government Center, City Hall, and Santa Rosa Avenue in downtown Santa Rosa and joins Matanzas Creek with Santa Rosa Creek. This culvert is widely believed to be a complete fish passage barrier that prevents anadromous fish returning from the ocean from reaching Matanzas Creek (A. Crealock pers. comm. 2021).

During the late 1990s, Sonoma Water considered a Matanzas Creek fishway project that would have improved passage through Matanzas Creek culvert. As described in Sonoma Water's 1996-1997 Fisheries Enhancement Program Work Plan (Sonoma Water, unpublished report):

> "Historically, Matanzas Creek supported a self-sustaining steelhead fishery. However, flood control structures constructed in downtown Santa Rosa during the early 1960s created an impassable migration barrier at the mouth of Matanzas Creek. While the adjacent Santa Rosa Creek flood control project included a fishway, the Matanzas Creek section of the project did not. Fish passage through the 1,400-linear-foot Matanzas Creek flood control project is prohibited by high winter velocities and shallow summer depths."

This project was pursued for 2 or 3 years before Sonoma Water concluded that the cost of such a project outweighed its benefit. (Chase, pers. comm. 2021).

A detailed passage evaluation has not been conducted, but a review of the existing hydraulic model that includes the Matanzas Creek culvert also suggests that it is a passage barrier. Based on JDE's review of the hydraulic model for Matanzas Creek provided by Sonoma Water (R. Anderson pers. comm. 2021), that model represents the culvert as a 1,329-foot-long, 16.6-foot-wide box culvert. The model also shows a structural height drop of approximately 2.6 feet from the Matanzas Creek culvert into Santa Rosa Creek and no evidence of a downstream hydraulic control that would backwater the area just downstream of the drop. The adjacent culvert that routes flow from Santa Rosa Creek under the same ground in downtown Santa Rosa includes provisions for fish passage; however, there are no provisions for fish passage, such as baffles, associated with the Matanzas Creek culvert. This culvert likely prevents upstream fish passage due to shallow depths (at lower flows) and high velocities (at higher flows).

In addition to the long culvert described above, there are other passage impediments in lower Matanzas Creek, upstream of the Matanzas Creek culvert in downtown Santa Rosa. A habitat survey of Matanzas Creek by the CDFW (CDFG 2006) notes that the E Street crossing, immediately upstream of the long culvert, is a permanent (or complete) barrier to anadromy, although this may be a reference to the long culvert described above. Passage impediments have also been noted between Santa Rosa Creek and the Bennett Valley Golf Course (City of Santa Rosa 2014, CDFW 2020a) and within the limits of the Bennett Valley Golf Course (City of Santa Rosa 2014). There are also several unassessed stream crossings along Matanzas Creek in the CDFW Passage Assessment Database (CDFW 2020a). These barriers, impediments, and unassessed crossing are downstream of Matanzas Creek Dam and would presumably limit upstream passage.

Sonoma Water and the California Sea Grant developed a Coastal Monitoring Plan for anadromous fish in the Russian River watershed in coordination with regional fisheries experts (Sonoma Water and CSG 2019). Although not explicitly stated in the report, our interpretation of the information provided is that the authors of the report also concluded that passage barriers on Matanzas Creek prevent anadromy. In 2012, Sonoma Water and the California Sea Grant began a series of meetings with professionals familiar with anadromous salmonid habitat in the Russian River watershed (Sonoma Water and CSG 2019). Professional expertise and available data were used to define the extent of anadromous salmonid spawning and juvenile rearing habitat in all streams of the Russian River watershed downstream of known passage barriers. This effort to identify salmonid habitat erred on the side of inclusiveness because the study design favored including reaches that could later be

eliminated if they did not contain habitat, rather than adding reaches that had been overlooked after the sampling frame was developed. Despite this overly inclusive approach to delineating salmonid habitat, and although the design included many reaches that were later determined not to contain salmonid habitat after field reconnaissance was conducted, none of Matanzas Creek was classified as potential habitat for anadromous salmonids.

Although steelhead and other anadromous fish are likely excluded from Matanzas Creek by downstream barriers, the persistence of the resident form of the species, rainbow trout, in Matanzas Creek downstream of Matanzas Creek Dam indicates that some habitat in Matanzas Creek is at least marginally suitable for steelhead. Resident rainbow trout were collected in small numbers during fish sampling efforts in Matanzas Creek at E Street (between the Santa Rosa Creek and Spring Creek confluences) in 2007; at Doyle Park (just upstream of the Spring Creek confluence) in 2006 and 2007; and just upstream of Hoen Frontage Road from 2005 to 2007 (Chase 2010). In 1997, a habitat inventory survey was conducted in Matanzas Creek from the E Street Bridge to the upstream end of Bennet Valley Golf Course (CDFG 2006). The survey found that the reach was a low-gradient, entrenched, meandering series of riffles and pools with a high width-to-depth ratio and predominantly cobble substrate. Several habitat features were suboptimal for salmonids, including high summer water temperatures (62 to 78°F in June), high cobble embeddedness in pool tail-outs (which can lead to poor redd oxygenation if salmonids use these areas for spawning), relatively low canopy cover (averaging 64 percent, which could be partially responsible for high water temperatures), and a thin or absent riparian buffer in much of the urbanized portion of the study area. Habitat in the reach just downstream of Matanzas Creek Dam consists of silt and embedded cobble and the reach is intermittent; consequently, the BSA downstream of Matanzas Creek Dam would primarily provide migration and rearing habitat when inundated.

Matanzas Creek Dam is currently a complete passage barrier, but the streambed at the upstream end of the BSA, approximately 1 mile upstream from Matanzas Creek Dam, contains loose cobble and gravel that could support spawning for resident rainbow trout if they are present. Rainbow trout may be present upstream of Matanzas Creek Dam. However, they were not observed upstream of the Matanzas Creek Dam during upstream California red-legged frog surveys in 2010, despite observations of other fish species (Sonoma Water 2010). Focused fish surveys have not been conducted upstream (A. Crealock pers. comm. 2021), and the presence of rainbow trout has never been confirmed upstream.

3.2.1.2 CALIFORNIA RED-LEGGED FROG

California red-legged frog is federally listed as a threatened species and is also a CDFW Species of Special Concern. The original listing described a zone of integration with the northern red-legged frog, extending north from Walker Creek in Marin County to southern Mendocino County (61 FR 25813). However, the intergrade zone between the two species is now defined as a narrow band between Big River and Mills Creek in Mendocino County (Nafis 2021), and the listing was updated in 2006 to include Sonoma County (71 FR 19244). Critical habitat was designated in 2006 (71 FR 19244) and was revised in 2010 (75 FR 12816). This section provides a summary of available information relevant to California red-legged frog in the BSA, drawn primarily from the California Red-Legged Frog Site Assessment conducted in the BSA in February 2021 (PCI 2021). Additional and more detailed information is provided in the site assessment report, available under separate cover.

The BSA is within the current range of the California red-legged frog. This California endemic was historically documented in 46 counties in California, but is now confined to 23 counties, with greater abundance in the San Francisco Bay area and central California coast than in other historical

locations. In Sonoma County, California red-legged frogs occur in many drainages, ponds, and man-made stock ponds (CDFW 2021). There are a handful of documented occurrences from within 5 miles of Matanzas Creek Dam, west (Taylor Mountain), east (Annadel State Park), and southeast (Sonoma Mountain) of the BSA (Figure 7). The closest known occurrence in the CNDDB is a single report from a pond on private property on the eastern flank of Taylor Mountain, approximately 0.8 mile from Matanzas Creek Dam.

Although Sonoma Water previously conducted focused surveys for California red-legged frog in portions of the BSA in association with their stream maintenance program and sediment management projects, all surveys to date were negative. No California red-legged frogs were observed during two days of California red-legged frog site assessment conducted in the BSA in February 2021, but Sierran treefrogs were observed throughout aquatic habitats in the BSA. A single frog, 2 to 3 inches in length, was observed in the reservoir pool immediately upstream of Matanzas Creek Dam, but it retreated before it could be identified. There are several anuran species that can be 2 to 3 inches in length, have ranges that overlap with the BSA, and commonly occur around ponds and pools, including California red-legged frog, California toad (*Anaxyrus boreas halophilus*), and American bullfrog. Of these species, only American bullfrog has been documented in the BSA (Sonoma Water 2005, Sonoma Water 2010).

The BSA supports native upland and aquatic communities but has experienced significant habitat alteration from anthropogenic activities. Various upland and aquatic habitats in the BSA could provide opportunity for California red-legged frog dispersal, shelter, predator avoidance, and forging. Suitable breeding habitat is absent from Matanzas Creek throughout most of the BSA. The pool immediately upstream of the dam was deep enough (18 inches) to support California red-legged frog breeding in February 2021, but the typical duration of inundation at this location is unknown and may be variable. There is also a perennial, or near-perennial, pool at the outlet of the primary spillway. However, high flows that occur during precipitation and runoff events would likely wash away egg masses and larvae should California red-legged frog breed in these locations.

California red-legged frog has not been observed previously in the BSA despite several surveys, and the availability of suitable breeding habitat may be limiting. However, based on several known occurrences from around the BSA, and on the presence of diverse upland and aquatic habitats that could provide dispersal or foraging habitat, California red-legged frog has a moderate potential to occur in the BSA.

3.2.1.3 TRICOLORED BLACKBIRD

Tricolored blackbird (*Agelaius tricolor*) is a State-listed threatened species and a CDFW Species of Special Concern. The species' range in California includes low-elevation areas west of the Sierra Nevada Mountains, the Central Valley, and along the coast from Sonoma County south to Baja California (USFWS 2019). Most breeding in California occurs in the Sacramento and San Joaquin Valleys, but breeding colonies also occur throughout much of the species' range (USFWS 2019, 71 FR 70483). Tricolored blackbirds are highly colonial, and nesting areas must be large enough to support a colony of at least 50 pairs (Zeiner et al. 1990). Breeding colony sites must also have open and accessible water, a protective nesting substrate (e.g., flooded or thorny vegetation), and foraging habitat within about 3 miles (71 FR 70483). Breeding begins in late March near fresh water, usually in emergent wetlands with tall, dense cattails or tules, although nesting can also occur in willow thickets, blackberry, and wild rose (71 FR 70483, Zeiner et al. 1990). Tricolored blackbirds feed primarily on insects, but also eat seeds and grains. They forage in grassland, cropland, wetland, riparian, and forested habitats (USFWS 2019). In the winter, tricolored blackbirds concentrate on the coast (including in Sonoma County) and around the Sacramento-San Joaquin Delta, where they roost in large flocks in wetland and marsh habitats (71 FR 70483, Zeiner et al. 1990, USFWS 2019).

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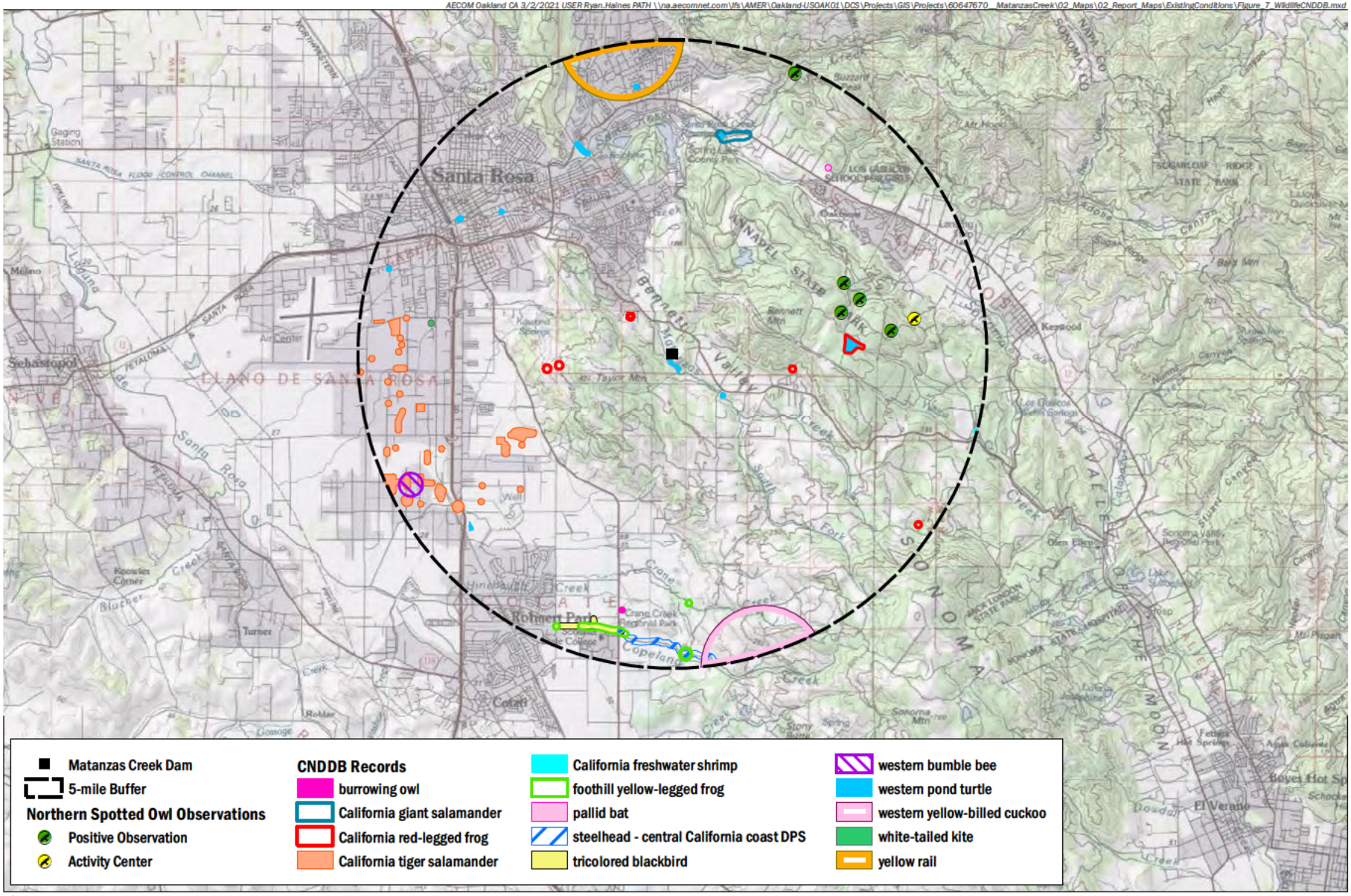

CDFW (CNDDB), 12/2020
USGS (Topo Basemap), 2019
AECOM, 2021

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FIGURE 7

Wildlife CNDDB Records within 5 miles of Matanzas Creek Dam

There is a single tricolored blackbird CNDDB occurrence 4.3 miles southwest of Matanzas Creek Dam (Figure 7). A colony of tricolored blackbirds was observed along Copeland Creek nesting in blackberry and willow thickets adjacent to the creek in the 1960s and 1970s. No birds were found in surveys in 2011, 2014, and 2015, and the colony is listed in CNDDB as possibly extirpated. There is one recent eBird occurrence within 5 miles of the dam and many others around Santa Rosa, most of which are from the winter months (eBird 2021).

The riparian habitat upstream of the reservoir inundation area provides some marginal potential nesting habitat for tricolored blackbirds. However, the lack of nearby CNDDB occurrences and the low number of nearby eBird occurrences suggests that there may not have been a nearby breeding colony in recent years. Based on the presence of marginal riparian nesting habitat and the lack of recent observations, there is low potential for tricolored blackbirds to nest in the BSA. The region around the BSA contains suitable wetland nesting and overwintering habitats, and there is moderate potential for tricolored blackbirds from those wetlands to forage in the grassland habitats in the BSA.

3.2.1.4 GOLDEN EAGLE

Golden eagle (*Aquila chrysaetos*) is a CDFW Fully Protected Species. Golden eagles are present year-round in California, and individuals may be resident breeders, resident floaters (typically young nonbreeders), and wintering migrants (Katzner et al. 2012). Golden eagles breed from late January to August, with a peak from March to July. They typically build large platform nests on cliff ledges or in large trees, which they often reuse repeatedly over their lifetimes (Zeiner et al. 1990). They have large territories (estimated at 48 square miles in northern California), where they hunt in grasslands and early successional stages of forest habitats, among other habitat types (Zeiner et al. 1990). They primarily prey on small mammals but also hunt birds and reptiles and, to a lesser extent, feed on carrion (Katzner et al. 2012).

The closest golden eagle CNDDB occurrence is just over 5 miles southeast of Matanzas Creek Dam near Sonoma Mountain, where a nest was originally found in oak woodland habitat in 1996. There were many observations of territorial behavior, courtship flights, juveniles, soaring, and hunting in this area between 2011 and 2015. There have also been numerous eBird occurrences of golden eagles within 5 miles of Matanzas Creek Dam, the closest of which was a juvenile golden eagle observed approximately 0.4 mile north of the dam in 2019 (eBird 2021).

The grassland and oak woodland habitats in the BSA provide suitable foraging habitat for golden eagles (Figure 4). Based on the observations of golden eagles in the vicinity of the BSA and the presence of foraging habitats, there is high potential for golden eagles to forage in the BSA. Although there are tall trees in the BSA that could support golden eagle nesting, the BSA provides suboptimal golden eagle nesting habitat because it lacks suitable cliffs that are the preferred nesting surface, the topographic relief (i.e., the difference between the highest and lowest points of elevation) in the BSA is low, and the level of human activity and development is high relative to preferred nest sites. The BSA is surrounded by large, open space areas that likely provide taller trees and suitable nesting cliffs, so golden eagles may prefer to nest outside of the BSA. They are more likely to forage in the BSA than they are to nest; however, there is a low potential for golden eagles to nest in the BSA.

3.2.1.5 WHITE-TAILED KITE

White-tailed kite (*Elanus leucurus*) is a CDFW Fully Protected Species and is known to occur in the BSA. They occur year-round in low elevation regions of California, including Sonoma County. White-tailed kites hunt for small mammals—and, to a lesser extent, birds, insects, reptiles, and amphibians—in open grasslands, farmlands, and emergent wetlands (Zeiner et al. 1990). They nest in

oaks, willows, and other tree stands near foraging habitats from February to October, with a peak from May to August (Zeiner et al. 1990).

In addition to the single white-tailed kite CNDDB occurrence within 5 miles of the Matanzas Creek Dam (Figure 7) and numerous eBird occurrences of white-tailed kite in Bennett Valley (eBird 2021), two wildlife surveys conducted at Matanzas Creek Dam have documented their presence in the BSA. An active white-tailed kite nest was observed in the BSA in an oak tree adjacent to grassland habitat during wildlife surveys associated with the Matanzas Creek Detention Reservoir Sediment Removal Project Initial Study (Sonoma Water 2005). As recently as February 2021, a pair of white-tailed kites were observed in the BSA, exhibiting courtship behavior over the auxiliary spillway.

Based on the observation of an active nest in the BSA, recent observations of courtship behavior, the frequency of eBird observations in Bennett Valley, and the presence of suitable oak woodland nesting habitats in the BSA (Figure 4), it is assumed that at least one pair of white-tailed kites continues to nest in the BSA. The grassland habitat in the BSA provides suitable foraging habitat, so there is also a high potential for white-tailed kites to forage in the BSA even if they are nesting outside of the BSA or foraging during the nonbreeding season.

3.2.2 PLANTS

In addition to the summary provided in Attachment B, this section includes information for six special-status plant species with moderate potential to occur in the BSA. Documented occurrences of State and federally listed plant species from within 5 miles of Matanzas Creek Dam are shown on Figure 8; CNPS List 1 and 2 species from the same area are shown on Figure 9. Botanical surveys following the CDFW (2018) protocol should be conducted in suitable habitats in the project footprint to confirm the absence of special-status plant species. Botanical surveys are currently being planned for 2021.

3.2.2.1 BAKER'S NAVARRETIA

Baker's navarettia (*Navarretia leucocephala* ssp. *bakeri*) is an annual herb in the phlox family (*Polemoniaceae*), with a California Rare Plant Rank of 1B.1. It blooms from April to July, and is found in meadows and seeps, vernal pools, and mesic areas in grassland, woodland, and coniferous forest (CNPS 2021a). Five CNDDB occurrences for this species are found east of the project in the Bennett Mountain area. The nearest occurrence is 2.4 miles from the dam (CDFW 2021). All of these occurrences were recorded in vernal pools or mesic habitats.

Although naturally occurring vernal pool habitat does not appear to be present in the BSA (Figure 3), seasonally ponded depressions that have developed in the auxiliary spillway (Figure 6) provide habitat that is hydrologically like vernal pools. These depressions have developed in a portion of the BSA that was graded to form the auxiliary spillway. Grading of the area and natural settlement appears to have reduced runoff and drainage and contributed to the development of these pools.

The presence of special-status plant species in these seasonally ponded depressions would depend on the availability of seed, either due to a naturally occurring seed bank in the soil or as a result of wildlife species transporting seed from other vernal pool habitats into the depressions in the BSA. However, the hydrology in at least some of these depressions appears to be suitable for vernal pool plants, and at least one obligate wetland species that may occur in vernal pools was present during surveys conducted in early 2021. On February 24, aquatic buttercup (*Ranunculus* sp.) was observed growing in Depressions 1 and 2 (Figure 6). The plant was later identified from photographs by PCI and AECOM botanists as either the annual Lobb's aquatic buttercup (*Ranunculus lobbii* or perennial

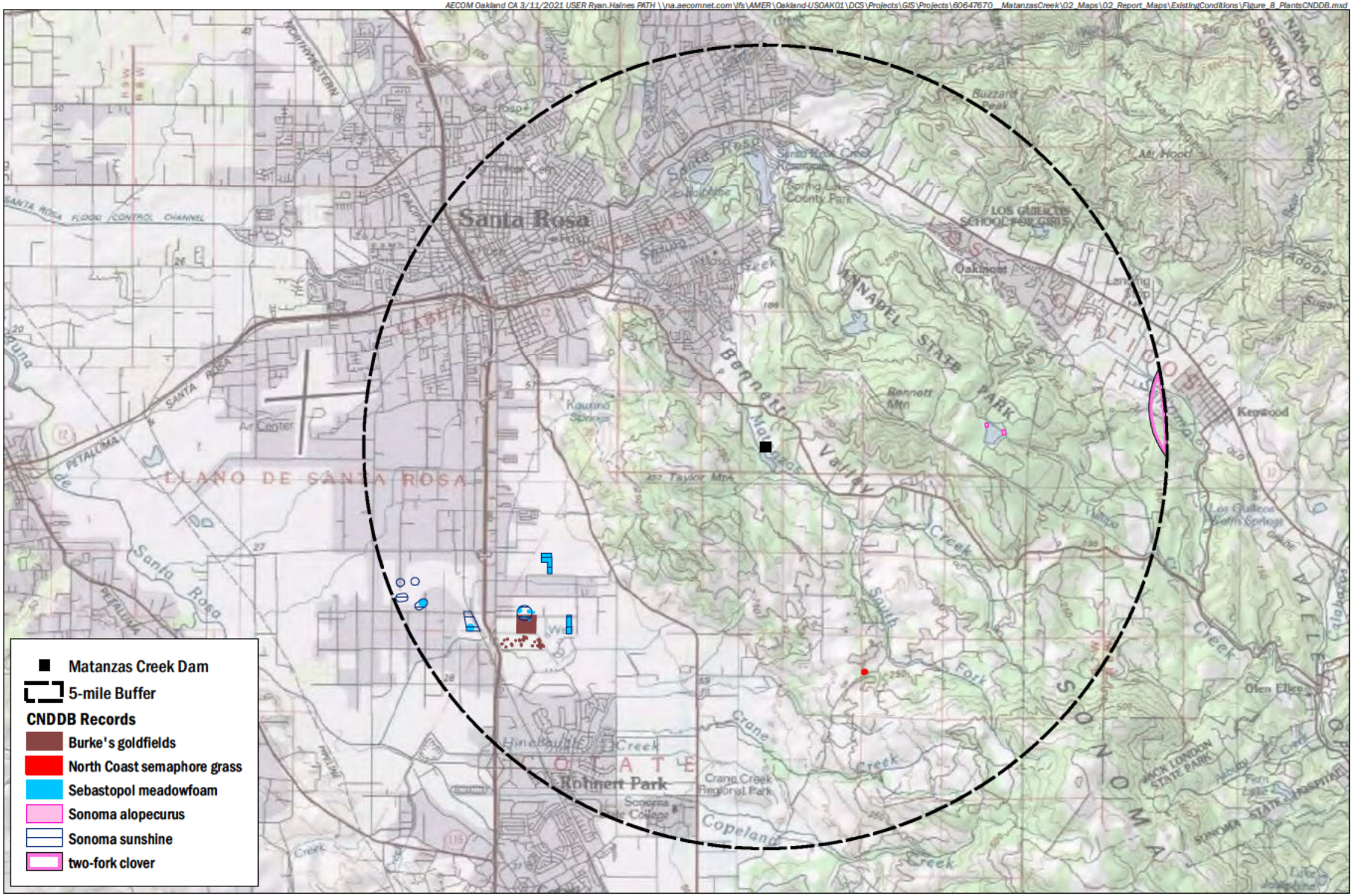

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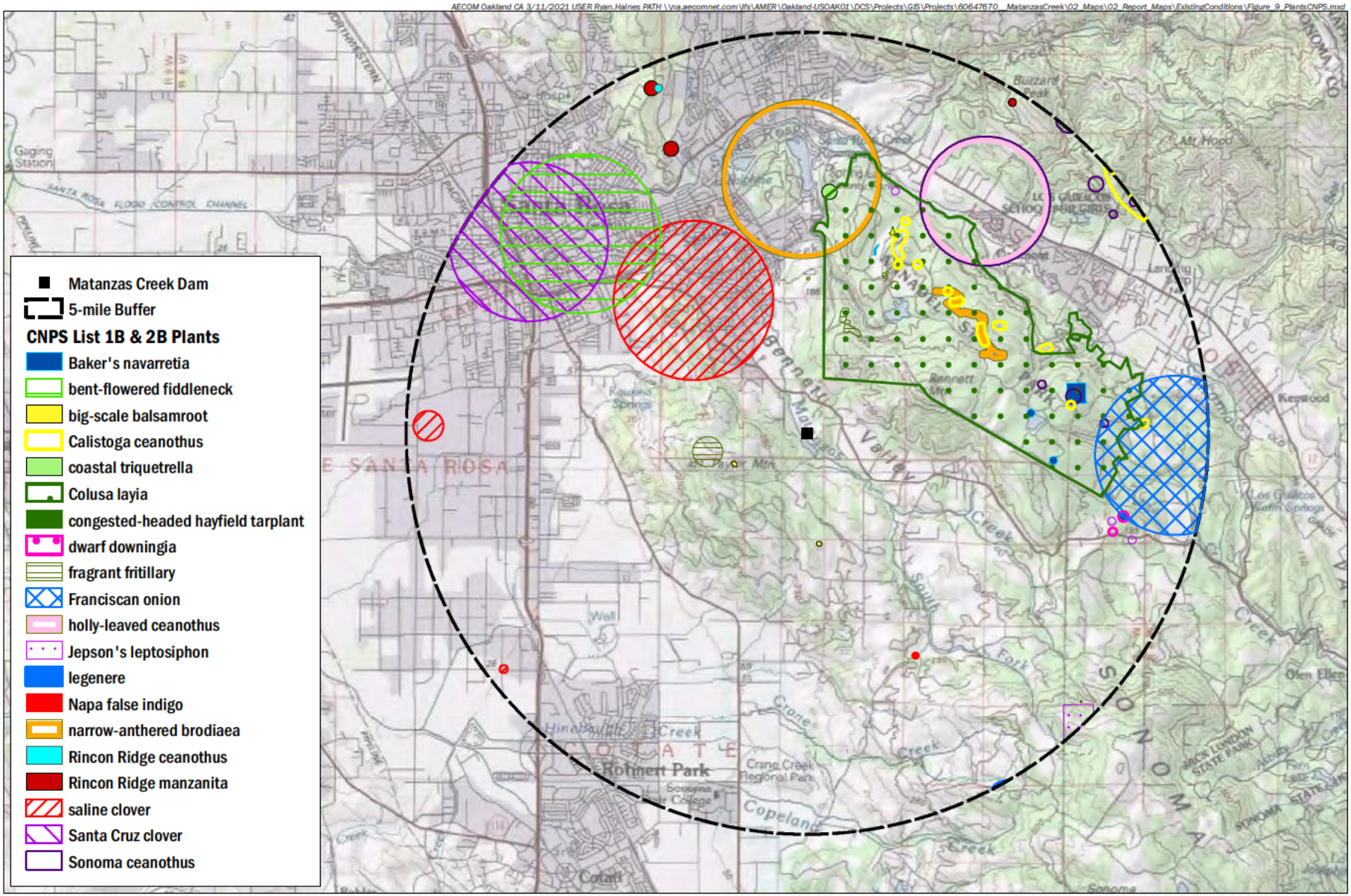
FIGURE 8

State and Federally Listed Plant CNDDB Records within 5 miles of Matanzas Creek Dam



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Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 9

CNPS List 1 & 2 Plant CNDDB Records within 5 miles of Matanzas Creek Dam

white water buttercup (*Ranunculus aquatilis*), both of which are obligate wetland species. These depressions were not inundated during the January 19 reconnaissance visit, were inundated in late February, and are presumed dry during the summer. Based on the intermittent hydrology, the habitat may be better suited for the annual Lobb's aquatic buttercup, a CNPS List 4.2 (List 4 includes species with limited distribution in California but also present elsewhere) that is known to occur in vernal pools. Also on the auxiliary spillway, Sierran treefrog tadpoles (*Pseudacris sierra*) and flatworms (*Platyhelminthes*) were observed in Depressions 3 and/or 4 (Figure 6). These species also require an inundation period that suggests a hydrology that may support vernal pool plants.

Based on the hydrology of the seasonally ponded depressions on the auxiliary spillway and the likely presence of Lobb's aquatic buttercup, Baker's Navarretia has a moderate potential to occur in seasonally ponded depressions in the BSA.

3.2.2.2 DWARF DOWNINGIA

Dwarf downingia (*Downingia pusilla*) is an annual herb in the bellflower family (*Campanulaceae*), with a California Rare Plant Rank of 2B.2. It blooms from March to May and is found in vernal pools and mesic grassland areas (CNPS 2021a). There is a single CNDDB occurrence 4.0 miles southwest of the dam on the northern side Bennett Valley Road (CDFW 2021). Habitat present at this occurrence includes two separate vernal pools. Like Baker's Navarretia, seasonally ponded depressions that have developed on the auxiliary spillway have moderate potential to support dwarf downingia and should be visited during botanical surveys if the project would result in disturbance to that area.

3.2.2.3 CONGESTED-HEADED HAYFIELD TARWEED

Congested-headed hayfield tarweed (*Hemizonia congesta* ssp. *congesta*) is an herbaceous annual plant in the sunflower family (*Asteraceae*), with a California Rare Plant Rank of 1B.2. It blooms from April to November, and is found in valley and foothill grassland, barren areas, openings in chaparral and woodland, and marsh edges, often (but not always) on serpentine derived soils (CNPS 2021a, Jepson Flora Project 2021). There is one CNDDB record for this species 4.8 miles southeast of the BSA, where the habitat is listed as open canopy grassland (CDFW 2021). Congested-headed hayfield tarweed has moderate potential to occur in grassland and woodland opening habitats in the BSA. Botanical surveys conducted in the project footprint should include grassland and woodland habitats.

3.2.2.4 FRAGRANT FRITILLARY

Fragrant fritillary (*Fritillaria liliacea*) is a geophytic perennial plant in the lily family (*Liliaceae*), with a California Rare Plant Rank of 1B.2. It blooms from February to April, and is found in cismontane woodlands, coastal prairie, and valley and foothill grasslands (CNPS 2021a). It grows in heavy clay soils, often (but not always) with a serpentine influence (CNPS 2021a, Jepson Flora Project 2021). There are six CNDDB occurrences for fragrant fritillary within 5 miles of the BSA, the closest of which is 1.1. miles from the dam. Nearby records list associated habitat as being mesic grassland at the edge of oak woodland, and rocky soils in grasslands (CDFW 2021), both of which are found in the BSA. Fragrant fritillary has moderate potential to occur in grassland and oak woodland habitats in the BSA.

3.2.2.5 JEPSON'S LEPTOSIPHON

Jepson's leptosiphon (*Leptosiphon jepsonii*) is an herbaceous annual plant in the phlox family (*Polemoniaceae*), with a California Rare Plant Rank of 1B.2. It blooms from March to May and is found in open or partially shaded slopes in chaparral, cismontane woodland, and valley and foothill grassland, usually on volcanic-derived soils (CNPS 2021a, Jepson Flora Project 2021). There are three CNDDB occurrences for this species recorded throughout the project vicinity, the nearest 3.2 miles from the dam. Habitat listed for this record is vernally wet grassland surrounded by oak woodland (CDFW 2021). Jepson's leptosiphon has a moderate potential to occur in grassland and woodland opening habitats in the BSA.

3.2.2.6 NORTH COAST SEMAPHORE GRASS

North coast semaphore grass (*Pleuropogon hooverianus*) is a perennial grass in the grass family (*Poaceae*) that is State listed as threatened and has a California Rare Plant Rank of 1B.1. It blooms from April to June, and is found in mesic grasslands, meadows, and seeps in openings in woodland and coniferous forest (CNPS 2021a). Within a 5-mile radius of Matanzas Creek Dam, there is a single CNDDB record, approximately 3 miles to the south. Habitat listed for this record is a freshwater marsh and seasonal wet drainage with associated obligate wetland species. North coast semaphore grass has a moderate potential to occur in mesic grassland and marsh habitats in the BSA.

3.3 SPECIAL-STATUS HABITATS

For this report, special-status habitats include vegetation communities with a California State rarity ranking of S1 to S3, critical habitat designated under the ESA, and Essential Fish Habitat (EFH). Sources reviewed to determine special-status habitats that occur in the BSA included the CNDDB, NMFS's critical habitat geospatial data, NMFS's EFH mapper, and the Sonoma Veg Map. Potentially jurisdictional wetlands, which also may have regulatory status, are described above.

3.3.1 SENSITIVE NATURAL COMMUNITIES

Sensitive natural communities are vegetation communities with a California State rarity ranking of S1 to S3 (CDFW 2020b). The potential for sensitive natural communities to occur in the BSA was evaluated based on nearby occurrences in the CNDDB, habitats mapped in the BSA in the Sonoma Veg Map, and site observations made during the January 19, 2021, reconnaissance visit. Two sensitive natural communities, "northern vernal pool" and "valley needlegrass grassland," are documented as occurring within 5 miles of the BSA in the CNDDB. Another three sensitive natural communities, "California bay forest and woodland," "Oregon white oak forest and woodland," and "valley oak woodland and forest," are present in the BSA, based on the Sonoma Veg Map and site observations made during the reconnaissance visit. These five communities and their presence or potential to occur in the BSA are described in this section.

In addition to the five communities described below, additional sensitive natural community types may be present in the BSA, particularly in riparian areas along Matanzas Creek that are not mapped to the alliance level in the Sonoma Veg Map. The reconnaissance visit did not include a comprehensive vegetation mapping effort and was conducted in January when many plant species were dormant, lacked leaves, and were not evident or easily identifiable. During recommended botanical surveys in the project footprint, in addition to confirming the boundaries of sensitive natural

communities known to be present, the absence of other sensitive natural communities should be confirmed.

3.3.1.1 NORTHERN VERNAL POOL

Northern vernal pool is a sensitive natural community with a state rank of S2.1, which is defined as an imperiled community that is rare due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it vulnerable to extirpation from the nation or state. There are two records of northern vernal pool in the CNDDB near the BSA (Figure 10). The nearest known occurrence is Ledson Marsh (or Bennett Mountain Lake), approximately 1.8 miles east of Matanzas Creek Dam on a plateau on the eastern side of Bennett Mountain in Annadel State Park. This is a large pool, floristically like Boggs Lake in Lake County, that sometimes does not dry completely and retains pockets of water through the dry season (CDFW 2021). The second known occurrence of northern vernal pool within 5 miles of Matanzas Creek Dam is a large, shallow pool known as the Bennett Valley Vernal Pool, located along Bennett Valley Road approximately 3.8 miles east of Matanzas Creek Dam. These are both large, well-known, naturally occurring vernal pools that are different from the seasonally ponded depressions observed in the BSA.

As described in Section 3.2.2.1, seasonally ponded depressions with hydrology similar to vernal pools have developed on the graded portion of the auxiliary spillway. These depressions have the potential to support vernal pool plants and will be investigated further during focused studies of biological resources that will be needed in the project footprint, including the wetland delineation and botanical surveys. Aside from these seasonally ponded depressions, which appear to be of anthropogenic origin, northern vernal pools are not expected to occur in the BSA.

3.3.1.2 VALLEY NEEDLEGRASS GRASSLAND

Valley needlegrass grassland is a sensitive natural community with a state rank of S3, which is defined as a community that is vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation. This community is typified by grasslands dominated by native needlegrass species (*Stipa* sp.). There are two records of valley needlegrass grassland in CNDDB near Matanzas Creek Dam, both in Annadel State Park. One is approximately 2 miles to the north of the dam and the other is approximately 2 miles east of the dam (Figure 10). Although no needlegrass species were observed during the reconnaissance visit, the reconnaissance visit was conducted at a time when many plant species were dormant or otherwise not identifiable, and not all grassland areas were visited. There is low potential for valley needlegrass grassland to be present in the BSA, and its absence should be confirmed when botanical surveys are conducted in the project footprint.

3.3.1.3 CALIFORNIA BAY FOREST AND WOODLAND

California bay forest and woodland is a sensitive natural community with a state rank of S3. The Manual of California Vegetation (MCV) describes California bay forest and woodland as dominated or co-dominated by California bay in the tree or tall shrub canopy with bigleaf maple (*Acer macrophyllum*), California buckeye (*Aesculus californica*), white and red alder (*Alnus rhombifolia* and *A. rubra*), Pacific madrone (*Arbutus menziesii*), beaked hazelnut (*Corylus cornutaf*), southern California black walnut (*Juglans californica*), tanoak (*Notholithocarpus densiflorus*), gray pine (*Pinus sabiniana*), California sycamore (*Platanus racemosa*), Douglas fir (*Pseudotsuga menziesii*), coast live oak, canyon live oak (*Quercus chrysolepis*), interior live oak (*Q. wislizeni*), and coast redwood (*Sequoia sempervirens*) (CNPS 2021b). This community is equivalent to the Sonoma Veg

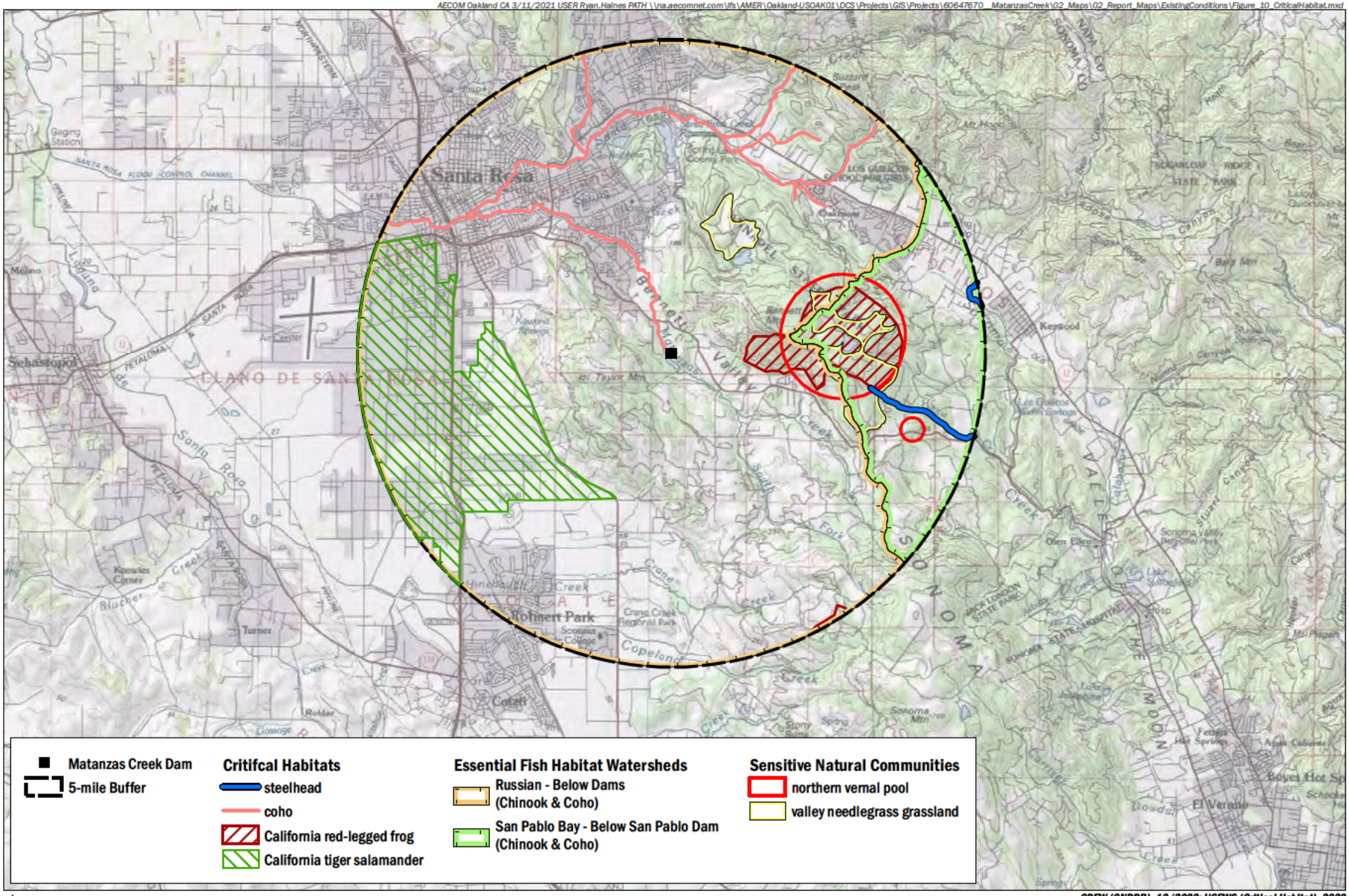

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FIGURE 10

Special-Status Habitats within 5 miles of Matanzas Creek Dam

Map's *Umbellularia californica* Alliance. Although there are no records of this community from within 5 miles of Matanzas Creek Dam in the CNDDB (CDFW 2021), it is mapped in the BSA in the Sonoma Veg Map and was confirmed present during the reconnaissance site visit. It occurs on one slope extending south from the base of the upstream side of Matanzas Creek Dam, west of Matanzas Creek (Figure 3). No additional California bay forest and woodland was observed during the reconnaissance visit.

3.3.1.4 OREGON WHITE OAK FOREST AND WOODLAND

Oregon white oak forest and woodland is a sensitive natural community with a state rank of S3. The MCV describes Oregon white oak forest and woodland as dominated or co-dominated by Oregon white oak in the tree canopy with western juniper (*Juniperus occidentalis*), Jeffrey pine (*Pinus jeffreyi*), Ponderosa pine (*P. ponderosa*), gray pine, Douglas fir, canyon live oak, California black oak (*Quercus kelloggii*), and California bay (CNPS 2021b). Trees are greater than 30 meters tall, with an open to continuous canopy, an open shrub layer, and an open to intermittent herbaceous layer that is mostly grassy. This community is equivalent to the Sonoma Veg Map's *Quercus garryana* Alliance. Although there are no records of this community from within 5 miles of Matanzas Creek Dam in the CNDDB (CDFW 2021), it is mapped in the BSA in the Sonoma Veg Map and was confirmed present during the reconnaissance site visit. It is present throughout much of the BSA, particularly on north-facing slopes south of the Matanzas Creek corridor (Figure 3).

3.3.1.5 VALLEY OAK WOODLAND AND FOREST

Valley oak forest and woodland is a sensitive natural community with a state rank of S3. The MCV describes Valley oak woodland and forest as dominated or co-dominated by valley oak in the tree canopy with boxelder (*Acer negundo*), white alder, Oregon ash (*Fraxinus latifolia*), northern California black walnut (*Juglans hindsii*), California sycamore, Fremont cottonwood (*Populus fremontii*), coast live oak, blue oak (*Quercus douglasii*), California black oak, interior live oak, Gooding's willow (*Salix gooddingii*), and Arroyo willow (*S. lasiolepis*) (CNPS 2021b). Trees are less than 30 meters tall and form an open or continuous canopy; the shrub layer is open to intermittent and may include California pipevine (*Aristolochia californica*) or California wild grape (*Vitis californica*). This community is equivalent to the Sonoma Veg Map's *Quercus lobata* Alliance. Although there are no records of this community from within 5 miles of Matanzas Creek Dam in the CNDDB (CDFW 2021), it is mapped in the BSA in the Sonoma Veg Map and was confirmed present during the reconnaissance site visit. It is present at multiple locations throughout the central portion and eastern, or upstream, end of the BSA (Figure 3).

3.3.2 DESIGNATED CRITICAL HABITAT

Critical habitat is generally designated by NMFS and the USFWS for species listed under the ESA. It includes areas in the region occupied by the species that contain physical or biological features essential to conservation of the species and that may require special management considerations or protection. Critical habitat may also include areas outside the region occupied by the species if the agency determines that the area is essential for the species' conservation. The status of designated critical habitat in Matanzas Creek and the BSA is described in this section.

3.3.2.1 COHO SALMON – CENTRAL CALIFORNIA COAST ESU

Central California Coast Evolutionarily Significant Unit (ESU) coho salmon critical habitat was designated in 1999 (64 FR 24049). Critical habitat for the Central California Coast ESU,

"encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between Punta Gorda and the San Lorenzo River (inclusive) in California, including two streams entering San Francisco Bay: Arroyo Corte Madera Del Presidio and Corte Madera Creek" (64 FR 24049). NMFS's critical habitat geospatial data for Central California Coast coho salmon shows critical habitat extending up to Matanzas Creek Dam (Figure 10). However, the critical habitat definition states that accessible reaches are those within the historical range of the ESU that can still be occupied by any life stage of coho salmon. As discussed in Section 3.2.1, a long culvert and several other passage impediments likely make this reach of Matanzas Creek inaccessible and prevent Matanzas Creek from supporting anadromy, and coho salmon are not known to have historically occurred in Matanzas Creek. Based on this definition of critical habitat, the BSA would not be considered critical habitat for Central California Coast coho salmon.

3.3.2.2 STEELHEAD – CENTRAL CALIFORNIA COAST DPS

Critical habitat for the Central California Coast DPS steelhead was designated in 2000 and revised in 2005 (65 FR 7764, 70 FR 52488). Critical habitat for Central California Coast steelhead in the Russian River watershed includes Laguna de Santa Rosa up to the confluence with Santa Rosa Creek. Santa Rosa Creek and Matanzas Creek, including the BSA, are outside of the critical habitat boundaries.

3.3.2.3 CALIFORNIA RED-LEGGED FROG

The critical habitat designation for the California red-legged frog was finalized in 2010 (75 FR 12816). Critical habitat Unit SON-1 is a little over 1 mile east of Matanzas Creek Dam, and Unit SON-2 is approximately 5 miles south of the dam; the dam, reservoir footprint, and BSA are all outside of designated critical habitat (Figure 10). Unit SON-1 encompasses approximately 1,564 acres in Annadel State Park and private land. It contains "aquatic habitat for breeding and nonbreeding activities and upland habitat for foraging and dispersal activities" (75 FR 12816). Critical habitat Unit SON-2 comprises approximately 4,932 acres of land on Sonoma Mountain. It contains "permanent and ephemeral breeding and nonbreeding aquatic habitats consisting of natural and manmade ponds surrounded by emergent vegetation and marshland with appropriate upland areas for dispersal, shelter, and foraging."

3.3.3 ESSENTIAL FISH HABITAT

The Magnuson Stevens Fishery Conservation and Management Act (MSA) of 1976, as amended, defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The MSA requires federal fisheries management plans to include descriptions of EFH for those species that are regulated under such a plan. EFH consultation with NMFS is required for any federal agency action that may adversely affect EFH. This section describes the status of EFH in Matanzas Creek and the BSA.

3.3.3.1 PACIFIC SALMON EFH

Pacific Salmon EFH, which protects habitat for Chinook and coho salmon, is present in the Russian River Watershed, and the BSA overlaps with the Pacific Salmon EFH boundaries (79 FR 75449, NMFS 2021, Figure 10). However, the extent of freshwater Pacific Salmon EFH is defined as, "all water bodies currently or historically occupied by the Council-managed salmon..." (PFMC 2014). It is unlikely that Chinook or coho salmon currently occur in Matanzas Creek, and there are no records indicating that they historically occurred in Matanzas Creek. Chinook and coho salmon distribution

maps for the Russian River watershed created by CDFW in 2002 and by Sonoma Water and California Sea Grant in 2019 did not include Matanzas Creek as part of the distribution of either species (CDFG 2002, Sonoma Water and CSG 2019). Based on the lack of Pacific salmon occurrence records in Matanzas Creek and the presence of fish passage barriers on Matanzas Creek downstream of the BSA (see discussion in Section 3.2.1.1), Matanzas Creek and the BSA are not considered Pacific salmon EFH.

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ATTACHMENT A WILDLIFE SPECIES OBSERVED DURING RECONNAISSANCE VISIT

Common Name	**Scientific Name**
crayfish (claw observed in pool downstream of dam)	*Pacifastacus leniusculus* or *Procambarus clarkia*
Sierran treefrog (on the auxiliary spillway and downstream of dam)	*Pseudacris sierra*
Anna's hummingbird	*Calypte anna*
turkey vulture	*Cathartes aura*
northern harrier	*Circus hudsonius*
sharp-shinned hawk	*Accipiter striatus*
red-tailed hawk	*Buteo jamaicensis*
acorn woodpecker	*Melanerpes formicivorus*
Nuttall's woodpecker	*Picoides nuttallii*
northern flicker	*Colaptes auratus*
black phoebe	*Sayornis nigricans*
California scrub-jay	*Aphelocoma californica*
American crow	*Corvus brachyrhynchos*
common raven	*Corvus corax*
chestnut-backed chickadee	*Poecile rufescens*
oak titmouse	*Baeolophus inornatus*
bushtit	*Psaltriparus minimus*
white-breasted nuthatch	*Sitta carolinensis*
Bewick's wren	*Thryomanes bewickii*
ruby-crowned kinglet	*Regulus calendula*
western bluebird	*Sialia mexicana*
lesser goldfinch	*Spinus psaltria*
spotted towhee	*Pipilo maculatus*
golden-crowned sparrow	*Zonotrichia atricapilla*
dark-eyed junco	*Junco hyemalis*
jackrabbit	*Lepus californicus*

ATTACHMENT B SPECIAL-STATUS SPECIES POTENTIAL TO OCCUR IN THE BIOLOGICAL STUDY AREA

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Invertebrates					
California freshwater shrimp	*Syncaris pacifica*	FE, SE	Low-gradient, clear, cool freshwater perennial streams in Marin, Napa, and Sonoma counties. Optimal habitat includes some emergent vegetation as well as undercut banks to provide shelter during high velocity storm events.	A single CNDDB occurrence sits 4.9 miles east of the project in Sonoma and Yulapa Creeks between Kenwood and Glen Ellen, encompassing upper Sonoma Creek. Habitat in this vicinity consists of exposed bedrock and deep pools with minimal undercut banks. Riparian overstory composition includes alders, bay laurel, and willows.	None. California freshwater shrimp are considered extirpated from Santa Rosa Creek since the 1960s.
San Bruno elfin butterfly	*Callophrys mossii bayensis*	FE	Inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco Peninsula, in the fog belt of north-facing slopes from 200 to 5,000 feet elevation; known host plant stonecrop (*Sedum spathulifolium*).	Historical range encompasses parts or all of the nine Bay Area Counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma). Current distribution is limited to four known populations of this species, all of which occur in San Mateo County.	None. All known populations are found in San Mateo County; the BSA is outside of the range of this species.
western bumble bee	*Bombus occidentalis*	SCE	Meadows and grasslands with an abundance of flowering plants and suitable habitat for overwintering. Overwintering habitat includes abandoned small mammal burrows and other underground cavities, often on north-facing slopes bordered by trees.	A single CNDDB occurrences from 1986 is located 4.5 miles west of the dam in the Santa Rosa Plains. Habitat in this area is open grasslands with abundant flowering plants that provide overwintering and foraging habitat.	Low. While the BSA contains grassland habitat, no California ground squirrel burrows were observed during the reconnaissance visit, which are necessary overwintering habitat for western bumblebees. In addition, the species' range has become restricted in recent years, and it now largely limited to high elevation areas in the Sierra Nevada and a few coastal locations (CDFW 2019). There are no recent occurrence records of the species, and therefore it is likely rare or absent from the BSA.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Fish					
coho salmon - central California coast ESU	*Oncorhynchus kisutch*	FE	Clean, clear, cool freshwater streams and rivers with gravel substrates and riffles for spawning and deep pools for juvenile rearing. Large woody debris and undercut banks to provide shelter from high velocity flows and predators. Freshwater habitats must be accessible from the ocean (i.e., free of passage barriers such as dams and, in the case of Matanzas Creek, long culverted reaches).	The nearest occurrences of coho salmon are in Mark West Creek (CDFG 2002, CDFW 2018). There are no records of coho salmon in Matanzas Creek.	Low. There are no reported occurrences of coho salmon in Matanzas Creek. There is a culvert that is likely a total passage barrier and numerous additional passage impediments on Matanzas Creek downstream of the BSA. The creek is intermittent from the dam to at least Bennett Valley Golf Course and would therefore be suitable only as migratory or rearing habitat when inundated. The dam is a complete passage barrier.
steelhead - central California coast DPS	*Oncorhynchus mykiss*	FT	Cool, clear streams with abundant cover and well-vegetated banks, with relatively stable flows. Pool and riffle complexes and cold gravelly streambeds for spawning. Freshwater habitats must be accessible from the ocean (i.e., free of passage barriers such as dams and, in the case of Matanzas Creek, long culverted reaches).	There is a single CNDDB occurrence 4.4 miles south of the dam in Copeland Creek, where steelhead were found in a scour pool just downstream of the Petaluma Hill Road culvert. A California giant salamander CNDDB occurrence notes that seine surveys detected steelhead on Santa Rosa Creek just north of Annadel State Park. Resident rainbow trout were found in Matanzas Creek downstream of the BSA during fish sampling efforts from 2005 to 2007 (Chase 2010).	Low. Steelhead historically occurred in Matanzas Creek (CDFG 2002, CDFG 2006, Sonoma Water 2003, NMFS 2008, City of Santa Rosa 2014), but anadromy is likely prevented by a long culvert, as well as numerous additional impediments, downstream of the BSA. Rainbow trout are present in Matanzas Creek downstream of the BSA, indicating that the creek contains at least marginally suitable habitat for *Oncorhynchus mykiss*. Matanzas Creek Dam is also a complete barrier to steelhead migration.
Chinook salmon - California coastal ESU	*Oncorhynchus tshawytscha*	FT	Streams and rivers with large deep pools and bedrock bottoms or plunge pools with bubble curtains and ledges that provide refugia. Gravel and small cobble bottom reaches with low silt content for spawning. Freshwater habitats must be accessible from the ocean (i.e., free of passage barriers such as dams and, in the case of Matanzas Creek, long culverted reaches).	There are no reported occurrences of Chinook salmon in Matanzas Creek. The Santa Rosa Citywide Creeks Master Plan reports that spawned-out Chinook salmon have been seen in Santa Rosa Creek between Calistoga Road and Farmers Lane, which is upstream of the confluence with Matanzas Creek (City of Santa Rosa 2014).	Low. There are no reported occurrences of Chinook salmon in Matanzas Creek. There is a culvert that is likely a total passage barrier and numerous additional partial or potential passage impediments on Matanzas Creek downstream of the BSA. The creek is intermittent from the dam to at least Bennett Valley Golf Course and would therefore be suitable only as migratory or rearing habitat when inundated. The dam is a complete passage barrier.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Russian River roach	*Lavinia symmetricus* ssp.	SSC	Small streams with clear, well oxygenated water, and cobble and boulder dominant substrates. Most commonly found in tributaries or at the confluence of tributaries with the Russian River.	Russian River roach were observed in Matanzas Creek more than 300 feet upstream of Matanzas Creek Dam during California red-legged frog surveys in 2010 (Sonoma Water 2010). Russian River roach were also observed in Matanzas Creek downstream of the BSA from E Street to Bethards Drive during fish sampling efforts in 2005, 2006, and 2007 (Chase 2010).	Present. Russian River Roach have been observed in the BSA and downstream of the BSA in Matanzas Creek.
Pacific lamprey, western river lamprey, and western brook lamprey	*Entosphenus tridentatus, Lampetra ayresi,* and *Lampetra richardsoni*	SSC	Optimal spawning habitat is found in gravel bottom pool tailouts and riffles of low gradient streams. Ammocoetes (larval lamprey) burrow into sandy or silty sediments in backwater pools or along stream edges.	Lamprey ammocoetes were observed in Matanzas Creek downstream of the BSA at Doyle Park in 2006 and at E Street and Hoen Avenue in 2007 (Chase 2010). These ammocoetes were not identified to species and therefore could have been Pacific lamprey, western river lamprey, or western brook lamprey.	Moderate. The range of all three species overlaps with the BSA and lamprey ammocoetes have been documented in Matanzas Creek downstream of the BSA. The portion of Matanzas Creek in the BSA downstream of the dam is intermittent and is therefore unsuitable for spawning or rearing. However, individuals may move into the BSA downstream of Matanzas Creek Dam when it is inundated.
Amphibians					
California red-legged frog	*Rana draytonii*	FT, SSC	Occurs in or near permanent water of streams, marshes, ponds, lakes, and other bodies of water from sea level to 4,921 feet in elevation. Frequently found in woodlands, grasslands, or other plant cover adjacent to streams. In summer, estivate in small mammal burrows, leaf litter, or other moist sites in or near riparian areas. Adults disperse into riparian corridors and in damp thickets and forests typically within 300 feet of aquatic habitat. However, during wet periods, they can travel up to 1 mile between aquatic features.	Five occurrences of California red-legged frogs are found within 5 miles of Matanzas Creek Dam. The closest occurrence to the dam is 0.8 mile northwest, where 1 adult and 25 California red-legged frog metamorphs were observed in a pond on the eastern flank of Taylor Mountain in 2017. California red-legged frogs have also been reported at a private pond in Bennett Valley, and at Annadel State Park, Taylor Mountain Park and Open Space Preserve, and Sonoma Mountain. Most records in the vicinity are from perennial ponds with emergent vegetation, surrounded by rangelands.	Moderate. There is one CNDDB occurrence within the species' 1-mile dispersal distance and several other occurrences in Bennett Valley, but occasional surveys in the BSA have been negative. Native aquatic and upland habitats are present but have been modified by anthropogenic activities. Optimal breeding habitat is not present in the BSA, although some features may provide occasional or marginal breeding opportunity, depending on inundation period, scour, and presence of predators.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
California tiger salamander	*Ambystoma californiense*	FT, ST	Found in grassland and oak savanna of the valleys and foothills. Requires vacant or mammal-occupied burrows (e.g., California ground squirrel, valley pocket gopher) for aestivation and standing water until late spring (May) for larvae to metamorphose. Adults may move as far as 1.24 miles between breeding ponds and upland aestivation sites. Breeding occurs in shallow ephemeral or semi-permanent pools and ponds that fill during heavy winter rains or in permanent ponds.	There are 25 occurrences of California tiger salamanders within 5 miles of Matanzas Creek Dam, all are west of Petaluma Hill Road in the Santa Rosa Plains. The nearest occurrence is found 2.5 miles from the dam. Habitat around the occurrences consists of natural and constructed wetlands and vernal pools surrounded by nonnative, grazed grasslands intermixed with residential development.	Low. The species is not known to occur in Bennett Valley. When Matanzas Creek and Reservoir are inundated, flows are too high to provide suitable aquatic habitat for the species. The surrounding uplands contain some scattered pocket gopher mounds, but California ground squirrel burrows were not observed on site; absence of ground squirrel burrows limits the suitability of the upland habitats in the BSA for California tiger salamander.
foothill yellow-legged frog (northwest/ north coast clade)	*Rana boylii*	SSC	Low-gradient, cobble-dominate perennial streams that are partially shaded. Dominant vegetation communities range broadly and include mixed chaparral, conifer, hardwood, wet meadows, and valley-foothill riparian forests. Breeding habitat in creeks are characterized by wide, shallow, sunny reaches, with cobble and boulder-sized substrates and stable flows.	There are four CNDDB occurrences of foothill yellow-legged frogs within 5 miles of Matanzas Creek Dam, the nearest of which is 3.9 miles from the dam. All four occurrences are from along Copeland and Cane Creek south of the project. Both creeks have mature riparian canopies with willows, alders, and maples and have low gradients with rocky substrates that provide quality breeding habitat. Frogs were found cohabitating with California red-legged frogs and American bullfrogs.	High. While there are no CNDDB records of foothill yellow-legged frogs in the Matanzas Creek watershed, there is suitable cobble-dominated, partially shaded stream habitat in Matanzas Creek in the BSA upstream of Matanzas Creek Reservoir. Populations in Sonoma County are part of the Northwest/North Coast Clade and State listing of this clade is considered not warranted.
California giant salamander	*Dicamptodon ensatus*	SSC	Moist refugia in coastal forests (Douglas fir, redwood and montane and valley-foothill riparian) adjacent to rocky perennial and semi-perennial streams that provide suitable breeding habitat. Occasionally in lakes and ponds.	There is a single CNDDB occurrence 3.5 miles north of the dam along Santa Rosa Creek. Habitat in this vicinity includes oak woodland and mixed riparian woodland along a perennial creek.	High. Suitable riparian habitat is present in the BSA along Matanzas Creek, and Matanzas Creek in the upper portion of the BSA contains suitable intermittent stream habitat.
Reptiles					
green sea turtle	*Chelonia mydas*	FT	Beaches for nesting, open ocean convergences zone, and coastal areas for benthic feeding (seagrass and algae). Globally distributed in tropical and subtropical waters. In California, they most commonly occur while foraging in coastal waters near San Diego.	There are no CNDDB occurrences for this species within 5 miles of Matanzas Creek Dam.	None. This species is found in open water marine habitats and sandy beaches. The BSA contains oak woodland, riparian, and grassland habitats and is therefore not suitable for this species.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
western pond turtle	*Emys marmorata*	SSC	Natural and man-made aquatic habitats with open muddy banks, partially submerged logs, rocks, or matted emergent vegetation for basking. Breeding occurs from March to August when females find suitable egg-laying habitats along stream and pond banks. Aquatic habitats with rocky or mud bottoms are preferred and often found in woodland, forest, and grassland areas.	There are ten CNDDB records for western pond turtle within 5 miles of Matanzas Creek Dam, two of which were recorded in Matanzas Creek or the reservoir area 0.1 mile from the dam. Habitat at these sites consists of perennial streams and freshwater ponds with sand to cobble substrates. Creek habitats are lined with mature riparian woodland dominated by oaks, bay laurel, and big leaf maple. While pond habitats are found with emergent vegetation including bulrush and cattail.	Present. This species has been found in the past in Matanzas Creek in the BSA as recently as 2006. Upland habitat in the BSA contains riparian and oak woodland habitat that may provide both basking and breeding habitat for the species. Suitable aquatic habitat is intermittently present in Matanzas Creek and Reservoir.
Birds					
northern spotted owl	*Strix occidentalis caurina*	FT	Unfragmented old growth mixed-conifer forests with multi-layered canopy and fragmented Douglas fir (*Pseudotsuga menziesii*), and redwood (*Sequoia sempervirens*) forests. Preferred habitat is typically characterized by dense canopy closure with a variety of different species, habitat structures, and open spaces to allow flight under the canopy. Spotted owls nest in treetops, tree cavities, caves, and cliff edges.	There is a single activity center for this species in Annadel State Park, north of the project. There are five positive survey records associated with this activity center within 5.0 miles of Matanzas Creek Dam. Habitat near this occurrence is dense coniferous forest.	Low. Requires old growth and mature redwood or coniferous forests. Habitat in the BSA consists primarily of grassland, oak woodland, and riparian habitats that are unsuitable for northern spotted owl.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT, SE	Woodlands, willow thickets, deciduous forests, abandoned farmland, and areas with scrubby overgrown vegetation along riparian corridors and marshlands. Nesting typically occurs from May through September along low gradient streams with cottonwood-willow groves.	A single CNDDB record for yellow-billed cuckoo is found in the project vicinity, 4.2 miles from the dam. Birds were observed along Copeland Creek near the Sonoma State College Campus in 1975. The creek is bordered by mature riparian habitat with oaks, bay laurels, alders, and maples and blackberry and willow thicket understory. There are no nearby eBird occurrences.	Low. Breeding populations in California are believed to occur only in the Sacramento River Valley, the South Fork Kern River Valley, and the Colorado River Valley (Point Blue 2014). The lack of recent CNDDB or eBird occurrences in Bennett Valley and the greater region around Santa Rosa suggests that few individuals stray into the area, if any.
tricolored blackbird	*Agelaius tricolor*	ST, SSC	Uses banks of aquatic habitat, typically emergent wetlands, for nesting. These areas are characterized by dense cattails, tules, blackberry, willows, or other emergent and riparian vegetation. Feeding typically occurs in grassland and cropland habitats near to, or many miles from breeding habitat. Tricolored blackbirds are colonial nesters.	There is a single CNDDB occurrence for this species 4.3 miles from the dam, listed by CNDDB as possibly extirpated. A colony of nesting tricolored black birds was observed along Copeland Creek, south of the project, nesting in blackberry and willow thickets adjacent to the creek. No birds were found in surveys in 2011, 2014, and 2015. There are several eBird occurrences within 5 miles of the dam; the closest occurrences is approximately 3.5 miles away.	Moderate. There is low potential for breeding in the BSA due to the presence of marginal riparian nesting habitat and the lack of recent observations; however, individuals from nearby wetlands may forage in the grasslands in the BSA.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
golden eagle	*Aquila chrysaetos*	FP	Open country including mountains, foothills, desserts, prairies, and rangelands that provide an abundance of small mammals for hunting and some carrion. Foraging habitat is also found along rivers and marshlands. Golden eagles typically use cliffs with overhanging ledges and large trees to build nests and take cover.	A single nest location was recorded by CNDDB just over 5 miles southeast of the dam. Habitat in this vicinity is oak savanna and oak woodland near Sonoma Mountain. There are numerous eBird occurrences of golden eagle within 5 miles of the dam.	High. There is high potential for individuals to forage in the BSA. Although the BSA lacks cliffs with overhanging ledges suitable for nesting, golden eagles have low potential to nest in the large trees in the BSA.
white-tailed kite (nesting)	*Elanus leucurus*	FP	Open grasslands, emergent wetlands, meadows, and farmlands with sparse trees for perching and nesting, and ample prey for hunting. Nesting occurs in trees with dense canopies for cover, often oaks or willows. Breeding typically occurs from February to October, peaking between May and August.	A single CNDDB occurrence for white-tailed kite was recorded 3.8 miles west of the dam, in the Santa Rosa Plains. Habitat at the potential nest location was comprised of mature landscape trees in a low-density residential area surrounded by grassland habitat. There are numerous eBird occurrences of white-tailed kite in Bennett Valley, the closest of which is less than 0.5 mile from the dam along Bennett Valley Road near Carrithers Road.	Present. The BSA contains a mix of grassland, riparian, and oak woodland habitats which provide suitable nesting and foraging habitats for the species. A pair of white-tailed kites exhibiting courtship behavior was observed in the auxiliary spillway at Matanzas Creek Dam in February 2021.
burrowing owl	*Athene cunicularia*	SSC	Nesting in abandoned small mammal burrows in grassland and desert habitats. Open grasslands with sparse shrubs and limited taller vegetation.	A single CNDDB occurrence from 2002 is found 4.1 miles south of the dam. Habitat in the vicinity is open grasslands and agriculture crops. There are no nearby eBird occurrences.	Low. California ground squirrel burrows were not observed in the grassland habitat in the BSA, which limits the suitability of the habitat for burrowing owls. The lack of eBird occurrences and recent CNDDB occurrences indicates that the species is uncommon in the vicinity of the BSA.
yellow rail	*Coturnicops noveboracensis*	SSC	Densely vegetated meadows and marshes with moist soils or shallow standing water. Wet meadows and coastal tidal marshes may be occupied in the winter.	A single CNDDB occurrence from 1912 is found 4.1 miles north of the dam. Habitat in this vicinity is now residential but in 1912 was likely low flat grasslands and intermittent streams. There are no nearby eBird occurrences.	None. The BSA lacks the permanent wet meadow or marsh habitat required by the species.
yellow warbler (nesting)	*Setophaga petechia*	SSC	Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	There are no CNDDB records of yellow warbler within 5 miles of Matanzas Creek Dam, but there are numerous eBird occurrences within 5 miles.	High. The BSA contains suitable riparian habitat to support nesting and foraging and there are numerous records of the species in the vicinity of the BSA.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
loggerhead shrike (nesting)	*Lanius ludovicianus*	SSC	Occurs in broken woodlands, savannah, and riparian woodlands, among other habitats. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	There are no CNDDB records of loggerhead shrike within 5 miles of Matanzas Creek Dam, but there are two eBird occurrences within 5 miles.	Moderate. The BSA contains suitable grassland habitat for hunting, and the riparian and oak woodland habitats may be suitable for nesting. There are few records of the species in the vicinity of the BSA, indicating that they may be uncommon in the area.
northern harrier (nesting)	*Circus cyaneus*	SSC	Associated with coastal salt and freshwater marshes. Nests and forages in grasslands. Nests are placed on the ground in shrubby vegetation, usually at marsh edge.	There are no CNDDB records of northern harrier within 5 miles of Matanzas Creek Dam, but there are numerous eBird occurrences within 5 miles and a northern harrier was observed at the dam spillway during the January 19, 2021 reconnaissance visit.	Present. A northern harrier was observed in the BSA during the January 19, 2021 reconnaissance visit and there are numerous records of the species in the vicinity. However, the BSA does not contain suitable marsh habitat to support nesting.
yellow-breasted chat (nesting)	*Icteria virens*	SSC	Inhabits riparian thickets of willow and other brushy tangles near watercourses. Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 feet of ground.	There are no CNDDB records of yellow-breasted chat within 5 miles of Matanzas Creek Dam, but there are several eBird occurrences within 5 miles.	High. The BSA contains suitable riparian habitat to support nesting and foraging and there are several records of the species in the vicinity of the BSA.
Mammals					
pallid bat	*Antrozous pallidus*	SSC	Dry, open, desert-like habitats with rock crevices, abandoned buildings, caves, mines, or hollow trees for roosting. In northern California they are found in low elevation oak savannah habitats and have been observed roosting in oak cavities.	There is a single CNDDB occurrence located 3.8 miles northeast of the dam. Habitat in this area consisted of a day roost in a residential building, surrounded by oak woodland and vineyards.	High. Oak woodland habitat in the BSA may provide suitable foraging and potential roosting habitat.
Plants					
Sonoma alopecurus	*Alopecurus aequalis* var. *sonomensis*	FE, 1B.1	Freshwater marshes, swamps, and riparian scrublands in Sonoma and Marin Counties. Elevations between 15 and 1,200 feet. Bloom period: May - July.	There is a single CNDDB occurrence 2.7 miles east of the dam found in Ledson Marsh inside Annadel State Park. USFWS identified the only extant population in Sonoma County of this species, as the one found in Annadel State Park. Habitat in Ledson Marsh for Sonoma alopecurus is along the shallow, semi-upland area at the border of the marsh.	Low. Potentially present in freshwater marsh and riparian habitat in the BSA.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
two-fork clover	*Trifolium amoenum*	FE, 1B.1	Coastal bluff scrub, swales, and valley and foothill grassland. Occasionally found on serpentinite derived soils. Elevations between 15 and 1,360 feet. Bloom period: April - June.	There is a single natural population of this species in Marin County, two experimental populations in the Point Reyes National Seashore, and two experimental populations in Sonoma County. The dam is located 4.8 miles west of a CNDDB occurrence for this species in the town of Kenwood.	Low. The BSA is farther from the coast than this species is typically found.
white sedge	*Carex albida*	FE, SE	Freshwater marshes, meadows, and seeps in Sonoma County. Bloom period: May - July.	There are no CNDDB occurrences recorded within 5.0 miles of the project. There is one known population of this plant species in Pitkin Marsh in Sonoma County. The marsh is a riparian wetland fed almost year-round by underground seeps.	None. There is only one known population of this species in Sonoma County at Pitkin Marsh, which does not overlap with the BSA. Additionally, this species is no longer recognized and is synonymous with the common *Carex lemmonii*.
Sonoma sunshine	*Blennosperma bakeri*	FE, SE, 1B.1	Vernal pools and wet grasslands with clay and loam soils at elevations below 330 feet. Only known to occur in Sonoma and Mendocino Counties. Bloom period: March - May.	Five CNDDB occurrences for this species are found west of the project in Santa Rosa Plain, the nearest 3.0 miles from the dam. Plants were found in both natural and created vernal pool and seasonal wetland habitats surrounded by grazed grassland.	Low. Potentially present in seasonal wetlands found in the dam spillway, although BSA is above the known elevational range for this species.
Burke's goldfields	*Lasthenia burkei*	FE, SE, 1B.1	Vernal pools, meadows and seeps with sloping loams, clay loams, and clay soils. Elevations less than 1,640 feet. Bloom period: April - June.	Three CNDDB occurrences of this species are found in the Horn Avenue Mitigation Bank, the nearest 3.0 miles from the dam. Habitat at this site includes created vernal pool habitats where natural clay soils have formed but Burke's goldfields were seeded.	Low. Potentially present in seasonally ponded depressions that have formed in the auxiliary spillway. However, in Sonoma County this species is known from lower elevations and soil types not present in the BSA.
Sebastopol meadowfoam	*Limnanthes vinculans*	FE, SE, 1B.1	Meadows and seeps, valley and foothill grasslands, stream banks, and Northern Basalt Flow and Northern Hardpan vernal pools. This species is also known to occur in artificial habitats like ditches. Elevations less than 980 feet. Bloom period: April - May.	There are five CNDDB occurrences for this species, all recorded east of the project in the Santa Rosa Plains. The nearest occurrence is 3.0 miles from the dam. Records of this species include populations found in both natural and created vernal pool and seasonal wetland habitat. Created wetlands are located at the Horn Avenue Mitigation Bank.	Low. Potentially present in seasonally ponded depressions that have formed in the auxiliary spillway. However, the BSA is outside of the typical elevation range of this species in Sonoma County.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Kenwood Marsh checkerbloom	*Sidalcea oregana* ssp. *Valida*	FE, SE, 1B.1	Freshwater marshes and swamps in Sonoma county. Elevations less than 500 feet. Bloom period: June - September.	This species is known from two populations, one at Kenwood Marsh on the Deerfield Ranch Winery and the other at Knights Valley, both in Sonoma County. The dam is located approximately 5 miles west of the population located at Kenwood Marsh. Kenwood Marsh is a freshwater marsh surrounded by grassland adjacent to Sonoma Creek.	Low. Potentially present in freshwater marsh habitat in the BSA. However, marsh habitat in the BSA is limited and dries seasonally.
Clara Hunt's Milk-vetch	*Astragalus clarianus*	FE, ST, 1B.1	Chaparral, cismontane woodlands, and valley and foothill grasslands on thin rocky clay soils derived from serpentine, or volcanic rock. Found at elevations between 250 and 740 feet in eastern Sonoma and northwestern Napa Counties. Bloom period: March - May.	There are no CNDDB occurrences recorded within 5.0 miles of the project. The species is known to occur at 5 sites: Bale Grist Mill State Historic Park, Lewelling Lane, Spring Valley and Saint Helena Roads, and Lake Hennessey, none of which are within 5.0 miles of the project.	Low. Volcanic and metavolcanics soils (Goulding, Spreckels, Toomes) present in the BSA, but all known occurrences are from the Santa Rosa Plain.
North Coast semaphore grass	*Pleuropogon hooverianus*	ST, 1B.1	Meadows, seeps, and other open wet grassy areas in broadleaf upland forests, and north coast coniferous forests. Elevations less than 4,265 feet. Bloom period: April - June.	A single CNDDB occurrence for this species is found 3.0 miles south of the dam. Habitat in this area is freshwater marsh in an oak woodland.	Moderate. Potentially present in mesic grassland, freshwater marsh, or seep habitats in the BSA.
Rincon Ridge manzanita	*Arctostaphylos stanfordiana* ssp. *decumbens*	1B.1	Chaparral and cismontane woodlands in Sonoma and Napa Counties. Elevations below 330 feet. Bloom period: February - April.	Three CNDDB occurrences are recorded in the project vicinity, the nearest 3.8 miles north of the dam is now extirpated. However, the remaining two occurrences are extant and found in rocky chaparral communities.	Low. No chaparral habitat or Arctostaphylos individuals observed during the reconnaissance visit. No chaparral communities mapped in the Sonoma Veg Map.
Rincon Ridge ceanothus	*Ceanothus confusus*	1B.1	Volcanic slopes of coniferous forests, chaparral, and cismontane woodlands. Elevations between 250 and 3,600 feet. Bloom period: February - June.	There is one CNDDB occurrence for this species within 5.0 miles of the project. This occurrence is 4.6 miles north of the dam along Rincon Ridge in chaparral patches of a broader grassland habitat.	Low. No chaparral habitat or Ceanothus individuals observed during the reconnaissance visit. No chaparral communities mapped in the Sonoma Veg Map.
legenere	*Legenere limosa*	1B.1	Vernal pools, ponds, and wet meadows. Elevations less than 3,100 feet. Bloom period: April - June.	There is a single CNDDB occurrence for this species 5.0 miles east of the dam. The occurrence is noted as extirpated due to the creation of a landfill where vernal pool habitat used to be present.	Low. Potentially present in seasonally ponded depressions that have formed in the auxiliary spillway, but less likely due to lack of known, extant occurrences in Sonoma County.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Baker's navarretia	*Navarretia leucocephala* ssp. *bakeri*	1B.1	Vernal pools in cismontane woodlands, lower coniferous forests, and valley and foothill grasslands. Elevations less than 5,500 feet. Bloom period: April - July.	Five CNDDB occurrences for this species are found east of the project in the Bennett Mountain area. The nearest occurrence is 2.4 miles from the dam. All occurrences were recorded in vernal pools or mesic habitats.	Moderate. Potentially present in seasonally ponded depressions that have formed in the auxiliary spillway.
Santa Cruz clover	*Trifolium buckwestiorum*	1B.1	Gravelly margins of broadleaved upland forests, cismontane woodlands, and costal prairies. Elevations less than 2,330 feet. Bloom period: April - October.	A single CNDDB occurrence for this species is found 3.2 miles northwest of the dam. Habitat where the species was found was hard panned clay in a graded field.	Low. Potentially present in grassland and oak woodland habitats in the BSA.
Franciscan onion	*Allium peninsulare* var. *franciscanum*	1B.2	Dry hillsides in cismontane woodlands, and valley and foothill grasslands. Found on clay, volcanic, and serpentine soils at elevations less than 1,000 feet. Bloom period: April - June.	A single CNDDB occurrence for the species is found 3.6 miles east of the dam in the cismontane woodland and valley and foothill grassland habitat around Kenwood.	Low. Volcanic soils are present in the BSA.
Napa false indigo	*Amorpha californica* var. *napensis*	1B.2	Chaparral, cismontane woodland, and openings in broadleaved upland forests. Elevations less than 2,600 feet. Bloom period: April - July.	Two CNDDB occurrences for this species are found within 5.0 miles, the nearest 3.0 miles from the dam found within a wet meadow grassland.	Low. Potentially present in oak woodland openings in the BSA.
bent-flowered fiddleneck	*Amsinckia lunaris*	1B.2	Coastal bluff scrub, cismontane woodland, and valley and foothill grasslands. Elevations between 160 and 2,600 feet. Bloom period: March - June.	A single CNDDB occurrence for the species is found 2.8 miles northwest of the dam. Habitat in this vicinity is low density residential surrounded by grazed grasslands.	Low. Potentially present in grassland and oak woodland habitats in the BSA.
big-scale balsamroot	*Balsamorhiza macrolepis*	1B.2	Chaparral, cismontane woodlands, and valley and foothill grasslands. Sometimes found on open rocky, serpentine derived soils. Elevations less than 4,500 feet. Bloom period: March - June.	Two CNDDB occurrences for this species are found east of the project in basalt outcrops adjacent to reservoirs, 1.0 mile from the dam. Habitat surrounding reservoirs is cismontane woodland, and valley and foothill grassland on a ranch property.	Low. No serpentine soils present in the BSA.
narrow-anthered brodiaea	*Brodiaea leptandra*	1B.2	Open mixed evergreen forests and chaparral with rocky, volcanic derived soils. Elevations between 130 and 4,000 feet. Bloom period: May - July.	There are two CNDDB occurrences for this species found north and northeast of the project in rocky soils of chaparral habitat, the nearest sits 2.2 miles from the dam.	Low. No chaparral habitat in the BSA.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Calistoga ceanothus	*Ceanothus divergens*	1B.2	Chaparral habitat with rocky, serpentinite or volcanic derived soils. Elevations between 500 and 3,100 feet. Bloom period: February - April.	Seven CNDDB occurrences for this species are recorded along Bennett Mountain and Mount Hood, the nearest 2.3 miles from the dam. Multiple of the occurrences are in Annadel State Park. Habitat where the species was recorded is predominantly chaparral and cismontane woodlands.	Low. No chaparral habitat or serpentinite soils present in the BSA.
holly-leaved ceanothus	*Ceanothus purpureus*	1B.2	Chaparral and cismontane woodlands with rocky volcanic derived soils. Elevations between 475 and 2,200 feet. Bloom period: February - June.	A single CNDDB occurrence for this species is recorded 2.8 miles from the dam. Habitat in the vicinity of the occurrence includes cismontane woodlands, chaparral, and valley and foothill grasslands.	Low. No chaparral habitat present in the BSA.
Sonoma ceanothus	*Ceanothus sonomensis*	1B.2	Sandy, serpentinite or volcanic derived soils in chaparral communities. Elevations between 450 and 2,000 feet. Bloom period: February - April.	Seven CNDDB occurrences for this species are recorded along Bennett Mountain and Mount Hood, the nearest 2.8 miles from the dam. Habitat where the species was recorded is predominantly chaparral on north-west and south-facing slopes.	Low. No chaparral habitat or serpentinite soils in the BSA.
fragrant fritillary	*Fritillaria liliacea*	1B.2	Cismontane woodlands, coastal prairie, coastal scrub, and valley and foothill grasslands. This species is often found on serpentine derived soils on open hillsides. Elevations less than 650 feet. Bloom period: February - April.	There are six CNDDB occurrences for this species mapped in the project vicinity. The nearest is found 1.1 miles from the dam. Multiple records are in Annadel State Park where habitat present is mesic grassland at the edge of an oak woodland. Rocky, volcanic-derived soils in grasslands are habitats associated with records outside Annadel State Park.	Moderate. Potentially present in grassland and oak woodland habitats in the BSA.
congested-headed hayfield tarweed	*Hemizonia congesta* ssp. *congesta*	1B.2	Valley and foothill grasslands and marsh edges. Elevations less than 330 feet. Bloom period: April - November.	A single CNDDB occurrence for this species is mapped 4.8 miles southeast of the project. Habitat in this vicinity consists of open canopy grassland.	Moderate. Potentially present in grassland habitats in the BSA.
Colusa layia	*Layia septentrionalis*	1B.2	Chaparral, cismontane woodlands, and valley and foothill grasslands with sandy, serpentine derived soils. Elevations between 330 and 2,950 feet. Bloom period: April - May.	There is a single occurrence for this species 0.7 mile from the dam in Annadel State Park.	None. No serpentine soils present in the BSA.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Jepson's leptosiphon	*Leptosiphon jepsonii*	1B.2	Chaparral, cismontane woodlands, and valley and foothill grasslands with volcanic derived soils. Typically found on partially shaded or open grassy slopes at elevations less than 1,640 feet. Bloom period: March - May.	There are three CNDDB occurrences for this species recorded throughout the project vicinity, the nearest 3.2 miles from the dam. Habitat found in the record vicinity is vernally wet grassland surrounded by oak woodland.	Moderate. Potentially present in grassland and oak woodland habitats in the BSA.
saline clover	*Trifolium hydrophilum*	1B.2	Marshes and swamps, mesic and alkaline lowlands in valley and foothill grasslands, and vernal pools. Elevations less than 980 feet. Bloom period: April - June.	Three CNDDB occurrences for this species are found within 5.0 miles of the project, the nearest 1.2 miles north west of the dam. Two of the CNDDB occurrences are presumed extirpated due to development of historical vernal pool habitat.	None. No salt marsh or suitable alkaline vernal pool habitats are present in the BSA.
coastal triquetrella	*Triquetrella californica*	1B.2	Found within 10 miles of the coast in costal bluff scrub, coastal grasslands, and coastal scrub habitats. Elevations less than 1,600 feet.	There is a single CNDDB occurrence for this species 2.9 miles north of the dam. Habitat at this site is comprised of a west-facing hillside on thin damp soils surrounded by oak woodland and grassland habitat.	None. BSA is not close enough to the coast and does not contain coastal scrub or coastal grassland habitat.
dwarf downingia	*Downingia pusilla*	2B.2	Vernal pools in meadows, and valley and foothill grasslands. This species is also known to occur in roadside ditches that provide vernally inundated habitat. Elevations less than 1,400 feet. Bloom period: March - May.	There is a single CNDDB occurrence 4.0 miles southwest of the dam on the northern side Bennett Valley Road. Habitat present at the site includes two separate vernal pools.	Moderate. Potentially present in seasonally ponded depressions that have formed in the auxiliary spillway.

Notes:
BSA – Biological Study Area
CDFW – California Department of Fish and Wildlife
CNDDB – California Natural Diversity Database
DPS – Distinct Population Segment
ESU – Evolutionarily Significant Unit
FE – Federally Endangered
FP – CDFW Fully Protected Species
FT – Federally Threatened
SCE – Candidate for State Listing as Endangered
SE – State Endangered
SSC – CDFW Species of Special Concern
ST – State Threatened
USFWS – United States Fish and Wildlife Service

California Rare Plant Ranks:

1B.1 – Rare throughout its range; seriously threatened in California (more than 80 percent of occurrences threatened/high degree and immediacy of threat)
1B.2 – Rare throughout its range; moderately threatened in California (20 to 80 percent of occurrences threatened/moderate degree and immediacy of threat)
2B.2 – Rare, threatened, or endangered in California but more common elsewhere; moderately threatened in California

Appendix D.5. Botanical Assessment

Botanical Assessment
Matanzas Creek Dam Watershed Rehabilitation Project
Santa Rosa, Sonoma County
December 2021

Prepared for:
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1 Introduction

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) is completing a dam assessment in the Matanzas Creek watershed in Sonoma County, California. The dam was constructed in 1964 to control flooding in the City of Santa Rosa and reduce sedimentation in the creek downstream (City of Santa Rosa 2006). The site is owned and managed by Sonoma Water. NRCS, in collaboration with Sonoma Water, is evaluating potential changes to the dam to ensure it meets NRCS design criteria. Project alternatives are currently being developed.

As part of project planning, AECOM, under contract with Jones & DeMille Engineering, requested Prunuske Chatham, Inc. (PCI) complete rare plant surveys for the project site to assist with project planning. This report summarizes PCI's findings, with a general description of botanical conditions as well as a determination of the potential for rare plants to occur; it is intended to supplement AECOM's (2021) Summary of Existing Environmental Conditions and Draft Aquatic Resources Delineation for the project. AECOM (2021) provided additional project background, maps, and general biological resource findings based on literature review and reconnaissance-level fieldwork. Project participants will draw on the findings presented here in preparation of a NEPA Environmental Assessment. No specific project plans have been developed yet, so no impact findings are presented.

2 Methods

Background Review

A background literature and database search was conducted prior to fieldwork. Soil data (NRCS 2021, USDA 1972) and existing vegetation mapping data (Sonoma Veg Map 2021) were reviewed. To help determine the potential for special-status plants to occur on or adjacent to the project site, the California Natural Diversity Database (CNDDB[1]; CDFW 2021) and Calflora databases were reviewed. The CNDDB review focused on reported occurrences for the Santa Rosa 7.5-minute USGS quadrangle where the project site is located and the adjacent quads (Cotati, Glen Ellen and Kenwood).

[1] The California Natural Diversity Data Base (CNDDB), maintained by the California Department of Fish and Wildlife (CDFW), is a repository of information on sightings and collections of rare, threatened, or endangered plant and animal species within California. CNDDB reports occurrences of special-status species that have been entered into the database and does not generally include inventories of more common animals or plants. The absence of a species from the database does not necessarily mean that they do not occur in the area, only that no sightings have been reported. In addition, sightings are subject to observer judgment and may not be entirely reliable as a result.

Field Surveys

Botanical surveys were conducted on March 26 and April 16, 2021 by PCI's Principal Vegetation Ecologist, Joan Schwan, M.S., and on June 2, 2021 by Ms. Schwan and PCI Ecologist Ayla Mills, M.S. Both Ms. Schwan and Ms. Mills are experienced in the study and assessment of California vegetation. PCI's Senior Biologist, Jennifer Michaud, M.A., also visited the site for a wildlife habitat assessment on February 18 and 23, 2021; Ms. Michaud is also familiar with regional vegetation and made additional observations of early-season conditions. The Study Area included the Matanzas Reservoir, the dam/spillway area, and the surrounding lands owned and managed by Sonoma Water; see Figure 1.

Botanical surveys were conducted to characterize plant communities, compile an inventory of species observed, and to evaluate the potential for presence of special-status plant species. During each survey, areas of potential disturbance were traversed on foot. Some locations were inaccessible due to terrain or land ownership restrictions.

Because vernal pool habitat is present on the site and several listed plant species [Sebastopol meadowfoam (*Limnanthes vinculans*), Sonoma sunshine (*Blennosperma bakeri*), and Burke's goldfields (*Lasthenia burkei*)] occur in vernal pools in the project region, reference site visits were also conducted to confirm the phenology of listed species and ensure that project site visits were appropriately timed for identification. Reference sites were the Alton Lane Preserve (privately owned, located on Alton Lane just west of Fulton Road) and Haroutunian South Preserve (owned by Sonoma Ag + Open Space, located on Scenic Avenue just west of Highway 101). Alton Lane Preserve supports all three of the listed species, and Haroutunian supports Sonoma sunshine. Ms. Schwan also visited the Balletto Easement on the Laguna de Santa Rosa, where Sebastopol meadowfoam was recently successfully reintroduced. Reference site visits occurred on the following dates:

- Alton Lane: 3/31/21, 4/15/21, 4/30/21
- Haroutunian: 3/31/21
- Laguna de Santa Rosa, Balletto Easement: 4/11/21

These reference site visits were timed to coincide with peak blooming periods for the three species of interest, which all occur in spring. The reference site visits also confirmed that these annual species are indeed visible in the study year. Although drought conditions appeared to reduce the plant populations and in some cases plant stature, the three focal species were all readily observed and identifiable at the time of surveys, with Sonoma sunshine at their peak bloom in the late March visit, Sebastopol meadowfoam in mid-April, and Burke's goldfields in late April.

The project site field survey conformed to USFWS Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed Plants on the Santa Rosa Plain

[Appendix D of the 2005 Santa Rosa Plain Conservation Strategy (USFWS 2005)] and CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (2018).

All plants observed were identified using the Jepson eFlora (Jepson Flora Project 2021) to the taxonomic level necessary to determine whether or not they were rare. Botanical nomenclature follows the Jepson eFlora. Representative plant species observed within the project site are provided in the sections that follow. For a full list of all plant species observed within the project site, see Section 6. Vegetation types were identified based on visual assessment in the field and comparison with Manual of California Vegetation (CNPS 2021a) definitions; no detailed quantitative data was collected. Limited mapping of noteworthy vegetation types, such as native grassland, was conducted. This data was collected using a Trimble TDC 150 sub-meter GPS unit.

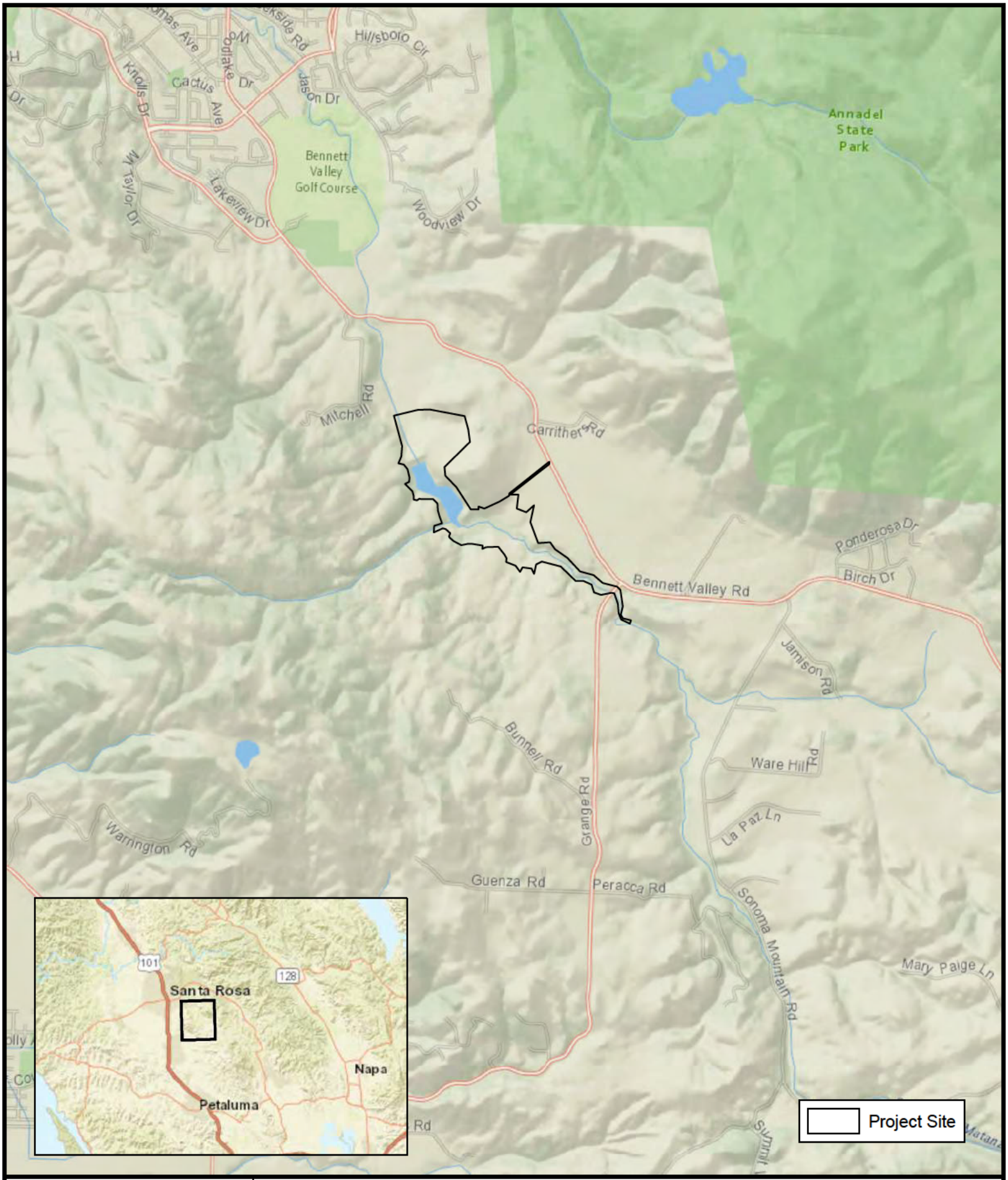
3 Setting

Matanzas Reservoir is the result of construction of an on-channel dam constructed on Matanzas Creek in Bennett Valley, Sonoma County. The site is located 0.7 miles south of Santa Rosa city limits and directly west of Bennett Valley Road (see Figure 1). The project site includes the reservoir upstream of the dam; principal spillway outlet, stilling basin, and outlet channel (downstream reach of Matanzas Creek); auxiliary spillway; dam; and surrounding lands owned and maintained by Sonoma Water. It comprises 118 acres and five assessor parcels (APNs 049-130-006; 049-150-009 and 010; 049-060-009 and 054), and is mapped on the Santa Rosa USGS 7.5' quadrangle (38.405872°N and 122.653254°W at dam) at approximately 375' to 425' in elevation. Matanzas Creek is an 11.4-mile-long stream originating on the northern slopes of Sonoma Mountain. The stream flows north through Bennett Valley and joins Santa Creek near the Luther Burbank Home and Gardens in downtown Santa Rosa. From there, Santa Rosa Creek joins the Laguna de Santa Rosa, Mark West Creek, and the Russian River before reaching the Pacific Ocean.

The project site is located at the base of Taylor Mountain's southeast side; terrain ranges from steep along the west side of the creek (especially at upstream and downstream ends and on dam faces), to gently undulating elsewhere. Land uses surrounding the project site include open space, rural residential properties, and vineyards.

4 Soils

Soil qualities can be important drivers of biological resource conditions. For example, soil types can strongly influence plant community composition, plant development, wetland potential, and erosion potential, which in turn can affect vegetation and aquatic habitat conditions. The Matanzas Creek Dam site includes areas of relatively intact soils, as well as areas that have been highly disturbed by dam creation. Soil maps for the region provide general information about soil types present, but generally do not provide information about human alterations to those types.



PRUNUSKE CHATHAM, INC.

Figure 1. Project Location
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

0 0.125 0.25 0.5 Miles

July 2021
Topo: ESRI

Six different soil series, as well as "Riverwash," are mapped in the Study Area (AECOM 2021, NRCS 2021). Most of the mapped types (i.e., Goulding, Los Robles, Spreckels, Toomes) are derived from volcanic or metavolcanic rock; the remainder (i.e., Yolo, Haire, and Riverwash) are associated with alluvial settings (USDA 1972). Volcanic and metavolcanic soils are often associated with plant communities that are rich in native plant species, and sometimes support rare plant species. See AECOM (2021) for a map of soil types.

5 Plant Communities

The site supports native upland and aquatic communities, but has also been significantly altered by human activities. In general, habitats closest to the dam and spillway areas are the most highly altered, but these still support patches of dense native cover. Farther from the dam and wetted area of the reservoir, high quality native habitat is present.

Most of the site supports grassland or oak woodland. Forest habitat is present in riparian stands along Matanzas Creek and on the site's western slopes. Wetlands occur along the fringes of the creek and reservoir, and in several isolated locations within the dam's auxiliary spillway. Patches of shrub-dominated habitats are scattered throughout the project area.

The table below summarizes natural vegetation types present, including the map class used by the Sonoma Veg Map project and (as applicable) the vegetation alliances within each observed by PCI. Vegetation types that are highly altered or managed and have no potential to support native plant diversity (i.e., vineyards) are not included. Detailed descriptions of each vegetation type follow the table. See Figure 2 for a map of vegetation types, based on Sonoma Veg Map data with refinements by AECOM (2021) and PCI, based on field assessments.

Table 1. Vegetation Types in the Biological Study Area

Vegetation Type	Sonoma Veg Map Class and Vegetation Alliances Observed	Sensitivity[2] and CDFW Rank[3]	Location in the Study Area
Wetland	Western Northern American Freshwater Marsh Macrogroup ▪ Pale spikerush marshes (*Eleocharis macrostachya* Alliance) ▪ Cattail marshes (*Typha* spp. Alliance) ▪ Rush marshes (*Junus phaeocephalus* Alliance)	Yes, based on wetland setting ▪ G4S4 ▪ G5S5 ▪ G4?S4?	Adjacent to channel above and below dam; isolated vernal pools in disturbed auxiliary spillway areas
Grassland	California Annual and Perennial Grassland Macrogroup ▪ Non-native Grassland - Wild oats and annual brome grasslands (*Avena spp. – Bromus* spp. Semi-natural Alliance) - Harding grass swards (*Phalaris aquatica* Alliance) ▪ Native Grassland - Needle grass grassland (*Stipa* spp. Alliance) - California brome – blue wildrye prairie (*Bromus carinatus – Elymus glaucus* Alliance)	Yes, for native grassland types only - NR - NR - G3S3 - G3S3	Common throughout
Shrublands and Willow Thickets	Coyote Brush Scrub *(Baccharis pilularis* Alliance)	No - S5G5	Limited stands adjacent to riparian forest
	Non-native Shrub ▪ Broom patches (*Spartium junceum* Semi-natural Alliance)	No - NR	Disturbed areas including at base of dam
	Himalayan Blackberry Scrub *(Rubus armeniacus* Alliance)	No - NR, except where associated with wetland or riparian	Disturbed, moist areas including near outlet channel

[2] Sensitivity based on federal (U.S. Army Corps of Engineers; Section 404) and state (CDFW) regulations. Alliances ranked S1, S2, or S3 are considered "sensitive natural communities" by CDFW (CDFW 2020). Non-native alliances (a.k.a. Semi-natural stands) are not ranked. Additional vegetation types (e.g., riparian and wetland types) are afforded special protections by resource agencies and are considered "sensitive" here.

[3] Based on CDFW (2020). "G" indicates conservation priority at the global level, and "S" refers to the state level. 1 = critically imperiled; 2 = imperiled; 3 = vulnerable; 4 = apparently secure; 5 = secure. "?" indicates the need for further study. NR = not ranked.

Vegetation Type	Sonoma Veg Map Class and Vegetation Alliances Observed	Sensitivity[2] and CDFW Rank[3]	Location in the Study Area
	Southwestern North American Riparian/Wash Scrub Group ▪ Arroyo willow (*Salix lasiolepis*) thickets ▪ Sandbar willow (*Salix exigua*) thickets	Yes, based on riparian setting ▪ S4G4 ▪ S4.2G5	Along reservoir and channel upstream of dam
Riparian Forest	Vancouverian Riparian Deciduous Forest Group ▪ Red willow forest (*Salix laevigata* Alliance) ▪ Oregon ash (*Fraxinus latifolia*) groves	Yes, based on ranking and riparian setting ▪ S3G4 ▪ S3.2G4	Along channel upstream and downstream of dam
Oak Woodland	Mixed Oak Woodland *[Quercus (agrifolia, garryana, kelloggii)* Alliance]	No – S4G4	Slopes
	Coast Live Oak Forest (*Quercus agrifolia* Alliance)	No – S4G5	Uplands near creek
	Blue Oak Woodland (*Quercus douglasii* Alliance)	No – S4G4	Limited stand at northern end of site
	Oregon White Oak Woodland (*Quercus garryana* Alliance)	Yes – S3G4	Northeast-facing slopes on west side of site
	Valley Oak Woodland (*Quercus lobata* Alliance)	Yes – S3G3	Limited stands at lower elevations within grassland
Upland Forest	California Bay Forest (*Umbellularia californica* Alliance)	Yes – S3G4	Along seasonal drainage on west side of reservoir
	Eucalyptus Stand (*Eucalyptus globulus* Semi-natural Alliance)	No - NR	One stand near upstream end of site

Wetlands

Wetlands on the site include vernal pools, fringe wetlands along the creek and reservoir, and seep wetlands around the dam face. In general, these are dominated by native plant species, but also support populations of common invasive species.

A number of vernal pools are present on the graded portion of the auxiliary spillway. These are in depressions which appear to be the result of past grading (intentional or accidental). One additional pool occurs in the central part of the project site, west of the

creek, apparently excavated into grassland. See Figure 2 for locations. Most of these locations held standing water at PCI's March and April botanical visits (as well as in February at the time of separate visits by a PCI wildlife biologist); depths were up to 8" in March despite the low-rainfall winter season. Soil present in this area are mapped as being of the Goulding cobbly clay loam type, but are highly disturbed and compacted, and these manipulations are likely the cause of the ponding. Vegetation of the vernal pools included common vernal pool and seasonal wetland species of the region. Dominant species in the pools included native creeping spikerush, semaphore grass (*Pleuropogon californicus*) and species of non-native or unknown origin: manna grass (*Glyceria* spp.), pennyroyal (*Mentha pulegium*), and at edges, Mediterranean barley (*Hordeum marinum*). Lobb's aquatic buttercup (*Ranunculus lobbii*), a native species of limited distribution (California Rare Plant Rank 4.2) closely associated with vernal pools in the region, was present in most pools. Other species present at lower cover included natives water starwort (*Callitriche* sp.), western rush (*Juncus occidentalis*), and nutsedge (*Cyperus eragrostis*). Algal mats were present in some pools. Extensive hoof punch was present in most pools; a horse and draft horse were observed grazing in and near the pools on most visits. Deeper pool areas are dominated by native Pacific rush (*Juncus effusus*).

Additional wetland vegetation is present at the periphery of the reservoir and downstream channel, and along a seasonal drainage leading downslope from the vernal pool area. These areas are also characterized by a mixture of common native and non-native herbaceous species. Small pools support cattail, non-native water plantain (*Alisma lanceolatum*), and nutsedge, with invasive Harding grass (*Phalaris aquatica*) and Himalayan blackberry nearby. On the gravel deposit upstream of the dam, disturbance-tolerant species are present including rough cocklebur (*Xanthium strumarium*), rabbitsfoot grass (*Polypogon monspeliensis*), and poison hemlock (*Conium maculatum*). On the downstream face of the dam, small patches of wet meadow species occur within the grassland matrix; species present include rushes (*Juncus* spp.), California buttercup (*Ranunculus californicus*), brownheaded rush (*Juncus phaeocephalus*), clustered field sedge (*Carex praegracilis*), mugwort (*Artemisia doulgasiana*) and Santa Barbara sedge (*Carex barbarae*).

Grasslands

Grasslands in the Study Area range from highly disturbed areas with extensive cover of highly invasive species, to common non-native annual and perennial grass stands, to areas of high native diversity.

In highly disturbed areas around the dam, most of the grassland is dominated by non-native annuals including wild oats and bromes (*Bromus diandrus, B. hordeaceus*). Invasive perennial Harding grass is abundant near the entry road from Bennett Valley Road, and many other low-lying grassland areas. Common non-native forbs such as

subterranean clover (*Trifolium subterraneum*) and filaree (*Erodium* spp.) are present throughout; highly invasive species including yellow star thistle (*Centaurea solstitialis*) occur in scattered stands. On the upstream dam face, patches of weedy forbs including fennel (*Foeniculum vulgare*), calendula (*Calendula arvensis*), and teasel (*Dipsacus fullonum*) are abundant. Invasive artichoke (*Cynara cardunculus*) is present in one stand at the northeastern end of the site.

In most of the less disturbed grassland areas on the site, native species are present at low cover. Other native forbs scattered throughout the grassland include lupines (*Lupinus bicolor, L. nanus*), California poppy (*Eschscholzia californica*), popcorn flower (*Plagiobothrys* spp.), and harvest brodiaea (*Brodiaea elegans*).

In several grassland locations (see Figure 2), native grasses and forbs are a dominant component or form dense stands. Soaproot (*Chlorogalum pomeridianum*) forms dense stands in many grassland areas in the Study Area, as well as in the understory of deciduous oak woodlands. Dense patches of native perennial forbs occur in several locations. Suncups (*Taraxia ovata*), mule's ear (*Wyethia angustifolia, W. glabra*), and shooting star (*Primula hendersonii*) form large stands on the southeast side of the Study Area. Common phacelia (*Phacelia distans*) and canyon nemophila (*Nemophila heterophylla*) form dense stands at woodland edges on the east side. The downstream dam face also supports significant native cover, including patches of needlegrass (*Stipa pulchra, S. lepida*), blue wildrye, California oatgrass (*Danthonia californica*), California poppy, yarrow (*Achillea millefolium*), yampah (*Perideridia kelloggii*), fiddleneck (*Amsinckia intermedia*), and, in slightly moist swales or roadside ditches, common meadowfoam (*Limnanthes douglasii*).

Shrublands

The shrub-dominated habitats on the site include native coyote brush and non-native invasive stands. Native plant diversity in these habitats is relatively low in these locations, which likely represent areas of significant or ongoing disturbance.

Coyote brush scrub occurs in scattered locations including adjacent to the riparian forest along Matanzas Creek and reservoir. It likely represents successional habitat and could transition to oak woodland if water levels and other disturbance remained low over time, or could transition to riparian vegetation if water levels increased. Other species present in these locations include non-native Harding grass and annual grasses, and native yampah.

Non-native shrubland occurs primarily in a stand above the dam's principal spillway. Spanish broom (*Spartium junceum*) is abundant there, with fennel, stinkwort (*Dittrichia graveolens*), and distaff thistle (*Carthamus lanatus*). All of these are highly invasive

species. Himalayan blackberry scrub forms additional non-native stands in many areas along drainages and the reservoir edge.

Native riparian scrub is present in the Study Area along the reservoir edge and channel upstream of the dam; these are thickets of arroyo and sandbar willow (*Salix lasiolepis, S. exigua*). Occasional young ash trees (*Fraxinus latifolia*) and invasive wild plum (*Prunus cerasifera*) are present in these stands, but otherwise little species diversity is present.

Riparian Forest

Riparian forest in the Study Area is dominated by a mosaic of tree species including willows (*Salix* spp.), ash, bigleaf maple (*Acer macrophyllum*), and boxelder (*Acer negundo*). In many areas willow growth is dense and understory is limited, but in steeper areas where willows were less dominant, understory of other common native shrubs and herbs was present, including elderberry (*Sambucus nigra*), snowberry (*Symphoricarpos* spp.), honeysuckle (*Lonicera hispidula*), bee plant (*Scorphularia californica*), and creeping wild rye (*Leymus triticoides*). Invasive species poison hemlock and bull thistle (*Cirsium vulgare*) are also common in this setting.

Oak Woodland

Oak woodland on the site includes a number of oak alliances, all of which are generally high in native diversity. These oak woodland types intergrade, forming mixed stands throughout the middle elevations of the Study Area.

Coast live oak woodland occurs in uplands along Matanzas Creek. Madrone (*Arbutus menziesii*) and bay are also present in the canopy. The understory is dominated by natives including poison oak, soaproot, melic grass (*Melica* spp.), California honeysuckle, hillside pea (*Lathyrus vestitus*), Douglas iris (*Iris douglasiana*), and maidenhair fern (*Adiantum jordanii*).

Oregon oak woodland is common on slopes on the west side of the Study Area. It includes occasional buckeye (*Aesculus californicus*), bay and madrone in the canopy. The mostly deciduous canopy allows for a well-developed native perennial understory of soaproot, yarrow, milkmaids (*Cardamine califonica*), and California fescue (*Festuca californica*), as well as low-growing poison oak.

A small stand of valley oak woodland occurs below the dam along a drainage. This supports mature valley oaks and an understory of native snowberry, California blackberry (*Rubus ursinus*), poison oak (*Toxicodendron diversilobum*), and Pacific sanicle (*Sanicula crassicaulis*) as well as non-native perennial grasses [Harding grass, Italian rye (*Festuca perennis*)].

Upland Forests

California bay forest occurs in one location, along the drainage leading to the dam from the southwest. This dense evergreen forest has a limited understory dominated by native ferns and perennials. Species present include California fescue, melic grass, sword fern, maidenhair fern, and honeysuckle (*Lonicera hispidula*).

A stand of mature eucalyptus is present in the southeastern portion of the site, along Bennett Valley Road. These planted trees form an overstory above a portion of the adjacent oak woodland and riparian forest.

Vegetation Types

- EU: Eucalyptus Grove
- BAY: California Bay Forest
- GR: Non-native Grassland
- NGR: Native Grassland
- COY: Coyote Brush Scrub
- NNS: Non-native Shrub
- HIM: Himalayan Blackberry Brambles
- OAK: Mixed Oak Woodland
- CLO: Coast Live Oak Forest
- OR: Oregon Oak Woodland
- VAL: Valley Oak Woodland
- MAR: Freshwater Marsh
- WIL: Riparian Scrub - Willow Thicket
- RIP: Riparian Forest
- VIN: Vineyard
- RD: Major Roads
- DEV: Developed
- Wetland

based on Sonoma Veg Map, AECOM 2021, and PCI data. For draft jurisdictional

Auxillary Spillway

Dam

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Figure 2. Vegetation Types
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

July 2021
Aerial: ESRI 2019
Vegetation Types: Sonoma Veg Map 2013, AECOM 2021, PCI

0 250 500 1,000 Feet

6 Sensitive Natural Communities

The California Department of Fish and Wildlife (CDFW) ranks natural communities based on their rarity and vulnerability to human impacts. Communities listed as critically imperiled (Rank 1), imperiled (Rank 2), or vulnerable (Rank 3) within the state are considered special-status, defined as "communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects" (CDFW 2021b). In addition, other vegetation types are considered sensitive or meriting special protection by CDFW, US Army Corps of Engineers, and other state and local agencies. These include most riparian and wetland vegetation types.

In the project site, the following vegetation types are considered sensitive based on their CDFW ranking (see Table 1):

- Native grassland (Needlegrass and California brome-blue wildrye alliances)
- Oregon oak woodland
- Valley oak woodland
- Red willow forest and Oregon ash groves
- California bay forest

The following additional vegetation types are considered sensitive based on their riparian or wetland setting:

- All freshwater marsh and vernal pool types (spikerush marsh, cattail marsh, rush marsh). Vernal pool habitat in particular is considered highly imperiled throughout the state.
- All riparian scrub (willow thickets)

7 Special-status Species

Definition of Special-status Species

In California, special-status plants include those species that are afforded legal protection under the federal and California Endangered Species Acts (ESA and CESA, respectively) and other regulations. These species must be considered during project evaluation to comply with CEQA, during consultation with State and federal resources agencies, and in development of specific management guidelines for resource protection. Special-status species are defined as the following:

- Species listed or proposed for listing as threatened or endangered under the federal ESA;
- Species listed or proposed for listing as threatened or endangered under CESA;

- Species that are recognized as candidates for future listing by agencies with resource management responsibilities, such as U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW);
- Plant species, subspecies, and varieties defined as rare or threatened by the California Native Plant Protection Act (California Fish and Game Code Section 1900, et seq.);
- Plant species listed by the California Native Plant Society as California Rare Plant Rank 1, 2 and 3[4] under CEQA (CEQA Guidelines Section 15380); and some CRPR 4 plants based on CNPS guidelines[5]; and
- Species that otherwise meet the definition of rare, threatened, or endangered pursuant to Section 15380 of the CEQA Guidelines

For the purposes of NEPA evaluation, only those species listed, proposed, or recognized as candidates for listing under the federal ESA are required to be considered.

Special-status Species Evaluation Criteria

The potential for special-status plant species to occur on the project site was reviewed and classified into the following categories: not present, low, moderate, high, or present. The criteria for each of these categories are:

None – Suitable habitat is not present within the project site and/or project site is outside the range of the species.

Low – One or more key habitat components is absent from the project site; no known occurrences in vicinity, or habitat present but species not observed during field surveys that would be expected to discover species, if present, based on season and level of effort. Species is unlikely to occur within the project site.

Moderate – Some of the habitat components required by this species are present within the project site and/or marginally suitable habitat is present within surrounding areas. Species may occur within the project site.

[4] California Rare Plant Ranks include: 1A – Presumed extinct in California and rare/extinct elsewhere; 1B – Rare, threatened, or endangered in California and elsewhere; 2A – Presumed extirpated in California, more common elsewhere; 2B – Rare, threatened, or endangered in California, more common elsewhere; 3 - Plants for which we need more information; 4 – Plants of limited distribution. Suffixes: .1 Seriously endangered in California; .2 Fairly endangered in California; .3 Not very endangered in California

[5] CNPS (2020) recommends that CRPR 4 taxa be considered in CEQA analysis, especially if the occurrence is: the type locality of the taxon; at the periphery of a species' range; in an area where the taxon is especially uncommon; in an area where the taxon has sustained heavy losses (declining); exhibits unusual morphology or occurs on unusual substrates; a species maintained on BLM, USFWS, or USFS sensitive species lists; associated with a habitat that is declining in California at a significant rate. Additional considerations CNPS states are length of time since a taxon's status has been reviewed, if its rank is currently being reviewed for elevation, regional rarity considerations, and local conservation concerns.

High – All of the habitat components required by this species are present within the project site and/or it is known to occur in surrounding areas. Species is likely to occur within the project site.
Present – Species has reported occurrences within the project site which are believed to be still extant and/or was observed within the project site during field surveys.

Special-status Species Findings

Based on the background literature review, a number of special-status plant taxa are known from the region and from habitat types present on the project site. See Figure 3. However, only one special-status plant species (a species of limited distribution, Lobb's aquatic buttercup [*Ranunculus lobbii*]; CRPR 4) was observed during the suite of surveys, which were timed to coincide with the blooming period (or other best identification timeframe) of focal species. Based on survey findings, no other special-status plant species were determined to be likely to occur; either no suitable habitat is present, or potentially suitable habitat is present but the species was not observed during appropriately-timed surveys.

Below is a discussion of the Lobb's aquatic buttercup occurrence. Following that discussion, Table 2 provides a list of special-status plant taxa known to occur in the project region in relevant habitats, their listing status, habitat needs and potential for occurrence on the site.

Lobb's aquatic buttercup

This annual aquatic species is closely associated with vernal pools. It is known primarily from the northern Bay Area, with most occurrences in Marin, Sonoma, and Napa counties, but also extends into northern California and British Columbia. Calflora (2021) includes 179 records for this species. According to CNPS (2021), threats to its persistence include factors that result in vernal pool loss, including urbanization, habitat alteration, agriculture, and development. However, wherever intact vernal pool habitat is present in Sonoma County, this species is likely to occur (J. Schwan, personal observation).

The plant's slender stems float in shallow ponded water or creep on mud, with small (.5-.8 cm long), 3-parted leaves and white flowers floating on the water surface in early spring. The five petals are 2-5 mm wide. See Project Site Photos. While each individual plant is small in habit, this species tends to occur in sizable numbers, often covering the entire surface of a vernal pool and making it highly visible.

On the project site, Lobb's buttercup was observed in three of the vernal pools present—two adjacent pools on the auxiliary spillway, and one isolated pool on the west side of the project site. See Figure 3. The buttercup was in bloom during PCI's visits

on February 23 and March 26. As is typical for this species, associated species present included semaphore grass, creeping spikerush, and other common vernal pool plants. Pool depth at time of blooming was typically 8”-12”. The species was not observed in several shallower, less distinct pools. Population size is difficult to estimate for this very fragile, aquatic species, but the occurrences extended over the ponded area of the three pools, and numbers likely ranged from dozens to hundreds in each pool. The pools, including the wetland fringes surrounding them, ranged from approximately 500-1,000 square feet each in size (AECOM 2021).

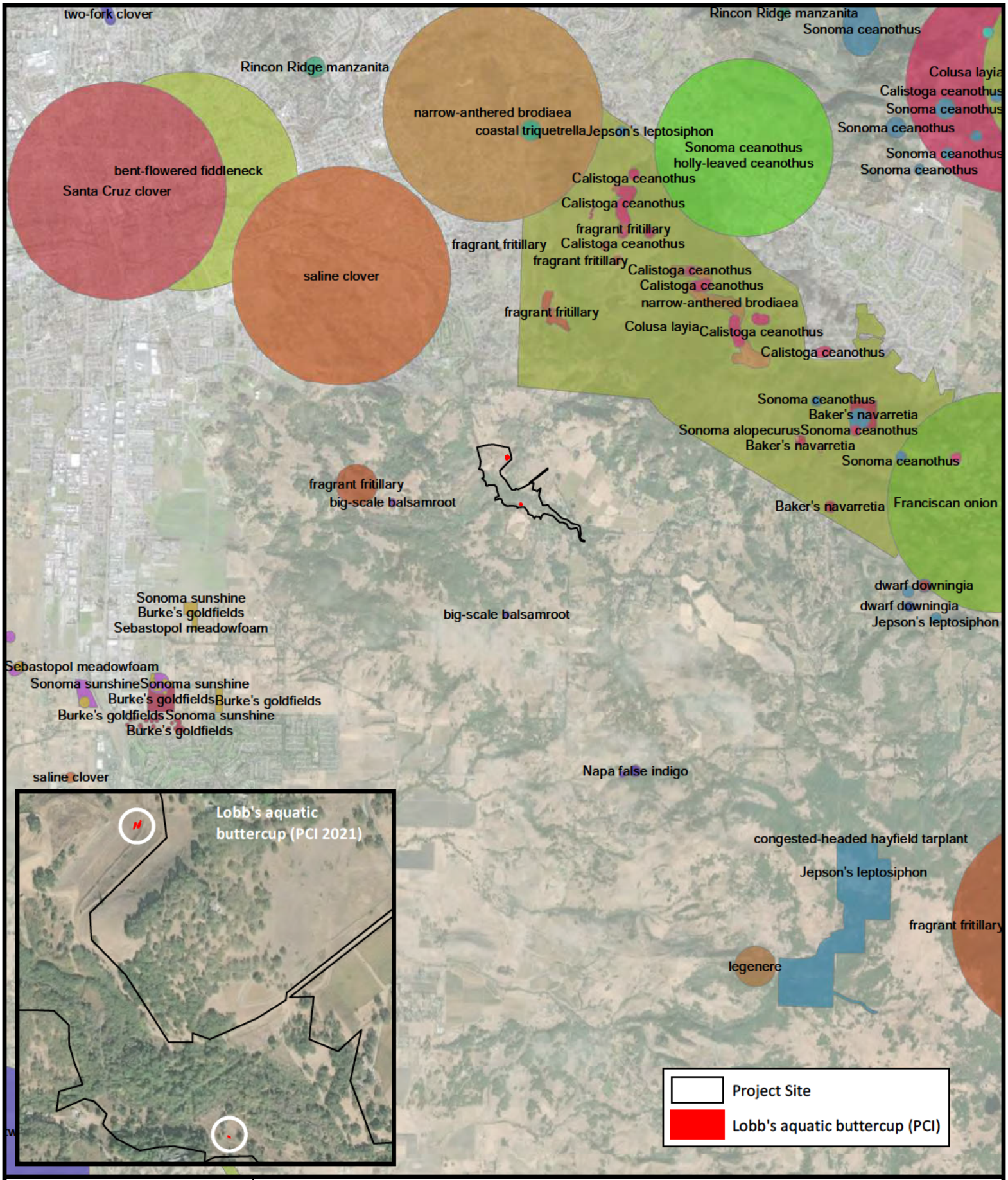

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Figure 3. Special-status Plant Species Occurrences in the Project Vicinity
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

0 0.25 0.5 1 Miles

July 2021
Topo: ESRI; Occurrences: CDFW 2021, PCI 2021

Table 2. Special-status Plant Species Known to Occur in the Project Region and Potential to Occur on the Project Site

Name & Listing Status (USFWS/CDFW/ CRPR[6])	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence	Nearby Occurrences (AECOM 2021)
Franciscan onion *(Allium peninsulare var. franciscum)* --/--/ 1B.2	Perennial bulbiferous herb. Blooms May-June. Woodland, grassland (clay, volcanic, often serpentinite). 52-300 m.	Low. Potentially suitable habitat present but species not observed.	A single CNDDB occurrence for the species is found 3.6 miles east of the dam within the woodland and grassland habitat around Kenwood.
Sonoma alopecurus *(Alopecurus aequalis var. sonomensis)* FE/--/ 1B.1	Perennial herb. Blooms May-July. Freshwater marshes and swamps, riparian scrub. 5-365 m.	Low. Freshwater marsh habitat is disturbed, relatively low in species diversity. Species not observed.	There is a single CNDDB occurrence 2.7 miles east of the dam found within Ledson Marsh inside Annadel State Park. USFWS identified the only extant population within Sonoma County of this species, as the one found within Annadel State Park. Habitat in Ledson Marsh for Sonoma alopecurus is along the shallow, semi-upland area at the border of the marsh.
Napa false indigo *(Amorpha californica var. napensis)* --/--/ 1B.2	Perennial deciduous shrub. Blooms April-July. Broadleafed upland forest (openings), chaparral, woodland. 120-2000 m.	Low. Potentially suitable habitat present but species not observed.	Two CNDDB occurrences for this species are found within 5.0 miles, the nearest 3.0 miles from the dam found within a wet meadow grassland.
bent-flowered fiddleneck *(Amsinckia lunaris)* --/--/ 1B.2	Annual herb. Blooms March-June. Coastal bluff scrub, woodland, grassland. Typically on gravelly slopes, grassland, openings in woodland, often serpentine. 3-500 m.	Low. Potentially suitable habitat present but species not observed.	A single CNDDB occurrence for the species is found 2.8 miles northwest of the dam. Habitat in this vicinity is low density residential surrounded by grazed grasslands.
Rincon Ridge manzanita *(Arctostaphylos stanfordiana ssp. decumbens)* --/--/1B.1	Perennial evergreen shrub. Blooms February-April. Chaparral (rhyolitic), woodland. 75-370 m.	None. No chaparral habitat present; no manzanita individuals observed.	Three CNDDB occurrences are recorded within the project vicinity, the nearest 3.8 miles north of the dam is now extirpated. However, the remaining two occurrences are extant and found within rocky chaparral communities.

[6] Listing Status Codes: Federal: FE - listed as endangered (in danger of extinction); FT - listed as threatened (likely to become endangered within the foreseeable future).
State of California (State): SE - listed as endangered; ST - listed as threatened; SR - listed as rare
California Rare Plant Rank: see above.

Name & Listing Status (USFWS/CDFW/ CRPR[6])	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence	Nearby Occurrences (AECOM 2021)
Clara Hunt's milk-vetch *(Astragalus claranus)* FE/ST/ 1B.1	Annual herb. Blooms March-May. Chaparral, woodland, meadows and seeps, grassland (serpentinite or volcanic, rocky, or clay soils). 75-275 m.	Low. Potential habitat present but not known from project vicinity and species not observed.	There are no CNDDB occurrences recorded within 5.0 miles of the project. The species is known to occur at 5 sites: Bale Grist Mill State Historic Park, Lewelling Lane, Spring Valley and Saint Helena Roads, and Lake Hennessey, none of which are within 5.0 miles of the project.
big-scale balsamroot *(Balsamorhiza macrolepis var. macrolepis)* --/--/ 1B.2	Perennial herb. Blooms March-June. Chaparral, woodland, grassland; sometimes serpentinite. 90-1555 m.	Low. Potentially suitable habitat present but species not observed.	Two CNDDB occurrences for this species are found east of the project within basalt outcrops adjacent to reservoirs, 1.0 mile from the dam. Habitat surrounding reservoirs is woodland and grassland on a ranch property.
Sonoma sunshine *(Blennosperma bakeri)* FE/SE/ 1B.1	Annual herb. Blooms March-May. grassland (mesic), vernal pools. 10-110 m.	Low. Vernal pool habitat present but species typically occurs at lower elevation on Santa Rosa Plain. Species not observed in focused surveys. Reference site visits were conducted for this species.	Five CNDDB occurrences for this species are found west of the project within Santa Rosa Plain, the nearest 3.0 miles from the dam. Plants were found in both natural and created vernal pool and seasonal wetland habitats surrounded by grazed grassland.
Sonoma white sedge *(Carex albida*; now considered synonymous with C. lemmonii, a common taxon) FE/SE/--	Perennial rhizomatous herb. Blooms May-July. Bogs and fens, freshwater marshes and swamps, wet meadows. 15-90 m.	Low. Only marginally suitable habitat present. Taxon no longer considered rare due to taxonomic changes. Species not observed.	There are no CNDDB occurrences recorded within 5.0 miles of the project. There is one known population of this plant species within Pitkin Marsh in Sonoma County. The marsh is a riparian wetland fed almost year-round by underground seeps.
Rincon Ridge ceanothus *(Ceanothus confusus)* --/--/ 1B.1	Perennial evergreen shrub. Blooms February-June. Closed-cone coniferous forest, chaparral, woodland (volcanic or serpentinite). 75-1065 m.	None. No chaparral habitat present; no ceanothus individuals observed.	There is one CNDDB occurrence for this species within 5.0 miles of the project. This occurrence is 4.6 miles north of the dam along Rincon Ridge in chaparral patches of a broader grassland habitat.
Calistoga ceanothus *(Ceanothus divergens)* --/--/ 1B.2	Perennial evergreen shrub. Blooms February-March. Chaparral (volcanic or serpentinite). 170-950 m.	None. No chaparral habitat present; no ceanothus individuals observed.	Seven CNDDB occurrences for this species are recorded along Bennett Mountain and Mount Hood, the nearest 2.3 miles from the dam. Multiple of the occurrences are within Annadel State Park. Habitat where the species was recorded is predominantly chaparral and woodland.
holly-leaved ceanothus *(Ceanothus purpureus)* --/--/ 1B.2	Evergreen shrub. Blooms February-June. Chaparral and woodland. 120-640 m.	None. No chaparral habitat present; no ceanothus individuals observed.	A single CNDDB occurrence for this species is recorded 2.8 miles from the dam. Habitat in the vicinity of the occurrence includes woodlands, chaparral, and grasslands.

Name & Listing Status (USFWS/CDFW/ CRPR[6])	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence	Nearby Occurrences (AECOM 2021)
pappose tarplant *(Centromadia parryi ssp. parryi)* --/--/ 1B.2	Annual herb. Blooms May-November. Chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, grassland (vernally mesic, often alkaline). 2-420 m.	Low. No alkaline habitat present.	Nearest CNDDB occurrence 6 miles to south in alkaline fields.
Pennell's bird's-beak *(Cordylanthus tenuis ssp. capillaris)* FE/SR/ 1B.2	Annual herb, hemiparasitic. Blooms June-September. Closed-cone coniferous forest, chaparral (serpentinite). 45-305 m.	None. No suitable habitat present on property. One common Cordylanthus species present (C. pilosus)	Four known occurrences, all in serpentine settings in the outer coastal ranges of Sonoma County; the nearest is 15 miles to the northwest.
dwarf downingia *(Downingia pusilla)* --/--/ 2.2	Annual herb. Blooms March-May. grassland (mesic), vernal pools. 1-445 m.	Low. Potentially suitable habitat present but species not observed.	There is a single CNDDB occurrence from 1927, 4.0 miles southwest of the dam on the north side Bennett Valley Road, in vernal pools.
white seaside tarplant (congested-headed hayfield tarplant) (*Hemizonia congesta ssp. congesta)* --/--/ 1B.2	Annual herb. Blooms April-November. Grassland, sometimes roadsides. 20-560 m.	Low. Potentially suitable habitat present but species not observed.	A single CNDDB occurrence for this species is mapped 4.8 miles southeast of the project. Habitat within this vicinity consists of open canopy grassland.
Burke's goldfields *(Lasthenia burkei)* FE/SE/ 1B.1	Annual herb. Blooms April-June. Meadows and seeps (mesic), vernal pools. 15-600 m.	Low. Vernal pool habitat present but species typically occurs at lower elevation, on Santa Rosa Plain, on soil types not present here. Species not observed in focused surveys. Reference site visits were conducted for this species.	Three CNDDB occurrences of this species are found within the Horn Avenue Mitigation Bank, the nearest 3.0 miles from the dam. Habitat at this site includes created vernal pool habitats where natural clay soils have formed but Burke's goldfields were seeded.
Colusa layia *(Layia septentrionalis)* --/--/ 1B.2	Annual herb. Blooms April-May. Sandy or serpentinite soil in chaparral, woodland, and grassland.	None. No suitable soils present.	There is a single occurrence for this species 0.7 miles from the dam within Annadel State Park.
legenere *(Legenere limosa)* --/--/ 1B.1	Annual herb. Blooms April-June. Vernal pools. 1 -880 m.	Low. Vernal pools present but species not observed. No known extant	There is a single CNDDB occurrence for this species 5.0 miles east of the dam. The occurrence is noted as extirpated due to the creation of a landfill where vernal pool habitat used to be present.

Name & Listing Status (USFWS/CDFW/ CRPR[6])	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence	Nearby Occurrences (AECOM 2021)
		occurrences in Sonoma County.	
Jepson's leptosiphon *(Leptosiphon jepsonii)* --/--/ 1B.2	Annual herb. Blooms March-May. Chaparral, woodland; open to partly shaded grassy slopes on volcanic soils or periphery of serpentine substrates. 100-500 m.	Low. Potentially suitable habitat present but species not observed.	There are three CNDDB occurrences for this species recorded throughout the project vicinity, the nearest 3.2 miles from the dam. Habitat found in the record vicinity is vernally wet grassland surrounded by oak woodland.
Sebastopol meadowfoam *(Limnanthes vinculans)* FE/SE/ 1B.1	Annual herb. Blooms April-May. Meadows and seeps, grassland, vernal pools (mesic). 15-305 m.	Low. Vernal pool habitat present but species typically occurs at lower elevation, on Santa Rosa Plain, on soil types not present here. Species not observed in focused surveys. Reference site visits were conducted for this species.	There are five CNDDB occurrences for this species, all recorded west of the project within the Santa Rosa Plain. The nearest occurrence is 3.0 miles from the dam. Records of this species include populations found within both natural and created vernal pool and seasonal wetland habitat. Created wetlands are located at the Horn Avenue Mitigation Bank.
marsh microseris *(Microseris paludosa)* --/--/ 1B.2	Perennial herb. Blooms April-June (rarely July). Closed-cone coniferous forest, woodland, coastal scrub, grassland. 5-300 m.	Low. Potentially suitable habitat present but species not observed.	Nearest CNDDB occurrence 6 miles to west near Laguna de Santa Rosa. Little microhabitat information available for the 4 reported Sonoma County occurrences.
Baker's navarretia *(Navarretia leucocephala ssp. bakeri)* --/--/ 1B.1	Annual herb. Blooms April-July. Vernal pools and swales; adobe or alkaline soils, in woodland, lower montane coniferous forest, meadows/seeps, grassland. 5-1740 m.	Low. Vernal pool habitat present but species not observed.	Five CNDDB occurrences for this species are found east of the project in the Bennett Mountain area. The nearest occurrence is located 2.4 miles from the dam. All occurrences were recorded within vernal pools or mesic habitats.
Sonoma beardtongue *(Penstemon newberryi var. sonomensis)* --/--/ 1B.3	Perennial herb. Blooms April-August. Rocky chaparral. 700-1370 m.	None. No chaparral present.	Nearest CNDDB occurrence 6 miles to the northeast.
North Coast semaphore grass *(Pleuropogon hooverianus)* --/ST/ 1B.1	Perennial rhizomatous herb. Blooms April-August. Wet, grassy usually shady areas, sometimes freshwater marsh; associated with forest environments. 10-671 m.	Low. Potentially suitable habitat present but species not observed.	A single CNDDB occurrence for this species is found 3.0 miles south of the dam. Habitat in this area is freshwater marsh within an oak woodland.

Name & Listing Status (USFWS/CDFW/ CRPR[6])	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence	Nearby Occurrences (AECOM 2021)
Lobb's aquatic buttercup *(Ranunculus lobbii)* --/--/4.2	Annual aquatic herb. Blooms February-May. Vernal pools. 15-470 m.	Present. Observed in vernal pools. See text for discussion.	No records for this species in CNDDB, which generally does not track CRPR 4 species.
Kenwood marsh checkerbloom *(Sidalcea oregana ssp. valida)* FE/SE/1B.1	Perennial rhizomatous herb. Blooms June-September. Freshwater marshes and swamps. 115-150m.	Low. No documented occurrences in vicinity. Marsh habitat present is limited and relatively disturbed.	This species is known from two populations, one at Kenwood Marsh on the Deerfield Ranch Winery and the other at Knights Valley, both in Sonoma County. The dam is located approximately 5 miles west of the population located at Kenwood Marsh. Kenwood Marsh is a freshwater marsh surrounded by grassland adjacent to Sonoma Creek.
two fork clover *(Trifolium amoenum)* FE/--/ 1B.1	Annual herb. Blooms April-June. Coastal bluff scrub, grassland (sometimes serpentinite). Open, sunny sites, swales. 5-415 m.	Low. Very few known extant occurrences; those are more coastal. Potentially suitable habitat present but species not observed.	There is a single natural population of this species in Marin County, two experimental populations in the Point Reyes National Seashore, and two experimental populations in Sonoma County. The dam is located 4.8 miles west of a CNDDB occurrence for this species in the town of Kenwood.
Santa Cruz clover *(Trifolium buckwestiorum)* --/--/ 1B.1	Annual herb. Blooms April-October. Gravelly margins of broadleafed upland forest, woodland, and coastal prairie. 105-610 m.	Low. Potentially suitable habitat present but species not observed.	Four reported occurrences from Sonoma County; the closest is found 3.2 miles northwest of the dam. Habitat where the species was found was hard panned clay in a graded field.
saline clover *(Trifolium hydrophilum)* --/--/ 1B.2	Annual herb. Blooms April-June. Marshes and swamps, grassland (mesic, alkaline), vernal pools. 0-300 m.	Low. Generally associated with alkaline habitat, not present. Species not observed.	Three CNDDB occurrences for this species are found within 5.0 miles of the project, the nearest 1.2 miles north west of the dam. Two of the CNDDB occurrences are presumed extirpated due to development of historical vernal pool habitat.
coastal triquetrella *(Triquetrella californica)* *--/--/1B.2*	Moss. Soil in coastal scrub and coastal bluff scrub. 10 - 100 m.	Low. No typical habitat present; typically occurs closer to coast. Species not observed.	There is a single CNDDB occurrence for this species 2.9 miles north of the dam. Habitat at this site is comprised of a west-facing hillside on thin damp soils surrounded by oak woodland and grassland habitat.
oval-leaved viburnum *(Viburnum ellipticum)* --/--/ 2B.3	Perennial deciduous shrub. Blooms May-June. Chaparral, woodland, lower montane coniferous forest. 215-1400 m.	Low. Potentially suitable habitat present but species not observed.	Nearest CNDDB occurrence 6 miles to NE. Most records in county are historic; little information available on microhabitat.

8 Project Site Photos

Vernal pool within auxiliary spillway. California semaphore grass visible in water; rushes at left.

Closeup of vernal pool aquatic vegetation: Lobb's aquatic buttercup and California semaphore grass.

Rush marsh within the auxiliary spillway.

Cattail stand below principal spillway outlet.

Above and closeup below: Grassland high in native forb cover in south-central portion of site, west of channel. This area was being grazed by a bull at the time of the April and May surveys.

Large stand of native mule's ears and suncups in grassland south of main entrance road.

Native grassland stand on downstream dam face, with purple needlegrass and blue wildrye.

Native bulbs in grassland (*Triteleia laxa*, left, and *Calochortus luteus*, right)

Weedy grassland, with fennel, poison hemlock, and other non-native species, on upstream face of dam

Sandbar willow thicket near upstream end of project.

Riparian forest near upstream end of project.

Valley oak stand and adjacent seasonal drainage, at base of auxiliary spillway.

Harding grass stand in foreground; non-native shrubs (Spanish broom) in mid-ground; grassland on lower dam face in left background; riparian forest and oak woodland in right background.

View of riparian forest (Oregon ash, willow) from recently cleared area; upstream end of site.

9 Plant Species Observed

Common Name	Latin Name	Family - Common Name	Native (N) or Introduced (I)
annual rabbitsfoot grass	*Polypogon monspeliensis*	Grass Family	I
annual ryegrass	*Festuca perennis*	Grass Family	I
arroyo willow	*Salix lasiolepis*	Willow Family	N
basket sedge	*Carex barbarae*	Sedge Family	N
bearded creeper	*Crupina vulgaris*	Sunflower Family	I
bee plant	*Scrophularia californica*	Figwort Family	N
big leaf maple	*Acer macrophyllum*	Soapberry Family	N
big squirreltail grass	*Elymus multisetus*	Grass Family	N
bird's beak	*Cordylanthus pilosus*	Broomrape Family	N
black oak	*Quercus kelloggii*	Oak Family	N
blow-wives	*Achyracaena mollis*	Sunflower Family	N
blue elderberry	*Sambucus nigra ssp. caerulea*	Muskroot Family	N
blue wildrye	*Elymus glaucus*	Grass Family	N
blue-eyed grass	*Sisyrinchium bellum*	Iris Family	N
boxelder	*Acer negundo*	Soapberry Family	N
bracken fern	*Pteridium aquilinum var. pubescens*	Bracken Family	N
bristly ox-tongue	*Helminthotheca echioides*	Sunflower Family	I
brownhead rush	*Juncus phaeocephalus*	Rush Family	N
bullthistle	*Cirsium vulgare*	Sunflower Family	I
burclover	*Medicago polymorpha*	Legume Family	I
buttercup	*Ranunculus californicus*	Buttercup Family	N
CA fescue	*Festuca californica*	Grass Family	N
California bay	*Umbellularia californica*	Laurel Family	N
California blackberry	*Rubus ursinus*	Rose Family	N
California brome	*Bromus carinatus*	Grass Family	N
California buckeye	*Aesculus californica*	Soapberry Family	N
California oat grass	*Danthonia californica*	Grass Family	N
California polypody	*Polypodium californicum*	Polypody Family	N
California poppy	*Eschscholzia californica*	Poppy Family	N
California rose	*Rosa californica*	Rose Family	N
California semaphore grass	*Pleuropogon californicus*	Grass Family	N
canyon larkspur	*Delphinium nudicaule*	Buttercup Family	N
canyon nemophila	*Nemophila heterophylla*	Borage or Waterleaf Family	N
cat-tail	*Typha sp.*	Cattail Family	N
celery weed	*Lomatium californicum*	Carrot Family	N
checkerbloom	*Sidalcea calycosa ssp. calycosa*	Checkerbloom Family	N
Chinese houses	*Collinsia heterophylla*	Plantain Family	N
cleavers, goose grass	*Galium aparine*	Madder Family	N
clustered field sedge	*Carex praegracilis*	Sedge Family	N
coast live oak	*Quercus agrifolia*	Oak Family	N
coastal tarweed	*Madia sativa*	Sunflower Family	N
coffee fern	*Pellaea andromedifolia*	Brake Family	N

Common Name	Latin Name	Family - Common Name	Native (N) or Introduced (I)
common fiddleneck	*Amsinckia intermedia*	Borage or Waterleaf Family	N
common phacelia	*Phacelia distans*	Borage or Waterleaf Family	N
coyote brush	*Baccharis pilularis*	Sunflower Family	N
creeping spikerush	*Eleocharis macrostachya*	Sedge Family	N
curly dock	*Rumex crispus*	Buckwheat Family	I
cut-leaf geranium	*Geranium dissectum*	Geranium Family	I
Davy's centaury	*Zeltnera davyi*	Gentian Family	N
dense sedge	*Carex densa*	Sedge Family	N
ditch beard grass	*Polypogon interruptus*	Grass Family	I
dock	*Rumex sp.*	Buckwheat Family	
Douglas iris	*Iris douglasiana*	Iris Family	N
dwarf sack clover	*Trifolium depauperatum var. depauperatum*	Legume Family	N
eucalyptus	*Eucalyptus sp.*	Myrtle Family	I
fennel	*Foeniculum vulgare*	Carrot Family	I
field marigold	*Calendula arvensis*	Sunflower Family	I
fringed checkerbloom	*Sidalcea diploscypha*	Checkerbloom Family	N
Geyer's oniongrass	*Melica geyeri*	Grass Family	N
giant mountain dandelion	*Agoseris grandiflora*	Sunflower Family	N
goldenback fern	*Pentagramma triangularis*	Brake Family	N
gray rush	*Juncus patens*	Rush Family	N
Harding grass	*Phalaris aquatica*	Grass Family	I
harvest brodiaea	*Brodiaea elegans ssp. elegans*	Brodiaea Family	N
hayfield tarweed	*Hemizonia congesta ssp. lutescens*	Sunflower Family	N
hedgehog dogtail	*Cynosurus echinatus*	Grass Family	I
hill morning glory	*Calystegia cf. subacaulis ssp. subacaulis*	Morning-Glory Family	N
Himalayan blackberry	*Rubus armeniacus*	Rose Family	I
honeysuckle	*Lonicera hispidula*	Honeysuckle Family	N
hyssop loosestrife	*Lythrum hyssopifolia*	Loosestrife Family	I
irisleaf rush	*Juncus xiphioides*	Rush Family	N
Italian thistle	*Carduus pycnocephalus*	Sunflower Family	I
Ithuriel's spear	*Tritelaiea laxa*	Brodiaea Family	N
Jersey cudweed	*Pseudognaphalium luteoalbum*	Sunflower Family	I
lippia	*Phyla nodiflora*	Vervain Family	I
little hop clover	*Trifolium dubium*	Legume Family	I
little quaking grass	*Briza minor*	Grass Family	I
Lobb's aquatic buttercup	*Ranunculus lobbii*	Buttercup Family	X
long beaked filaree	*Erodium botrys*	Geranium Family	I
maidenhair fern	*Adiantum jordanii*	Brake Family	N
meadow rue	*Thalictrum fendleri*	Buttercup Family	N
meadowfoam	*Limnanthes douglasii*	Meadowfoam Family	N
Mediterranean barley	*Hordeum marinum ssp. gussoneanum*	Grass Family	I

Common Name	Latin Name	Family - Common Name	Native (N) or Introduced (I)
medusa head	*Elymus caput-medusae*	Grass Family	I
Melic grass	*Melica sp.*	Grass Family	N
miner's lettuce	*Claytonia perfoliata*	Miner's Lettuce Family	N
miniature lupine	*Lupinus bicolor*	Legume Family	N
mugwort	*Artemisia douglasiana*	Sunflower Family	N
narrow leaf mule ears	*Wyethia angustifolia*	Sunflower Family	N
oat	*Avena sp.*	Grass Family	I
oceanspray	*Holodiscus discolor*	Rose Family	N
ookow	*Dichelostemma congestum*	Brodiaea Family	N
Oregon ash	*Fraxinus latifolia*	Olive Family	N
Oregon oak	*Quercus garryana*	Oak Family	N
owl's clover	*Castilleja densiflora*	Broomrape Family	N
Pacific madrone	*Arbutus menziesii*	Heath Family	N
Pacific rush	*Juncus effusus ssp. pacificus*	Rush Family	N
Pacific sanicle	*Sanicula crassicaulis*	Carrot Family	N
pennyroyal	*Mentha pulegium*	Mint Family	I
perennial pepperweed	*Lepidium latifolium*	Mustard Family	I
periwinkle	*Vinca major*	Dogbane Family	I
poison hemlock	*Conium maculatum*	Carrot Family	I
poison oak	*Toxicodendron diversilobum*	Sumac or Cashew Family	N
prickly lettuce	*Lactuca serriola*	Sunflower Family	I
purple needle grass	*Stipa pulchra*	Grass Family	N
purple sanicle	*Sanicula bipinnatifida*	Carrot Family	N
purple vetch	*Vicia benghalensis*	Legume Family	I
red willow	*Salix laevigata*	Willow Family	N
ripgut brome	*Bromus diandrus*	Grass Family	I
rose clover	*Trifolium hirtum*	Legume Family	I
rough cat's ear	*Hypochaeris radicata*	Sunflower Family	I
rough cocklebur	*Xanthium strumarium*	Sunflower Family	N
rush	*Juncus sp.*	Rush Family	N
rusty popcornflower	*Plagiobothrys nothofulvus*	Borage or Waterleaf Family	N
salsify	*Tragopogon porrifolius*	Sunflower Family	I
sandbar willow	*Salix exigua*	Willow Family	N
sedge	*Carex sp.*	Sedge Family	N
service berry	*Amelanchier alnifolia*	Rosaceae	N
shepherd’s needle	*Scandix pecten-veneris*	Carrot Family	I
shooting star	*Primula hendersonii*	Primrose Family	N
six-weeks fescue	*Festuca microstachys*	Grass Family	N
sky lupine	*Lupinus nanus*	Legume Family	N
small-flowered needlegrass	*Stipa lepida*	Grass Family	N
smooth cat's ear	*Hypochaeris glabra*	Sunflower Family	I
smooth mule ears	*Wyethia glabra*	Sunflower Family	N
snowberry	*Symphoricarpos albus*	Honeysuckle Family	N
soap plant	*Chlorogalum pomeridianum var. pomeridianum*	Century Plant Family	N

Common Name	Latin Name	Family - Common Name	Native (N) or Introduced (I)
soft chess brome	*Bromus hordeaceus*	Grass Family	I
Spanish broom	*Spartium junceum*	Pea Family	I
Spanish clover	*Acmispon americanus var. americanus*	Legume Family	N
spring vetch	*Vicia sativa*	Legume Family	I
sticky chickweed	*Cerastium glomeratum*	Pink Family	I
sticky monkeyflower	*Mimulus aurantiacus*	Lopseed Family	N
Sticky monkeyflower	*Diplacus aurantiacus*	Lopseed Family	N
stinging nettle	*Urtica dioca ssp. gracilis*	Nettle Family	N
stinkwort	*Dittrichia graveolens*	Sunflower Family	I
subterranean clover	*Trifolium subterraneum*	Legume Family	I
sun cups	*Taraxia ovata*	Evening-Primrose Family	N
swamp pricklegrass	*Crypsis schoenoides*	Grass Family	I
sweet clover	*Melilotus albus*	Legume Family	I
tall flatsedge	*Cyperus eragrostis*	Sedge Family	N
teasel	*Dipsacus fullonum*	Teasel Family	I
toad rush	*Juncus bufonius*	Rush Family	N
Torrey's melic	*Melica torreyana*	Grass Family	N
valley oak	*Quercus lobata*	Oak Family	N
valley tassels	*Castilleja attenuata*	Broomrape Family	N
velvet grass	*Holcus lanatus*	Grass Family	I
water montia	*Montia fontana*	Miner's Lettuce Family	N
water plantain	*Alisma lanceolatum*	Water-Plantain Family	I
water primrose	*Ludwigia sp.*	Evening-Primrose Family	varies
water starwort	*Callitriche sp.*	Plantain Family	N
western mannagrass	*Glyceria x occidentalis*	Grass Family	unknown
western rush	*Juncus occidentalis*	Rush Family	N
western yellowcress	*Rorippa curvisiliqua*	Mustard Family	N
wild plum	*Prunus cerasifera*	Rose Family	I
wild radish	*Raphanus sativus*	Mustard Family	I
wire rush	*Juncus balticus*	Rush Family	N
woolly distaff thistle	*Carthamus lanatus*	Sunflower Family	I
yampah	*Perideridia kelloggii*	Carrot Family	N
yarrow	*Achillea millefolium*	Sunflower Family	N
yellow mariposa lily	*Calochortus luteus*	Lily Family	N
yellow parentucellia	*Parentucellia viscosa*	Broomrape Family	I
yellow star-thistle	*Centaurea solstitialis*	Sunflower Family	I

10 Conclusions

In conclusion, the Matanzas Creek Dam project site supports the following native plant resources, which merit consideration in project planning.

- One species of limited distribution, Lobb's aquatic buttercup (CRPR 4.2), is present in vernal pools on the site. Although Lobb's aquatic buttercup does not have special status under federal regulations and is not designated a special-status species by the USFWS, this species may warrant consideration under a future CEQA evaluation. No other special-status plant species were determined to be likely to occur on the site.
- Sensitive plant habitat is present on the site, including:
    - Vernal pools, which appear to be the result of grading during dam and spillway creation, but nonetheless are functioning hydrologically and supporting a typical suite of common Sonoma County vernal pool taxa.
    - Additional emergent wetland habitat at the margins of the creek and reservoir, supporting common perennial rush- and cattail-dominated vegetation.
    - Stands of native grasses and native forbs in multiple locations.
    - Extensive stands of native riparian forest and willow thickets along Matanzas Creek.
    - Sensitive types of woodland and forest, including Oregon oak and valley oak woodland, and bay forest, all with diverse native understories.

- Additional native plant communities present include:
    - Coyote brush scrub, which may represent habitats in recovery from disturbance and likely to develop into woodland or forest habitats if not further disturbed.
    - Mixed oak woodland and other common oak woodland types, with diverse native understories.

Other habitat on the site is dominated by non-native species (e.g., annual grassland, Harding grass stands, Himalayan blackberry brambles, and others); these provide some ecological values despite being low in native plant diversity. Significant invasive plant populations are present, especially in moist, disturbed areas near the dam. All of these could represent restoration opportunities for the future.

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Appendix D.6. Aquatic Resources Delineation Report

AECOM

Aquatic Resources Delineation Report

Matanzas Creek Dam Watershed Rehabilitation Project

January 2022 | Project # 60647670

Prepared for:

Jones & DeMille Engineering and the Natural Resources Conservation Service

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January 2022

Executive Summary

This aquatic resources delineation report presents the results of a survey for wetland waters of the United States (WUS), other waters of the United States (OWUS), and waters of the state (WOS) for the Matanzas Creek Dam Watershed Rehabilitation Project.

On April 8 and 22, 2021, AECOM biologists formally delineated aquatic resources in accordance with the routine on-site methodology described in the United States Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (Environmental Laboratory 1987), using guidance from the *Arid West Regional Supplement* (USACE 2008), *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* (Lichvar and McColley 2008), and the State Water Resource Control Board's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (State Water Resources Control Board 2019).

Based on the definition of waters of the United States (WOTUS) in place at the time of the delineation in April 2021, the delineation identified 6.52 acres of WUS and OWUS potentially under the jurisdiction of the USACE in the 121-acre Study Area. Of these identified features, 5.28 acres were categorized as OWUS, including 0.02 acre of culverted waters (CWUS) that connect other jurisdictional wetlands and waters features, and 1.24 acres were categorized as WUS. The OWUS are intermittent riverine features and dam structures, and the WUS are freshwater marsh and forested/shrub wetlands.

Other aquatic features—including isolated seasonal wetlands, isolated freshwater marsh, and riparian woodlands— delineated during the wetlands surveys were categorized as WOS or California Department of Fish and Wildlife-jurisdictional and not as WOTUS. However, due to proposed WOTUS rule changes, the jurisdictional status of 0.15 acre of isolated wetlands under Section 404 of the Clean Water Act, categorized in this report as WOS, should be confirmed based on the final rule or current guidance from the USACE and the United States Environmental Protection Agency when submitting permit applications.

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Acronyms and Abbreviations

CDFW	California Department of Fish and Wildlife
Climate Center	NRCS National Water and Climate Center
CNPS	California Native Plant Society
CWA	Clean Water Act
CWUS	culverted waters of the United States
EPA	United States Environmental Protection Agency
°F	degrees Fahrenheit
FAC	facultative plant species
FACU	facultative upland plant species
FACW	facultative wetland plant species
GIS	geographic information system
GPS	Global Positioning System
HUC	Hydrologic Unit Code
IFM	isolated freshwater marsh
IM	isolated marsh
ISW	isolated seasonal wetland
NHD	National Hydrography Dataset
LiDAR	Light Detection and Ranging
NL	Not Listed plant species on the National Wetland Indicator List
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NWPR	Navigable Waters Protection Rule
OBL	obligate wetland plant species
OHW	ordinary high water
OHWM	ordinary high water mark
OWUS	other waters of the United States
PCI	Prunuske Chatham, Inc.
PDSI	Palmer Drought Severity Index
PEM1	persistent, emergent, palustrine wetlands
PEM1B	palustrine, emergent, persistent, seasonally saturated wetlands
PPT	parts per thousand
Procedures	Procedures for Discharges of Dredged or Fill Material to Waters of the State
project	Matanzas Creek Dam Watershed Rehabilitation Project
R4SB	riverine, intermittent, streambed
R4r	riverine, intermittent, artificial
RP1EM	riverine, freshwater emergent wetlands
RP1FO	riverine, forested, broad-leaved deciduous, seasonally flooded, wetlands
Regional Boards	Regional Water Quality Control Boards
RWQCB	Regional Water Quality Control Board
SCAPOSD	Sonoma County Agricultural Preservation and Open Space District
UP	upland data point
UPL	upland plant species

USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WETS	Natural Resource Conservation Service Wetlands Tables
WL	wetland data point
WOS	waters of the state
WOTUS	waters of the United States
WUS	wetland waters of the United States

1 Introduction

This aquatic resources delineation report was prepared to identify and delineate aquatic resources, including jurisdictional wetland waters of the United States (WUS), other waters of the United States (OWUS), and waters of the state (WOS) within the boundaries of the 120.68-acre Study Area for the Matanzas Creek Dam Watershed Rehabilitation Project (project) (Figures 1 and 2; all figures are provided in Appendix A). The purpose of this report is to provide an assessment of baseline environmental conditions in support of the Natural Resources Conservation Service's (NRCS's) Watershed Rehabilitation Program, and specifically to support the Supplemental Watershed Plan and Environmental Document for Matanzas Creek Dam in Sonoma County, California. The delineation of aquatic resources was performed in accordance with the guidelines defined in the United States Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008), and the State Water Resource Control Board's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (Procedures) (State Water Resources Control Board 2019). AECOM conducted field surveys to delineate aquatic resources on April 8 and 22, 2021.

The delineation was informed by an earlier reconnaissance level survey conducted by AECOM biologists on January 19, 2021. This reconnaissance survey included a wildlife habitat assessment and an evaluation of existing wetlands and vegetation community mapping. This delineation report incorporates discussion from the Existing Environmental Conditions report that summarized the results of that reconnaissance survey (AECOM 2021).

1.1 Regulatory Setting

1.1.1 Federal Regulation

Under Section 404 of the Clean Water Act (CWA), USACE regulates the discharge of dredged and fill materials into waters of the United States (WOTUS). Jurisdictional WOTUS include "intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, and wetlands adjacent to any water of the U.S." (33 Code of Federal Regulations Section 328). Certain WOTUS are considered "special aquatic sites" because they generally are recognized as having particular ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallows, and riffle and pool complexes. Special aquatic sites are defined by the United States Environmental Protection Agency (EPA) and may be afforded additional consideration in a project's permit process.

Projects that place fill in WUS and OWUS (cumulatively, WOTUS) require either an individual or a nationwide permit from USACE. Nationwide permits are issued by USACE for specific types of activities that have minimal individual or cumulative adverse environmental impacts. Individual permits are required for large projects, complex projects, and projects that exceed the impact threshold for nationwide permits.

1.1.1.1 Definition of Waters of the United States

The results of this aquatic resources delineation are reported consistent with the definition of WOTUS in place when field surveys were conducted in April 2021, at which time the 2020 Navigable Waters Protection Rule (NWPR) was in effect. On June 9, 2021, EPA and USACE announced their intention to revise the definition of WOTUS (USACE and EPA 2021). Under the previous administration, USACE, EPA, and the Department of Defense published the 2020 NWPR, which revised the definition of "waters of the United States" regulated under Section 404 of the CWA (USACE et al. 2020). The rule aimed to streamline the definition so that it included simple categories of jurisdictional waters, provided clear exclusions for water features that traditionally had not been regulated, and defined terms in the regulatory text that previously were undefined in statute. The agencies reviewed the NWPR and determined that the rule significantly reduced clean water protections. Subsequently, on August 30, 2021, the U.S. District Court of Arizona ordered the NWPR vacated and remanded in the case of *Pascua Yaqui Tribe v. U.S. Environmental Protection Agency*. As a result of this order, EPA and USACE are now interpreting WOTUS protections consistent with the pre-2015 Clean Water Rule regulatory regime (EPA 2021). On December 7, 2021, USACE and EPA published a proposed rule revising the definition of WOTUS (86 Federal Register 69372). The proposed rule proposes to put back into place the pre-2015 definition of WOTUS, updated to reflect consideration of Supreme Court decisions.

Because the definition of WOTUS is currently in flux, pending finalization of the proposed rule, the delineation results in this report have not been modified from the time of the aquatic resources delineation. The jurisdiction of aquatic resources presented in this report are consistent with the NWPR definition of WOTUS in place when field surveys were conducted in April 2021. Therefore, the jurisdictional status of the features described in this report should be confirmed when submitting permit applications under Section 404 of the CWA. Some features identified here as WOS and without federal jurisdiction, particularly isolated wetlands described in Section 3.3, may be considered jurisdictional depending on the final rule and/or latest guidance from USACE and EPA.

1.1.2 State and Local Regulations

1.1.2.1 Waters of the State under the Regional Water Quality Control Boards

EPA has deferred water quality certification authority to the Regional Water Quality Control Board (RWQCB, Regional Boards) under Section 401 of the CWA. A water quality certification or waiver is required for all nationwide or individual permits issued by USACE under Section 404 of the CWA. In California, issuance of water quality certification (or a waiver) is considered a discretionary action, requiring review under the California Environmental Quality Act. The RWQCB would be expected to consider impacts on all WUS and OWUS identified in this report, following submittal of the 401 Certification Permit application.

In California, the State Water Resources Control Board adopted the Procedures, effective on May 22, 2020 (State Water Resources Control Board 2019), to address several important issues, including strengthening protection of WOS that are no longer protected under the CWA because of United States Supreme Court decisions. The Water Boards historically have relied on CWA protections in dredged or fill discharge permitting practices, as well as to alleviate inconsistencies across the Regional Boards in requirements for discharges of dredged or fill material into WOS, including wetlands. The state policy asserts jurisdiction over some wetlands and waters that have been

excluded in the NWPR. The RWQCB has much of the "handle," or responsibility, for permitting projects affecting aquatic resources of the state.

The RWQCB also is authorized to protect and regulate WOS, including wetlands and riparian areas. Discharges to WOS are regulated under Section 13263(a) of the Porter-Cologne Act. All WUS and OWUS qualify as WOS, which are broadly defined and also include certain isolated wetland features. Impacts to WOS that are nonjurisdictional WUS and OWUS are regulated through issuance of waste discharge requirements. In Section 13050(e), the act defines WOS to mean any surface water or groundwater, including saline waters, within the boundaries of California. Protection of riparian areas and discharges to riparian areas are granted under the State Water Resource Control Board Order 2004-0004-DWQ, and State Executive Order W-59-93. California Water Code requires the RWQCB to address both direct and indirect impacts to WOS. Riparian areas are protected because they are integral to the chemical, physical, and biological characteristics of WOTUS. Impacts to riparian areas affect the water quality and beneficial uses of WOS.

1.1.2.2 Waters of the State under CDFW

All WUS and OWUS qualify as WOS, and riparian woodlands adjacent to streams and lakes may be regulated by California Department of Fish and Wildlife (CDFW) under Fish and Game Code Section 1600. Portions of riparian habitat may contain a dominance of hydrophytic plant species, but do not meet the USACE hydrology or soils criteria to be considered wetlands. Although this habitat does not meet the federal three-parameter definition of a wetland, some willow scrub or other tree-dominated habitats with wetland species would qualify as WOS. Where riparian habitat along streams extends beyond the active floodplain to terraces, the outmost limits of the habitat on the terrace is mapped as potential WOS to the canopy edge, or drip line.

1.2 Methods

1.2.1 Determining Limits of the Study Area

The wetland Study Area shown in Figure 1 was intended to capture a potential project footprint at Matanzas Creek Dam, as well as the maximum potential inundation area upstream of Matanzas Creek Dam. The Study Area included the likely maximum extent of direct impacts anticipated from a range of potential project alternatives, from removal of Matanzas Creek Dam to raising the auxiliary spillway. The areas that may be disturbed by construction of a potential project at Matanzas Creek Dam were identified in coordination with AECOM and Jones & Demille Engineering engineers, and a boundary was drawn around the entire area (including the dam, the principal and auxiliary spillways, and immediately downstream). That boundary was then merged with the maximum allowable inundation behind the dam, or the area that could be subject to periodic inundation if the elevation of the auxiliary spillway was raised to provide additional flood protection. The wetlands Study Area is smaller than the Biological Study Area used during the general biological surveys described in the Matanzas Creek Dam Watershed Rehabilitation Summary of Existing Environmental Conditions report (AECOM 2021) because the wetlands Study Area does not include the 250-foot buffer on the potential project footprint and maximum inundation area that was included in the Biological Study Area described in that previous report.

In advance of the field investigations, a desktop analysis of the Study Area was performed using reference materials and maps. Satellite images of the Study Area were examined to identify potential

aquatic resources to investigate during field surveys. The following sections provide details on these analytical methods.

1.2.2 Reference Materials

Reference materials were assembled to inform the methods and data interpretation used in the delineation. Five primary reference materials were used:

- USACE Wetlands Delineation Manual (Environmental Laboratory 1987)
- Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008)
- A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Lichvar and McColley 2008)
- USACE Ordinary High Flows and the Stage-Discharge Relationship in the Arid West Region (Curtis et al. 2011)
- USACE Jurisdictional Determination Form Instructional Guidebook (USACE and EPA 2007)

Additional reference materials that informed the methods and data interpretation used in the jurisdictional delineation of the Study Area included:

- The Jepson Manual: Vascular Plants of California (Baldwin et al. 2012)
- National Wetlands Inventory (NWI) (USFWS 2021)
- The National Wetland Plant List: 2018 Wetland Ratings (USACE 2018)
- Geographic information system (GIS) layer for the National Hydrography Dataset (NHD) (USGS 2021)
- Classification of Wetlands and Deepwater Habitats in the United States (Cowardin et al. 1979)
- A Hydrogeomorphic Classification for Wetlands (Brinson 1993)
- NRCS National Water and Climate Center (Climate Center) Custom Soils Report (NRCS 2021a)
- Google Earth web version 7.3.1 (Google Earth 2021*)*
- Recodification of Pre-Existing Rules for the Definition of "Waters of the United States" (USACE and EPA 2019)
- Sonoma Vegetation and Habitat Map (SCAPOSD 2019)
- Matanzas Creek Dam Watershed Rehabilitation Summary of Existing Environmental Conditions (AECOM 2021)

1.2.3 Field Surveys

On April 8 and 22, 2021, AECOM biologists conducted a jurisdictional delineation of aquatic resources in the Study Area to determine the extent of WOTUS and WOS. These surveys were informed by the data collected by AECOM during the reconnaissance survey on January 19, 2021, and reported in the Matanzas Creek Dam Watershed Rehabilitation Summary of Existing Environmental Conditions (AECOM 2021); by a habitat assessment conducted by Prunuske Chatham,

Inc. (PCI) biologist Jennifer Michaud in late February 2021; and by botanical surveys conducted by PCI botanist Joan Schwan in spring 2021. Potential WUS and OWUS that were noted or mapped during these prior surveys were evaluated for WUS and OWUS parameters during the April 2021 surveys, as discussed below.

In the field, areas suspected of being wetlands were delineated in accordance with the routine onsite methodology described in the USACE Wetlands Delineation Manual and Arid West Region Supplement (Environmental Laboratory 1987; USACE 2008). This method uses a three-parameter approach to determine the presence and extent of a wetland. The three parameters are soil, hydrology, and vegetation. Under normal circumstances (undisturbed conditions), a wetland exhibits positive wetland indicators of hydric soils, wetland hydrology, and a dominance of hydrophytic vegetation. Soil colors were recorded using a Munsell Color Chart (Munsell 1994). The Munsell Color Chart is used to identify specific color hues, such as those indicative of redoximorphic features, which are a type of mottling that is associated with soil wetness. Positive indicators of hydric soil include field indicators and published data, such as NRCS lists of hydric soils (NRCS 2018).

Photographs that were taken to document important observations are provided in Appendix B. Plants observed during the investigation were identified to species and recorded. Plant species observed in the Study Area were compiled by PCI botanist Joan Schwan during botanical surveys and by AECOM biologists during the wetland delineation; these are provided in Appendix C, with their wetland indicator status (USACE 2018). Riparian areas were delineated using the Sonoma Veg Map (where the extent of the riparian forest group is shown in Figure 4) and mapping in the field around the drip line of riparian trees. Because some areas were not accessed (due to time limitations and accessibility issues, as discussed in Section 1.2.4), the full extents of the riparian areas—WOS—were not field verified, but were based on a combination of digitizing using aerial imagery and mapping the edges of riparian trees in the field.

The boundaries of aquatic resources were mapped in the field, using aerial photographs of the Study Area and a Trimble Geo-XT Global Positioning System (GPS) receiver. All GPS data were corrected differentially to achieve a sub-meter horizontal accuracy. Mapped feature boundaries were digitized and projected onto current 1:2,400 (1 inch equals 200 feet) aerial photograph maps. USACE wetland delineation datasheets were completed in the field for each data point (Appendix D). Potential other waters that did not meet the wetland parameters but did exhibit an OHWM were evaluated using indicators such as watermarks, bank scouring, and drift debris (Lichvar and McColley 2008). Riverine features were delineated by walking each bank (where accessible) and recording the location with GPS, or recording the creek centerline and measuring the width of the creek at various locations to get average widths along different reaches of creeks.

1.2.4 Limitations that May Limit Results

Some areas of the Study Area along Matanzas Creek upstream of the dam and along the intermittent creeks that drain runoff from the surrounding hillsides contain dense vegetation or run through private property (such as private parcels near Grange Road) and were not accessible. Where the creeks and their riparian corridors were not easily or safely accessible, a combination of Light Detection and Ranging (LiDAR), NHD (USGS 2021), NWI (USFWS 2021), Sonoma Veg Map (SCAPOSD 2019) data, and clear views from vantage points, were used to determine approximate creek channel boundaries and limits of riparian communities.

2 Study Area Setting

Matanzas Creek Dam and the Study Area are in Bennett Valley, approximately 2 miles southeast of the city of Santa Rosa in Sonoma County (approximate project location: 38.404463, -122.652084) (Figure 1). Bennett Valley is bordered by Taylor Mountain to the west and Bennett Mountain to the east. The Study Area is in the United States Geological Survey's (USGS') Santa Rosa 7.5-minute topographic quadrangle and includes portions of 20 Assessor's Parcel Numbers (049-060-009, 049-060-034, 049-060-041, 049-060-033, 049-060-044, 049-060-054, 049-060-057, 049-060-043, 049-060-061, 049-060-042, 049-060-053, 049-130-005, 049-130-011, 049-150-005, 049-130-006, 049-130-012, 049-150-006, 049-150-007, 049-150-009, and 049-150-010).

2.1.1 Climate and Topography

The Study Area experiences a Mediterranean-type climate, generally characterized by wet, mild winters and dry summers, with almost all measurable precipitation (89 percent) falling as rainfall between November and April (NRCS 2021b). Periods of abundant winter precipitation and prolonged periods of drought are both frequent in the historical record. Average precipitation ranged from 0.04 inch in July to 5.63 inches in January. Precipitation in the area averages about 30 inches annually (NRCS 2021b). In 2020, only 12.5 inches of rainfall, total, were recorded in Santa Rosa (NRCS 2021b). In March, the month prior to the survey, 3.15 inches of rainfall were recorded (NRCS 2021b), which was significantly lower than the 4.35-inch, 51-year average for the month of March.

Daily average temperatures between 1971 and 2021 at the nearby Santa Rosa rain station ranged from 48.3 degrees Fahrenheit (°F) in December to 67.5°F in August (NRCS 2021b). Elevations in the Study Area range from approximately 320 to 515 feet above sea level (Google Earth 2021).

Precipitation and growing season analyses have established baseline hydrology conditions for the Study Area and have confirmed the interpretation of hydrology field indicators during years with above- or below-normal rainfall. Establishing whether conditions during the delineation field survey were within a normal precipitation range, and determining precipitation in a "typical year" is an important criterion. To meet this criterion, current conditions were compared with long-term data maintained by the Climate Center and supplemented with information from the Palmer Drought Severity Index (PDSI), where time-series plots of PDSI values are provided by month or year (NOAA 2021a; NOAA 2021b); and by the Water-Budget Interactive Modeling Program (Matsuura et al. 2009).

The Climate Center publishes the ranges of weather data for more than 8,000 National Weather Service weather stations (NRCS 2021b). The data pertinent to wetland hydrology, called WETS data, are shown in standardized tables. These tables show monthly summaries and probability analyses of temperature and precipitation, specifically tailored to wetland determinations; they summarize this information for the Study Area using the nearest WETS station, at the Santa Rosa station near downtown Santa Rosa, approximately 4.5 miles northwest of the Study Area (Appendix E). This station was selected for the analysis because it is the closest weather station with comprehensive precipitation and climate data.

The objective of the WETS table (in Appendix E) is to define the normal ranges for growing seasons and monthly precipitation, so that the climatic characteristics for a geographic area may be assessed over a representative period.

2.1.1.1 Growing Season Analysis

The growing season is defined as the period when soil temperatures 12 inches below ground surface are greater than 41°F. Lacking field data, the growing season start and end dates may be approximated by the median dates (50 percent probability of occurrence) of 28°F air temperatures in spring and fall, as described in the WETS tables (USACE 2005).

To meet USACE criteria for positive wetland hydrology, a site must have continuous surface saturation and/or inundation during 5 percent of the growing season. Table 2-1 shows a growing season analysis for Santa Rosa station (NRCS 2021b).

Table 2-1 Growing Season Analysis

Station and Period of Record	Relative Location to Project	Elevation (feet)	Average Annual Rainfall (inches)	Rainfall November through April	>28°F Growing Season	Number of Days
Santa Rosa (1971 through 2021)	4.5 miles northwest	166	30.5	89%	1/19 through 12/24	339

Source: NRCS 2021b
Note:
°F = degrees Fahrenheit

As shown in Table 2-1, the growing season is 339 days long; therefore, the site must exhibit continuous surface saturation and/or inundation for 17 days. Observations of inundation and/or surface saturation during the early spring would be a strong, positive indicator that the wetland hydrology criteria have been met, assuming that climate conditions were normal.

2.1.1.2 Precipitation Analysis

Indicators of hydrology may not be reliable during years with above- or below-normal rainfall. To determine whether conditions were normal, drier than normal, or wetter than normal during the field inspections, the field investigators used "the NRCS Method," developed by NRCS and defined by Sprecher and Warne, to assess antecedent precipitation conditions (NRCS 1997; Sprecher and Warne 2000). Under the "NRCS Method," normality is defined as the range of rainfall between the 30th and 70th percentiles.

Table 2-2 compares the WETS normal precipitation ranges with the actual observed rainfall for the 3 months before the field investigations at the Santa Rosa station (the closest station to provide recent data).

Using weighted averages and thresholds developed in the NRCS Method, the data show that rainfall conditions were normal when the field surveys were conducted in April. However, in the entire North Coast Drainage region (which encompasses the Study Area watershed and much of the North Coast of California), the 3-month period preceding the surveys was the 30th driest on record (between 1895 and 2021) (NOAA 2021b), and the wet season preceding the surveys (October 2020 through April 2021) was the seventh driest on record.

Table 2-2 NRCS Precipitation Analysis for the Santa Rosa Station for 2021

Month[1]	Total PPT (observed)[2]	PPT Average[3]	30th Percentile PPT[4]	70th Percentile PPT[5]	Condition[6]	Condition Weight Factor[7]	Month Weight Factor[8]	Product[9]
January	4.16	5.63	2.83	6.88	Normal	2	1	2
February	2.06	5.65	2.59	6.79	Dry	1	2	2
March	3.15	4.35	1.84	5.29	Normal	2	3	6
							SUM[10]	10

Notes:

Data presented in inches.

1 The 3 months before the month in which the field delineation was conducted
2 The total observed rainfall for each month, based on the current year's rainfall
3 Long-term precipitation average
4 30th percentile (amount of rainfall that is lower than 70 percent of recorded rainfall for each month)
5 70th percentile (amount of rainfall that is greater than 70 percent of recorded rainfall for each month)
6 If Total PPT Observed is between 30th percentile and 70th percentile values, Condition = Normal; if Total PPT Observed is less than 30th percentile, Condition = Dry; if Total PPT Observed is more than 70th percentile, Condition = Wet
7 Dry = 1; Normal = 2, Wet = 3
8 Earliest month = 1, middle month = 2, latest month = 3
9 Condition Value*Month Weighing Factor
10 If SUM = 6 to 9, weather is drier than normal; if SUM = 10 to 14, weather is normal; if SUM = 15 to 18, weather is wetter than normal

NRCS = Natural Resources Conservation Service
PPT = parts per thousand

The Study Area is in a region that has been designated as being in extreme drought by several drought monitors, including the PDSI (NOAA 2021a). Although it experienced a "normal" winter, the area has gone through exceptionally dry periods over the last several years, and these long periods of drought may influence the delineation results by changing plant compositions over time (favoring upland species) and reducing evidence of wetland hydrology such as standing water. During periods of below-normal rainfall, drought conditions, and unusually low winter snowpack, USACE has recommended that delineators use the Difficult Wetland Situations protocol (USACE 2008). In addition to long periods of drought, the area has also seen intense rain events, like the severe winter storms and flooding in 2017 and 2019. These events produce significant flows that have caused changes to the morphology of riverine features and the structures of riparian communities.

2.1.2 Hydrology

The Study Area is within the 56-square-mile Upper Santa Rosa Creek Hydrologic Unit Code (HUC) (USGS HUC 180101100702) (USGS 2021; Figure 3). Matanzas Creek's headwaters are south of the Study Area near Sonoma Mountain. Two headwater streams, Matanzas Creek and South Fork Matanzas Creek, meet between Sonoma Mountain Road and Grange Road upstream of the Study Area. From that confluence, Matanzas Creek flows northwest until it reaches Matanzas Creek Reservoir and Matanzas Creek Dam. The watershed drainage area upstream of Matanzas Creek Dam is 11.5 square miles (USGS 2016). Downstream of Matanzas Creek Dam, Matanzas Creek flows north through Bennett Valley, then turns west and flows through the city of Santa Rosa to its confluence with Santa Rosa Creek. Santa Rosa Creek continues west to its confluence with Laguna de Santa Rosa, which flows north for a short stretch before meeting Mark West Creek, a tributary to the Russian River.

Sediment management and operational changes have affected the morphology and hydrology of Matanzas Creek Reservoir over time. For example, in 2006, the Matanzas Creek Reservoir Sediment Removal Project involved the planned removal of approximately 120,000 cubic yards of accumulated sediment from Matanzas Creek Reservoir (RWQCB 2006). Upon implementation this project, intended to restore and maintain the sediment retention pool in the reservoir, 102,000 cubic yards of sediment were removed. Previously, the low-level outlet was kept closed so that lower Matanzas Reservoir consistently held water during the dry season; however, the low-level outlet is currently kept open, so that water accumulated behind the dam is intermittent and more closely linked to precipitation events and wet periods with streamflow. A mix of wetland and upland species currently occupies the reservoir footprint.

2.1.3 Soils

The NRCS soil survey indicates nine soil map units (conglomerations of soil series) in the Study Area (Appendix F; NRCS 2021a; California Soil Resource Lab 2021). These soil types can be broadly categorized into three soil series: Goulding, Haire, and Spreckels. Descriptions of these soil series are included below. The NRCS Custom Soils Report for the Study Area is provided in Appendix F (NRCS 2021b).

2.1.3.1 Goulding Series

Goulding series soils are shallow, somewhat excessively drained soils formed in material weathered from metavolcanics or metasedimentary rocks. Goulding series soils are on hills and mountains and have slopes ranging from 5 to 75 percent. They have medium to very rapid runoff and moderate permeability. Goulding series soils cover the majority of the Study Area.

2.1.3.2 Haire Series

Haire series soils are generally clayey and are moderately well drained, with slow to rapid runoff and very slow permeability. They are found on nearly level to moderately steep hills at elevations of 20 to 2,400 feet. In the Study Area, Haire gravelly loam occurs at the downslope terminus of the auxiliary spillway, and Haire clay loam occurs in the central and eastern portions of the Study Area north of Matanzas Creek.

2.1.3.3 Spreckels Series

Spreckels series soils are fine, well drained, and have slow permeability and medium runoff. They occur on sloping to hilly uplands of tuffaceous (derived from volcanic ash) sediments, at elevations of 100 to 800 feet. Two areas of Spreckels loam occur in the central portion of the Study Area, one north and one south of Matanzas Creek.

2.1.3.4 Riverwash

Riverwash is not a soil series but is mapped in the Study Area along the Matanzas Creek channel. Riverwash is composed of mixtures of gravel, rocks, and sand typical of creek beds.

2.1.3.5 Water

Water is mapped in the Study Area on the NRCS web soil survey included in Appendix F, at the base of Matanzas Creek Dam. However, no standing water was observed there during the reconnaissance visit conducted on January 19, 2021, or the wetland delineation conducted in April 2021. This

mapped water is likely a relic of when the low-level outlet was kept closed and does not accurately represent current conditions.

2.1.4 Landcover Types

Fine-scale vegetation communities and habitats were mapped across Sonoma County as part of the Sonoma County Vegetation Mapping and LiDAR Program (SCAPOSD 2019). This body of work, described in the Sonoma Vegetation and Habitat Map Final Report and with spatial data available for download, is known as the Sonoma Veg Map. Development of the Sonoma Veg Map began with the California Native Plant Society (CNPS) and CDFW Vegetation Classification and Mapping Program countywide vegetation surveys, which were conducted in 2013 and 2014. Data from these surveys and other vegetation surveys conducted by CDFW and CNPS were used to create a vegetation classification system specific to Sonoma County. High-density LiDAR and aerial imagery were collected countywide in the fall of 2013, and therefore the Sonoma Veg Map represents landscape conditions at that time. A lifeform map was created using the LiDAR and aerial imagery data, and countywide field data were used to train automated machine learning algorithms to produce a fine-scale vegetation map from the lifeform map. The fine-scale map was manually edited and validated through subsequent field data collection and was finalized after incorporating input from two advisory groups. Accuracy assessment plot data collected from 2016 to 2018 found the overall accuracy of the final fine-scale vegetation and habitat map to be 79 percent.

The Sonoma Veg Map shows 16 unique vegetation communities in the Study Area and three other landcover types (Figure 4). The vegetation communities were generally mapped in the Study Area at the alliance level (consistent with the National Vegetation Classification system), and sometimes at the group or macrogroup level. A description of each of the landcover types is included in Table 2-3, primarily from the Sonoma Veg Map, but with relevant observations from the reconnaissance visit and the wetland delineation. Additional detail on wetland types is provided in Section 3. Based on AECOM's observations during the reconnaissance visit, the Sonoma Veg Map vegetation communities data were mapped in the Study Area at a level of accuracy sufficient to inform an alternatives analysis and impact assessment for the National Environmental Policy Act. However, during wetland delineation, some remapping was conducted to modify the extent of wetlands and riparian woodlands; these modified boundaries are shown in Figure 5. A list of all plants observed in the Study Area during the wetland delineation and the botanical surveys conducted by PCI in 2021 is provided in Appendix C.

Table 2-3 Landcover Types in the Study Area

Sonoma Veg Map Class Common Name	Map Code[1]	Description	Location in the Study Area
California Annual and Perennial Grassland Macrogroup NA	CA Gr	This is a grassland vegetation classification that is a catch-all for many grassland types, both native and nonnative. According to observations of the Study Area during the reconnaissance visit, grasslands in the Study Area were generally dominated by nonnative annual and perennial species. Seasonal wetlands and a freshwater marsh were mapped during the wetland surveys, in the grassland communities where vernal pool and marsh species were observed in depressions.	This classification is found throughout the Study Area, on the dam face, spillway, and in gaps between forest and woodland communities.
Baccharis pilularis Alliance Coyotebrush Alliance	BAPI	This alliance consists of shrubland dominated by coyote brush.	This alliance is found in the central part of the Study Area, on both sides of Matanzas Creek.
Umbellularia californica Alliance California Bay Laurel	UMCA	This alliance consists of forest and woodland dominated by California bay.	This alliance is found on one slope extending south from the base of the upstream side of the dam, west of Matanzas Creek.
Eucalyptus (*globulus*, *camaldulensis*) Semi-Natural Alliance Eucalyptus (Blue Gum, River Red Gum) Semi-Natural Alliance	EU	This is a nonnative forest community dominated by *Eucalyptus* spp.	This community is found in one small polygon mapped adjacent to Bennet Valley Road at the southeastern end of the Study Area.
Forest Sliver NA	For	This community consists of small forested areas not identified by dominant species in the Sonoma Veg Map. The Sonoma Veg Map defines these areas as between ½ and 1 acre in area, surrounded by nonforested map classes. During the reconnaissance visit, the forest sliver mapped near the eastern end of the dam was observed to be dominated by coast live oak (*Quercus agrifolia*); other forest slivers in the Study Area are also likely oak-dominated.	This community is found in one polygon near the eastern end of the dam and three polygons south of Matanzas Creek in the central portion of the Study Area.
Rubus armeniacus Alliance Himalayan Blackberry Alliance	RUAR	This alliance consists of blackberry patches dominated by the highly invasive Himalayan blackberry.	One small polygon of this community occurs in the Study Area toward the downslope end of the spillway.

Sonoma Veg Map Class Common Name	Map Code[1]	Description	Location in the Study Area
Nonnative Forest and Woodland NA	NNF	This is a broad category for forest and woodland communities dominated by nonnative species. These areas were not visited during the reconnaissance visit, so the dominant species in these polygons in the Study Area was not determined.	Two small polygons of this type occur in the Study Area—at the northeastern end, on the slopes above the spillway, and at the eastern end near Bennet Valley Road.
Nonnative Shrub NA	NNS	In the Study Area, this mapping unit is composed of the highly invasive Spanish broom (*Spartium junceum*).	One small polygon of this community occurs on the bank of Matanzas Creek at the base of the dam outlet.
Quercus (*agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni*) Alliance Oak (California Live, Blue, Oregon White, California Black, Valley, Interior Live) Alliance	QU	This alliance consists of forest and woodland in which multiple oak species are co-dominant.	This alliance is prevalent in the eastern half of the Study Area, along both sides of Matanzas Creek.
Quercus agrifolia Alliance California Live Oak Alliance	QUAG	This alliance consists of forest and woodland dominated by coast live oak.	This alliance is scattered throughout the Study Area in several polygons.
Quercus douglasii Alliance Blue Oak Alliance	QUDO	This alliance consists of forest and woodland dominated by blue oak.	This alliance is found in one small polygon at the northern end of the Study Area,
Quercus garryana Alliance Oregon White Oak Alliance	QUGA	This alliance consists of forest and woodland dominated by Oregon white oak.	This alliance is prevalent throughout the Study Area, particularly on north-facing slopes south of the Matanzas Creek corridor.
Quercus lobata Alliance Valley Oak Alliance	QULO	This alliance consists of forest and woodland dominated by valley oak.	This alliance is prevalent throughout the central and eastern end of the Study Area.

Sonoma Veg Map Class Common Name	Map Code[1]	Description	Location in the Study Area
Southwestern North American Riparian/ Wash Scrub Group NA	Rip SW	This is a general vegetation type in which a variety of riparian shrubs or small trees are dominant. Deciduous riparian trees lacked leaves during the reconnaissance visit and could not be identified, and riparian vegetation communities could not be distinguished. Finer-scale vegetation mapping would result in more detailed alliances and may result in refining the riparian vegetation boundaries on Figure 4. During the wetland surveys, potions of this vegetation type near the dam were mapped separately and classified as forested/shrub wetlands.	This alliance is found primarily in the Matanzas Creek floodplain on the upstream side of the dam, surrounding the area mapped as marsh. Two small polygons are also present in the far eastern end of the Study Area.
Vancouverian Riparian Deciduous Forest Group NA	Rip Van	This is a general vegetation type dominated by riparian trees such as alders (*Alnus* sp.), Pacific willow (*Salix lasiandra*), and boxelder (*Acer negundo*). Deciduous riparian trees lacked leaves during the reconnaissance visit and could not be identified, and riparian vegetation communities could not be distinguished. Finer scale vegetation mapping would result in more detailed alliances and may result in refining the riparian vegetation boundaries.	This type is found throughout the Matanzas Creek floodplain. Part of this community north of Matanzas Dam was remapped as marsh.
Western Northern American Freshwater Marsh Macrogroup NA	M	This group consists of marshes and wet meadows dominated by silverweed (*Potentilla* spp.), sedge (*Carex* spp.), rush (*Juncus* spp.), water parsley (*Oenanthe sarmentosa*), bulrush (*Schoenoplectus* spp. and *Scirpus* spp.), and cattail (*Typha* spp.).	This group is mapped in the reservoir inundation area from the Matanzas Creek Dam to approximately 0.25 mile upstream of the dam. However, much of this marsh has been reduced due to limited hydrologic inputs, and the limits were remapped during the wetland surveys.
Developed NA	Dev	This classification consists of man-made developed areas greater than 0.2 acre. Areas were considered developed if they contain significant man-made impervious cover or are highly altered by man. This includes lawns, paved areas, and heavily landscaped gardens.	There is a small developed area on private property on the perimeter of the western side of the Study Area.
Major Roads NA	pp	This classification consists of major paved roads, including highways and major arterial roads. Minor paved roads and dirt roads are not included.	This classification includes the portion of Grange Road that intersects with the Study Area.

Sonoma Veg Map Class Common Name	Map Code[1]	Description	Location in the Study Area
Vineyard NA	Vin	This classification consists of vineyards, as observed in the fall 2013 imagery.	Vineyards are found in several areas near the outer perimeter of the Study Area, along Bennett Valley Road on the eastern edge of the Study Area.

Notes:

NA – Not Applicable

[1] Map Code corresponds with Sonoma Veg Map classification code used in Figure 4.

3 Findings

This chapter presents the aquatic resources delineated in the Study Area. Details regarding mapped features are provided in Table 3-1; Figure 5 depicts the extent of aquatic resources in the Study Area. Representative photographs of the aquatic resources and adjacent uplands are provided in Appendix B. Arid West data sheets and are provided in Appendix D. Appendix G is a copy of the Aquatic Resources Sheet of the Consolidated ORM Upload Workbook, which provides the delineated extents, locations, and Cowardin et al. (1979) classifications of all waters evaluated in the Study Area.

Table 3-1 Aquatic Resources Delineated in the Study Area

Feature Type	Delineated Area (square feet)[1]	Delineated Area (acres)[2]	Length (linear feet)[3]
Potential WOTUS and WOS			
WUS			
Forested/shrub wetland[4]	5,998	0.14	N/A
Freshwater emergent marsh[4]	47,914	1.10	N/A
WUS Total[5]	53,913	1.24	N/A
OWUS			
Riverine intermittent[4]	225,548	5.18	15,747
Matanzas Creek dam spillway[4]	1284	0.03	105
Matanzas Creek dam conduit[4]	2305	0.05	439
Culverted waters	752	0.02	244
OWUS Total[5]	229,889	5.28	16,096
WOTUS Total[5]	**283,801**	**6.52**	**17,260**
Isolated Wetlands and Riparian Woodland (WOS)			
Isolated freshwater marsh	332	0.01	N/A
Isolated seasonal wetlands	6,326	0.15	N/A
Isolated Wetlands Total[4, 5, 6]	6,658	0.15	N/A
Riparian woodland[4]	1,597,410	36.67	N/A
WOS Total[5, 6]	**1,604,068**	**36.82**	N/A

Notes:

1 Square feet are rounded to the nearest whole foot.

2 Acres are rounded to the nearest hundredth of an acre. The sum of acres is calculated using measurements of each feature to the nearest square foot.

3 Linear feet are rounded to the nearest whole foot; they are provided for OWUS and CWUS features only.

4 Potential California Department of Fish and Wildlife 1600 jurisdictional.

5 The sum of totals may not add up exactly, due to rounding.

6 Pending finalization of a proposed rule that would revise the definition of the WOTUS, some isolated wetlands may be considered jurisdictional WOTUS under Section 404. Findings presented here are based on the definition of WOTUS in place at the time of the delineation in April 2021.

CWUS = culverted waters of the United States
OWUS = other waters of the United States
WOS = waters of the state
WOTUS = waters of the United States
WUS = wetland waters of the United States

3.1 Potentially Jurisdictional Wetlands

Approximately 1.24 acres of potentially jurisdictional WUS were identified in the Study Area (Figure 5). Wetlands were grouped by their USACE hydrogeomorphic (Brinson 1993; Cowardin et al. 1979) classification and included freshwater emergent marshes and forested/shrub wetlands. These features are shown in Table 3-2. These wetlands meet the definition of WOTUS and WOS. In addition to being WOS, because these wetlands are associated with riverine features, they are also likely CDFW jurisdictional. Isolated wetlands observed in the Study Area, including one freshwater marsh and 10 seasonal wetlands, are described in Section 3.3.

Table 3-2 Wetland Waters of the United States in the Study Area

Feature ID	Feature Type	Cowardin Code	Latitude	Longitude	Delineated Area (square feet)[1]	Delineated Area (acres)[2]	Linear Feet[3]
WUS-2	Forested/shrub Wetland	RP1FO	38.404346	-122.65231	5,998	0.14	N/A
WUS-3	Freshwater emergent marsh	RP1EM	38.404885	-122.652694	41,249	0.95	N/A
WUS-4	Freshwater emergent marsh	RP1EM	38.406847	-122.653856	6,666	0.15	N/A
Wetlands Total					**53,913**	**1.24**	**N/A**

Notes:

[1] Square feet are rounded to the nearest foot.
[2] Acres are rounded to the nearest hundredth of an acre and presented to the nearest whole number when less than 0.01 acre.
[3] Linear feet are rounded to the nearest whole foot.

RP1EM = riverine, freshwater emergent wetlands
RP1FO = riverine, forested, broad-leaved deciduous, seasonally flooded, wetlands
WUS = wetland waters of the United States

3.1.1 Forested/Shrub Wetland

Forested/shrub wetlands generally are dominated by woody vegetation that is greater than 20 feet tall, and include an overstory of trees, an understory of young trees and shrubs, and a herbaceous layer. This wetland type was mapped near the base of the dam in the Matanzas Creek floodplain (or Matanzas Reservoir) (WUS-2). Dominant species in the forested shrub wetland are arroyo willow (*Salix lasiolepis*), fat-hen (*Atriplex prostrata*), and stinging nettle (*Urtica dioica*). The floodplain area maintains saturation through the summer months, contains wetland vegetation, and exhibits hydric soils. Hydrology for this wetland area is related to subsurface flows during spring and summer months, when flood flows subside. The Cowardin classification assigned to these wetlands is riverine, forested, broad-leaved deciduous, seasonally flooded, wetlands (RP1FO).

Riparian habitat is discussed in the USACE Arid West Manual section on difficult wetland situations, both in terms of problematic vegetation (riparian areas) and soils (vegetated sand and gravel bars in floodplains). Given the abundance of hydrophytic vegetation in both the overstory and understory, the hydrophytic vegetation criteria are met at this location. Although no soil saturation was observed here, flowing or standing water is likely present for some periods in the year due to the manipulated

nature of the channel hydrology. Using best professional judgment, coupled with the positive hydrophytic vegetation and hydrology indicators (such as drift deposits and surface soil cracks), it was determined that hydric soils are likely present in this location (although the soil did not exhibit hydric indicators [Appendix D, WL-8]), and this area is likely to be considered a jurisdictional wetland by USACE.

3.1.2 Freshwater Emergent Marsh Wetland

Freshwater marsh wetlands are features that consist of dense stands of wetland vegetation, dominated by annual and perennial emergent species. Freshwater marsh wetlands have saturated or inundated soils throughout most of the year, except in some cases when soils dry during late summer/early fall.

In the Study Area, WUS-3 occurs in the floodplain of Matanzas Creek, within the potential inundation footprint of Matanzas Reservoir. In the past, a dam outlet left closed created a permanent pool of water immediately upstream of Matanzas Creek Dam; the freshwater marsh was mapped within the limits of this former pool. After sediment removal projects were conducted at Matanzas Creek Reservoir, the low-level outlet (or primary spillway) is now left in the open position so that a pool is rarely present. The freshwater marsh wetland, as mapped in the field, is much smaller than the marsh wetland shown in the Sonoma Veg Map layer. Much of the area mapped as wetland by Sonoma Veg Map did not present wetland hydrology, and the herbaceous layer was dominated by facultative or upland species, such as curly dock (*Rumex crispus*) and mustard (*Brassica* sp.).

Downstream, WUS-4 occurs as a riverine emergent wetland below the ordinary high water (OHW) of Matanzas Creek. The emergent wetland vegetation occurs along this portion of Matanzas Creek at the base of the Primary Spillway, where there is shallow, slow-moving, and pooling water. Dominant species in these wetlands are cattails, bulrush, spreading rush (*Juncus patens*), water primrose (*Ludwigia* sp.), nutsedge (*Cyperus* sp.), water-plantain (*Alisma* sp.), spikerush (*Eleocharis* sp.), and annual beard grass (*Polypogon monspeliensis*). The Cowardin classification assigned to these emergent marsh wetlands is riverine, freshwater emergent wetlands (RP1EM).

3.2 Potentially Jurisdictional Other Waters of the United States

Approximately 5.28 acres of potentially jurisdictional OWUS (including 0.2 acre of culverted waters, described in Section 3.2.2 and listed in Table 3-4) were identified in the Study Area (Figure 5). Potentially jurisdictional other waters include Matanzas Creek (an intermittent creek), unnamed intermittent creeks, and dam structures (as well as the culverts described in Section 3.2.2). These features meet the NWPR definition of WOTUS and WOS. All riverine features are also likely CDFW jurisdictional. These features are shown in Table 3-3 and discussed in the following sections.

Table 3-3 Other Waters of the United States in the Study Area (excluding Culverted Waters)

Feature ID	Feature Type	Cowardin Code	Latitude	Longitude	Delineated Area (square feet)[1]	Delineated Area (acres)[2]	Length (linear feet)[3]
OWUS-1A	Riverine intermittent (Matanzas Creek above dam)	R4SB	38.400379	-122.643843	183,369	4.21	7,599
OWUS-1B	Matanzas Creek dam conduit	R4r – concrete structure	38.406002	-122.652984	2,305	0.05	439
OWUS-1C	Matanzas Creek dam spillway	R4r – concrete spillway channel	38.406554	-122.653590	1,284	0.03	105
OWUS-1D	Riverine intermittent (Matanzas Creek below dam)	R4SB	38.407509	-122.654105	6,322	0.15	509
OWUS-2	Riverine intermittent	R4SB	38.398128	-122.637283	213	0.005	71
OWUS-3	Riverine intermittent	R4SB	38.398683	-122.638487	1,943	0.04	483
OWUS-4A	Riverine intermittent	R4SB	38.398539	-122.641012	404	0.01	134
OWUS-4B	Riverine intermittent	R4SB	38.398771	-122.640779	164	0.004	53
OWUS-5A	Riverine intermittent	R4SB	38.399366	-122.643978	3,367	0.08	424
OWUS-5B	Riverine intermittent	R4SB	38.400115	-122.644241	1,569	0.04	154
OWUS-6	Riverine intermittent	R4SB	38.399333	-122.644848	3,076	0.07	389
OWUS-7A	Riverine intermittent	R4SB	38.402267	-122.644415	984	0.02	509
OWUS-7B	Riverine intermittent	R4SB	38.401729	-122.645816	990	0.02	494
OWUS-8A	Riverine intermittent	R4SB	38.403487	-122.645568	2,302	0.05	576
OWUS-8B	Riverine intermittent	R4SB	38.402393	-122.647093	3,401	0.08	848
OWUS-9	Riverine intermittent	R4SB	38.400877	-122.649025	4,001	0.09	657
OWUS-10	Riverine intermittent	R4SB	38.401603	-122.651036	5,232	0.12	520
OWUS-11A	Riverine intermittent	R4SB	38.403054	-122.653164	252	0.01	83
OWUS-11B	Riverine intermittent	R4SB	38.403799	-122.652518	1,433	0.03	477
OWUS-12A	Riverine intermittent	R4SB	38.404118	-122.653889	92	0.002	29
OWUS-12B	Riverine intermittent	R4SB	38.404085	-122.652943	1,423	0.03	472
OWUS-13	Riverine intermittent	R4SB	38.407271	-122.654199	218	0.01	73
OWUS-14	Riverine intermittent	R4SB	38.407938	-122.652965	4,794	0.11	1,194
Other Waters of the United States (excluding Culverted Waters) Total					229,136	5.26	16,291

Notes:

[1] Square feet are rounded to the nearest foot.
[2] Acres are rounded to the nearest hundredth of an acre and presented to the nearest whole number when less than 0.01 acre.
[3] Estimated to the nearest foot.

OWUS = other waters of the United States
R4SB = riverine, intermittent, streambed
R4r = riverine, intermittent, artificial

3.2.1 Intermittent Riverine

3.2.1.1 Matanzas Creek

Matanzas Creek (OWUS-1A and OWUS-1D) is an 11.4-mile northwestward-flowing intermittent stream. In the field, the OHWM was defined by a bed and bank that was measured and averaged approximately 20 feet wide through the Study Area. The width varies from approximately 50 feet at the OHW at the Grange Road bridge, to approximately 3 feet wide in the low flow channel closer to the dam, in the reservoir. A dense canopy of riparian vegetation, mapped as riparian woodland and scrub, is adjacent to most of the creek. At the time of the survey in April, water still was flowing in some areas, and shallow pools were present in some locations. In a few locations, the banks are eroded, with roots visible because of bank undercutting from flood events. The substrate upstream of the reservoir is predominantly pebbles and cobbles. Closer to the dam, the substrate is sand and gravel.

Although this feature may have previously been perennial, recent field observations suggest that it is an intermittent stream. Existing databases, including NWI and NHD (USFWS 2021, USGS 2021), classify the stream as perennial, but those classifications may not reflect current hydrology. Although our study did not include a review of upstream water use, increased riparian diversion and groundwater extraction in recent decades have resulted in a reduction in streamflow in many streams throughout the region. Based on field observations, including lack of water in the stream throughout most of the Study Area and downstream of the Study Area during the site visit in January 2021, the Cowardin classification assigned to this water is riverine, intermittent, streambed (R4SB) deep water habitat.

3.2.1.2 Reservoir Conduit Structure

The Matanzas Creek dam conduit structure (OWUS-1B) is a concrete box culvert that carries flow through the dam embankment; it is approximately 439 feet long and 5.25 feet wide. The outlet structure is the main source of water discharged into Matanzas Creek north of the dam. The Cowardin classification assigned to this water is riverine, intermittent, artificial substrate (R4r).

3.2.1.3 Matanzas Dam Spillway

The concrete spillway outlet structure (OWUS-1C) on the northeastern side of Matanzas Creek dam is considered an OWUS, based on the discharge of water from Matanzas Creek upstream (OWUS-1A), to the downstream reach (OWUS-1D). The spillway structure is approximately 10 feet wide at the base of the sidewalls. The Cowardin classification assigned to this water is riverine, intermittent, artificial substrate (R4r).

3.2.1.4 Unnamed Intermittent Creeks

The majority of the intermittent riverine creek features in the Study Area exhibit a well-defined bed and bank, and they appear to carry flows for only a few months of the year. These waters, mapped on the slopes to the west and east above Matanzas Creek, are fed by groundwater in spring and early summer, in addition to carrying surface waters during the rainy season, but do not appear to carry water year-round. Matanzas Creek is fed by these unnamed tributaries. OWUS-2, -3, -4A, -4B, -5A, --5B, -7A, -7B, -8A, -8B, -9, -10, -11A, and -11B drain the area to the south of the dam. Many of these features on the western side of the Study Area are steep, incised channels. OWUS-14 is a small channel, approximately 1 to 3 feet wide, that flows from east to west down the lower portion of

the auxiliary spillway and joins Matanzas Creek north of the dam. This feature contained some ponded water during the April 2021 surveys. The construction of the auxiliary spillway may have interrupted a natural seep or drainage feature that historically may have included OWUS-14, and what was observed in the field is the remnants of this feature combined with drainage and surface runoff through the spillway.

OHW was defined by deposition of organic debris, benches, and break in bank. The creeks may exhibit one or all of the following: shelving; defined bed and bank; vegetation matted down, bent, or absent; and evidence of scouring. In some cases, despite a thick layer of leaf litter, the creeks support sparse vegetation below the top of bank, which often includes poison oak (*Toxicodendron diversilobum*) and a mix of native and nonnative annual grasses. The Cowardin classification assigned to these waters is riverine, intermittent, streambed (R4SB) habitats.

3.2.2 Culverted Waters

Approximately 0.02 acre of culverted waters in the Study Area are potentially jurisdictional because of their function of connecting surface flow between potentially jurisdictional WUS and OWUS. In the Study Area, these features all carry intermittent flow. The Cowardin classification assigned to these waters is riverine, intermittent, artificial substrate (R4r). The locations of these potentially jurisdictional (culverted) OWUS are shown in Figure 5. Table 3-4 lists these features.

Table 3-4 Culverted Waters of the United States in the Study Area

Feature ID	Feature Type	Cowardin Code	Latitude	Longitude	Delineated Area (square feet)[1]	Delineated Area (acres)[2]	Length (linear feet)[3]
CWUS-1	Culverted Waters	R4r	38.398695	-122.640837	59	0.001	22
CWUS-2A	Culverted Waters	R4r	38.399915	-122.644349	188	0.004	51
CWUS-2B	Culverted Waters	R4r	38.399915	-122.644363	188	0.004	52
CWUS-3	Culverted Waters	R4r	38.401788	-122.644919	57	0.001	30
CWUS-4	Culverted Waters	R4r	38.402914	-122.645922	86	0.002	25
CWUS-5	Culverted Waters	R4r	38.403173	-122.653058	66	0.002	23
CWUS-6	Culverted Waters	R4r	38.40406	-122.653799	109	0.003	39
Total Culverted Waters of the U.S. (CWUS)					752	0.02	244

Notes:

[1] Square feet are rounded to the nearest foot.
[2] Acres are rounded to the nearest hundredth of an acre, and presented to the nearest whole number when less than 0.01 acre.
[3] Estimated to the nearest foot.
CWUS = culverted waters of the United States
R4r = riverine, intermittent, artificial

3.3 Waters of the State

All WUS and OWUS in the Study Area also qualify as WOS. Isolated wetlands and riparian woodlands described below may be considered WOS and may be regulated by the RWQCB. Eleven isolated wetlands were identified in the Study Area (Table 3-5 and Figure 5). Because federal regulations are currently in flux (see Section 1.1.1), the jurisdictional status of these isolated wetlands as WOTUS

under Section 404 should be confirmed based on the final rule and/or guidance from EPA and USACE at the time permit applications are prepared.

3.3.1 Isolated Freshwater Marsh

Isolated marsh IM-1 is an isolated depressional freshwater marsh that appears to be a created feature. This feature is dominated by some typical seasonal wetland species seen in the seasonal wetlands observed in the auxiliary spillway (and described below), such as spikerush, popcorn flower (*Plagiobothrys* sp.), manna grass (*Glyceria leptostachya*), pennyroyal (*Mentha pulegium*), and California loosestrife (*Lythrum californicum*). However, this feature contained standing water at the time of the late April survey (during which all the seasonal wetlands were dry); it was also dominated by emergent annual species, such as narrowleaf narrow leaf cattail (*Typha angustifolia*) and water-plantain. Much of the surface of the water was covered in lesser water starwort (*Callitriche* sp.). The Cowardin classification assigned to this emergent marsh wetland is persistent, emergent, palustrine (PEM1).

3.3.2 Isolated Seasonal Wetlands

Isolated seasonal wetlands ISW-5, -6, -7, -8, -9, -10, -11, -12,-13, and -14 are depressional seasonal wetlands observed in the cut surface that forms the floor of the auxiliary spillway on the eastern side of the Study Area. These features may have developed or may persist in part as a result of cattle or vehicle activity. WUS-5 and WUS-6 appear to have been recently created by heavy equipment (based on the presence of tire ruts). At the time of the April 8, 2021, survey, WUS-8 and WUS-9 exhibited standing water in some areas, and desiccated tadpoles were observed. Seasonal wetlands are seasonally inundated wetlands where saturation, rather than inundation, dominates the hydrologic regime of the wetland. Seasonal wetland habitat is typically associated with depressions in the landscape that inundate long enough to support hydric soils and hydrophytic vegetation (such as vernal pools). These seasonally ponded depressions were noted during the January 2021 surveys to have hydrology similar to vernal pools. Vernal pool communities are characterized as shallow depressions underlain by an impermeable layer that restricts the downward flow of water and causes them to inundate with water seasonally. The area is likely underlain by a layer of claypan or volcanic rock; remnant lava rocks were observed. During the April 2021 surveys, several species endemic to vernal pool habitats were identified. Redoximorphic features were observed in soil profiles, and algal matting on the soil surface. Therefore, these features exhibit the three parameters of a wetland.

The pools are dominated by nonpersistent emergent vegetation, such as annual herbs and grasses adapted to these unique conditions. Dominant species found in the pools in the Study Area include those common to vernal pools, including spikerush, annual semaphore grass (*Pleuropogon californicus* var. *californicus*), aquatic pygmy weed (*Crassula aquatica*), popcorn flower, toad rush (*Juncus bufonius*), common bog rush (*J. effusus*), western rush (*J. occidentalis*), manna grass, pennyroyal, California loosestrife. Lobb's aquatic buttercup (*Ranunculus lobbii*), a CNPS list 4 species typical of vernal pools in the region, also grows in these features (CDFW 2021). Isolated wetlands that do not qualify as OWUS qualify as WOS and may be regulated by the RWQCB. The Cowardin classification assigned to the seasonal wetlands is palustrine, emergent, persistent, seasonally saturated wetlands (PEM1B).

Table 3-5 Isolated Wetlands in the Study Area

Feature ID	Feature Type	Cowardin Code	Latitude	Longitude	Delineated Area (square feet)[1]	Delineated Area (acres)[2]	Linear Feet[3]
IFM-1	Freshwater emergent marsh	PEM1	38.400835	-122.647202	332	0.01	32
ISW-5	Seasonal wetland	PEM1B	38.405619	-122.651839	86	0.002	14
ISW-6	Seasonal wetland	PEM1B	38.405559	-122.651729	175	0.004	25
ISW-7	Seasonal wetland	PEM1B	38.406818	-122.65007	88	0.002	20
ISW-8	Seasonal wetland	PEM1B	38.406914	-122.649782	863	0.02	59
ISW-9	Seasonal wetland	PEM1B	38.406934	-122.649674	1,127	0.03	66
ISW-10	Seasonal wetland	PEM1B	38.407024	-122.650055	167	0.004	19
ISW-11	Seasonal wetland	PEM1B	38.407132	-122.650458	77	0.002	14
ISW-12	Seasonal wetland	PEM1B	38.407478	-122.649693	3,473	0.08	99
ISW-13	Seasonal wetland	PEM1B	38.40711	-122.649676	143	0.003	44
ISW-14	Seasonal wetland	PEM1B	38.407987	-122.651471	127	0.003	24
Isolated Wetlands Total					**6,658**	**0.15**	**415**

Notes:

[1] Square feet are rounded to the nearest foot.

[2] Acres are rounded to the nearest hundredth of an acre, and presented to the nearest whole number when less than 0.01 acre.

[3] Linear feet are rounded to the nearest whole foot.

IFM = isolated freshwater marsh
ISW = isolated seasonal wetland
PEM1 = palustrine, emergent, persistent wetlands
PEM1B = palustrine, emergent, persistent, seasonally saturated wetlands

3.3.3 Riparian Woodlands

A total of 36.67 acres of riparian habitat along Matanzas Creek and adjacent intermittent creeks was mapped. These areas would be potentially jurisdictional WOS. Riparian habitat along the creeks is dominated by willows (*Salix* spp.), box elder, alder (*Alnus* sp.), oaks (*Quercus* spp.), hedgenettles (*Stachys* spp.), poison oak, blackberry (*Rubus* sp.), mugwort (*Artemisia douglasiana*), curly dock, and various native and nonnative grasses. The riparian woodlands are likely CDFW jurisdictional.

3.4 Jurisdictional Determination

Based on the regulations in place at the time of the aquatic resource delineation in April 2021, the Study Area contains 6.52 acres of potentially jurisdictional WOTUS (considered jurisdictional under Section 404), including 1.24 acres of WUS and 5.28 acres of OWUS and culverted waters of the United States (CWUS). All WUS and OWUS in the Study Area also qualify as WOS. The Study Area also contains 0.15 acre of isolated wetlands and 36.67 acres of riparian woodlands, which would qualify as WOS and may be considered WOTUS pending finalization of the proposed rule that would revise the definition of WOTUS. To comply with federal and state regulations protecting aquatic resources, permits may be required from USACE, CDFW, and the RWQCB before the start of project activities.

4 Report Preparers

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Saana Deichsel, Senior Ecologist
Joseph Broberg, Botanist

Report prepared by:

Saana Deichsel
Ryan Haines, GIS Specialist

Report reviewed by:

Jonathan Stead, Senior Project Ecologist
Justin Whitfield, Senior Project Ecologist

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Appendix A
Figures

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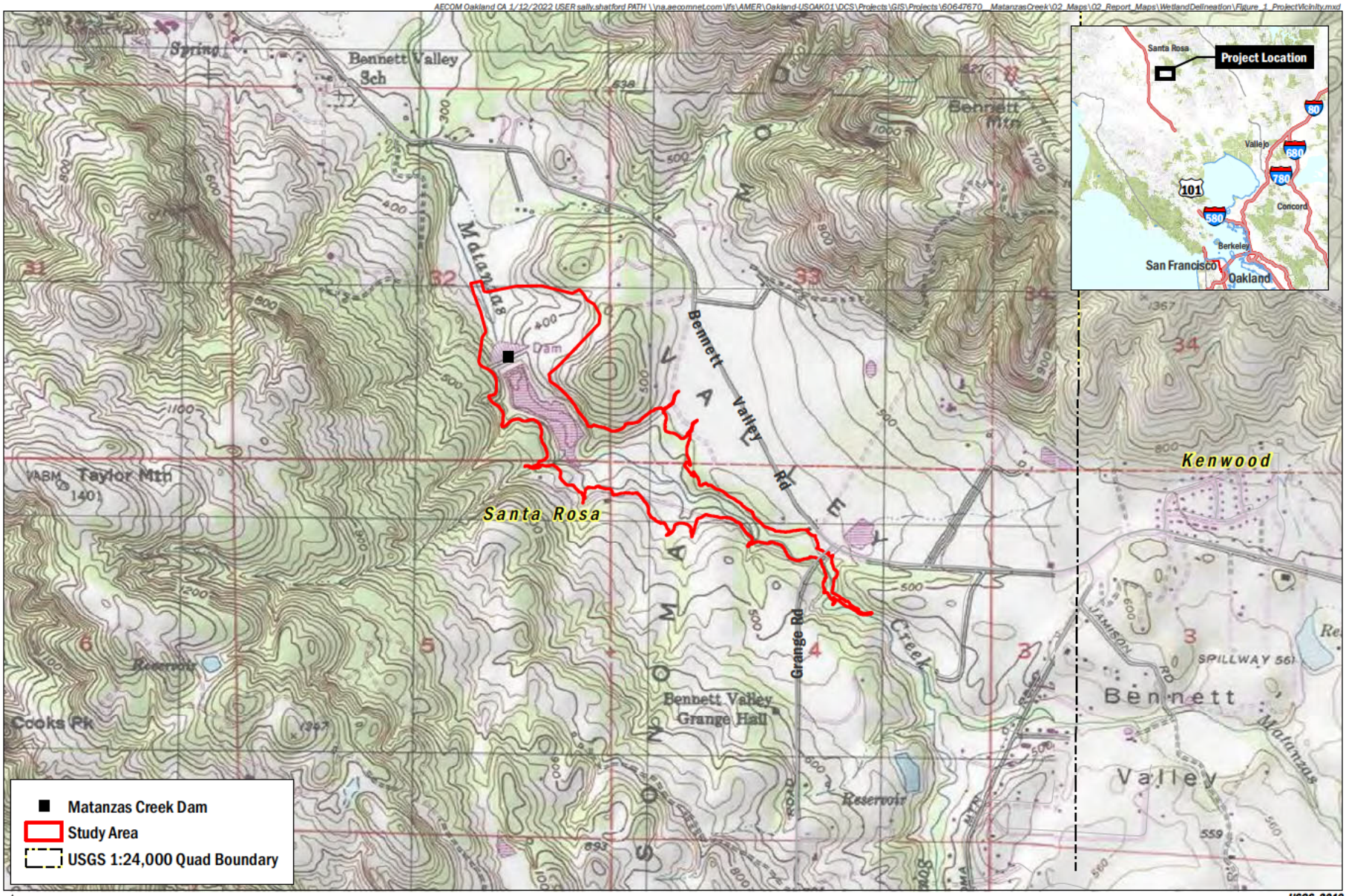

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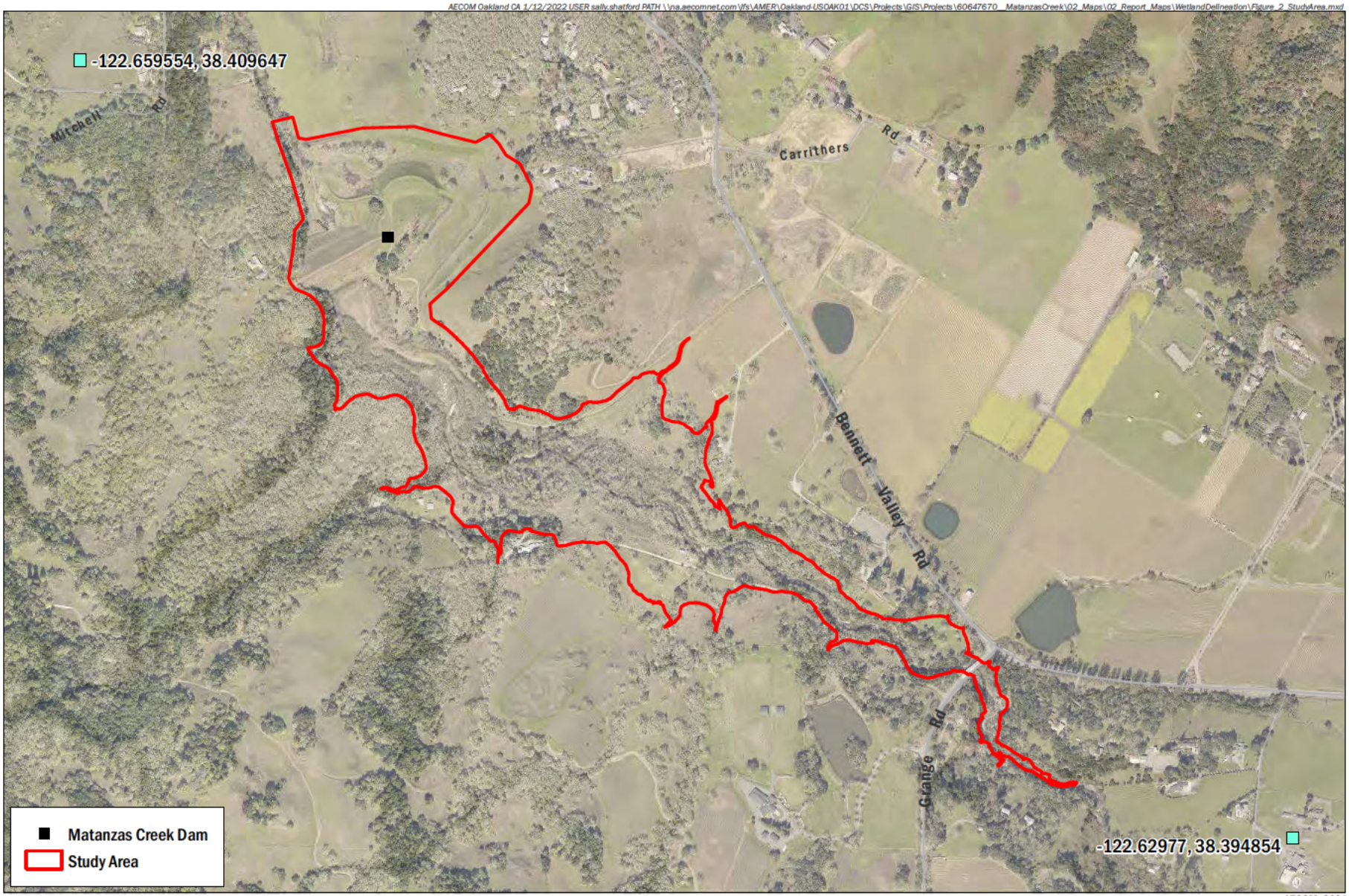
Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 1

Project Vicinity



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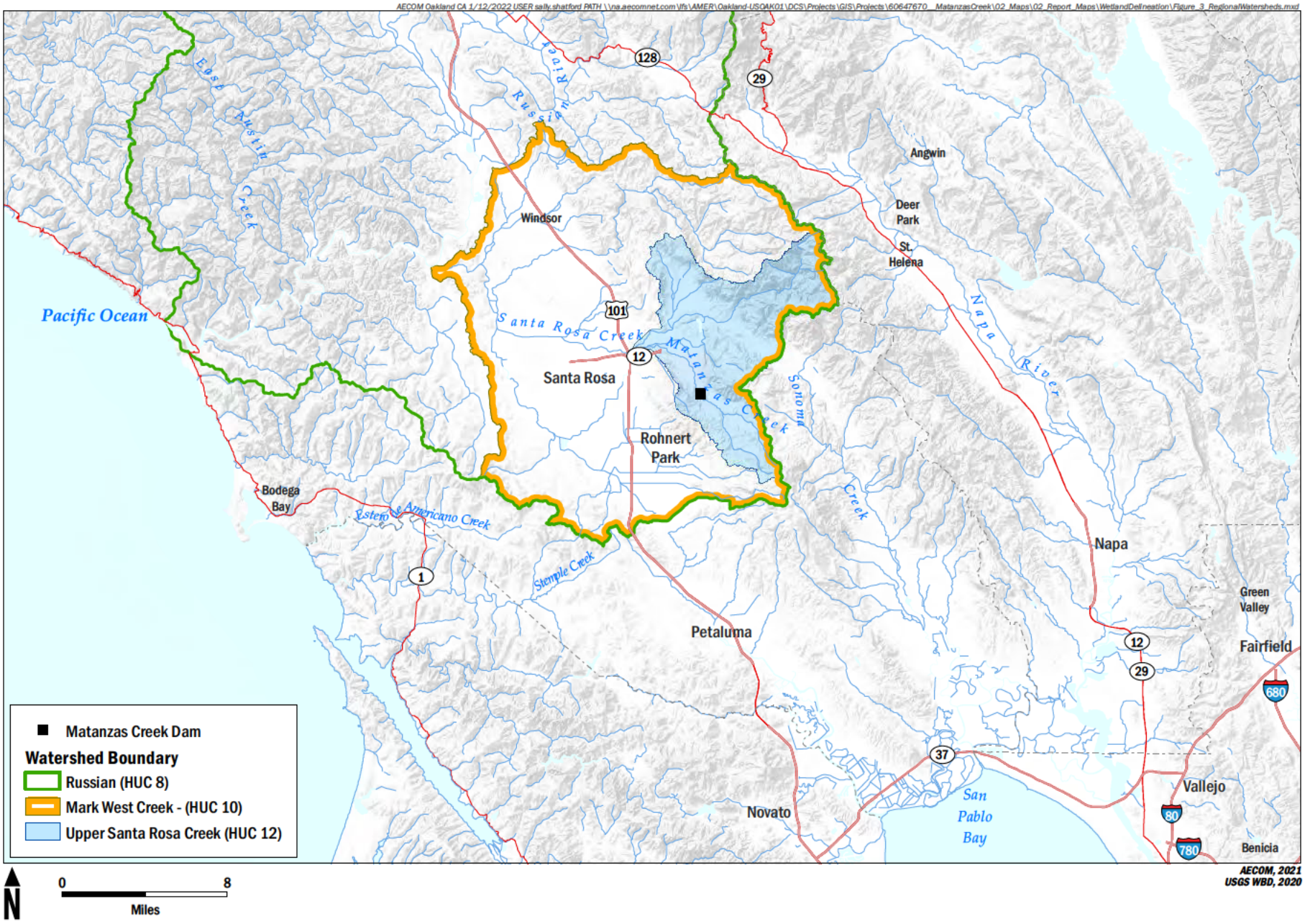
Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 2

Study Area



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Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 3

Regional Watersheds and Drainages

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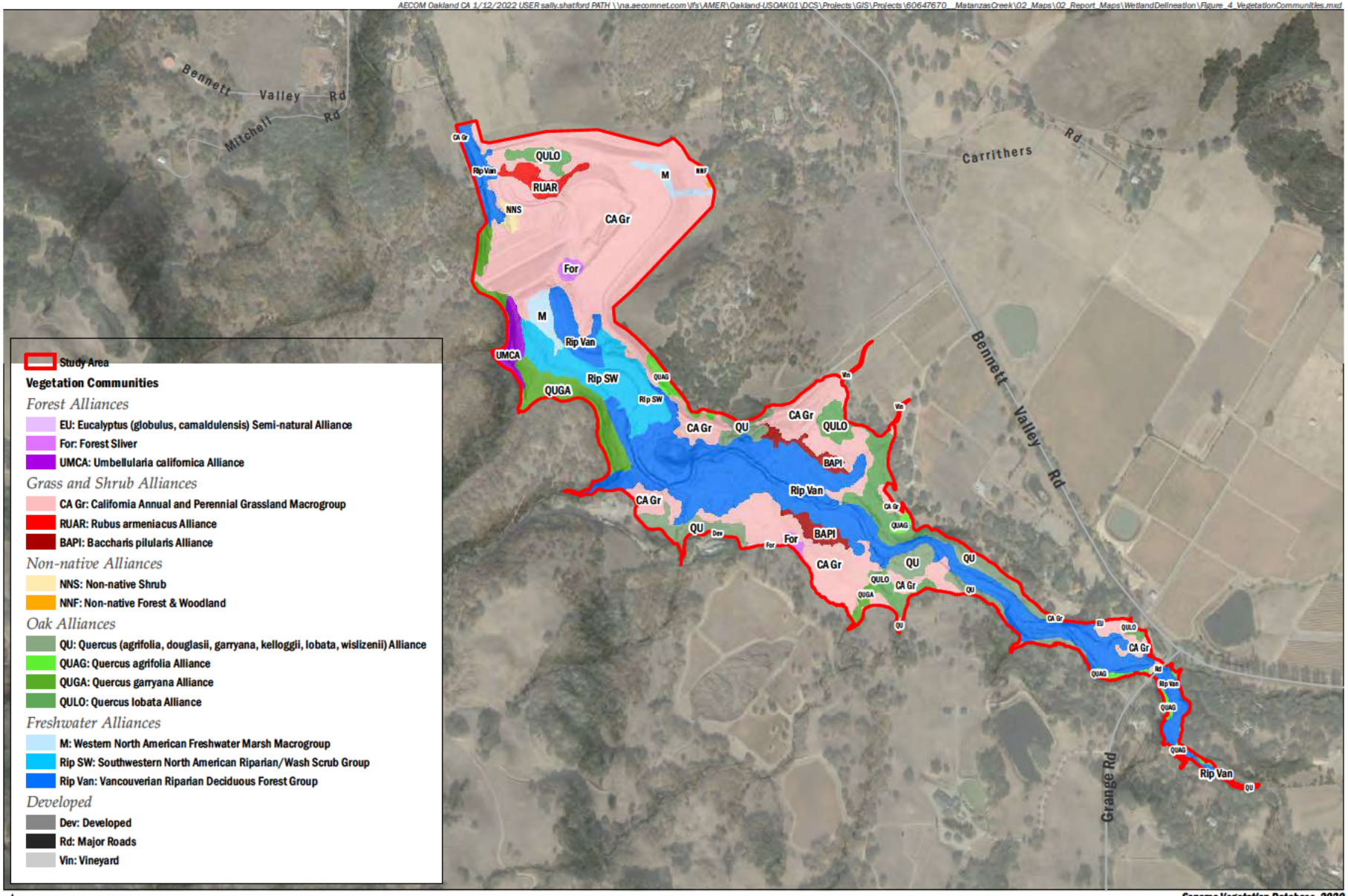

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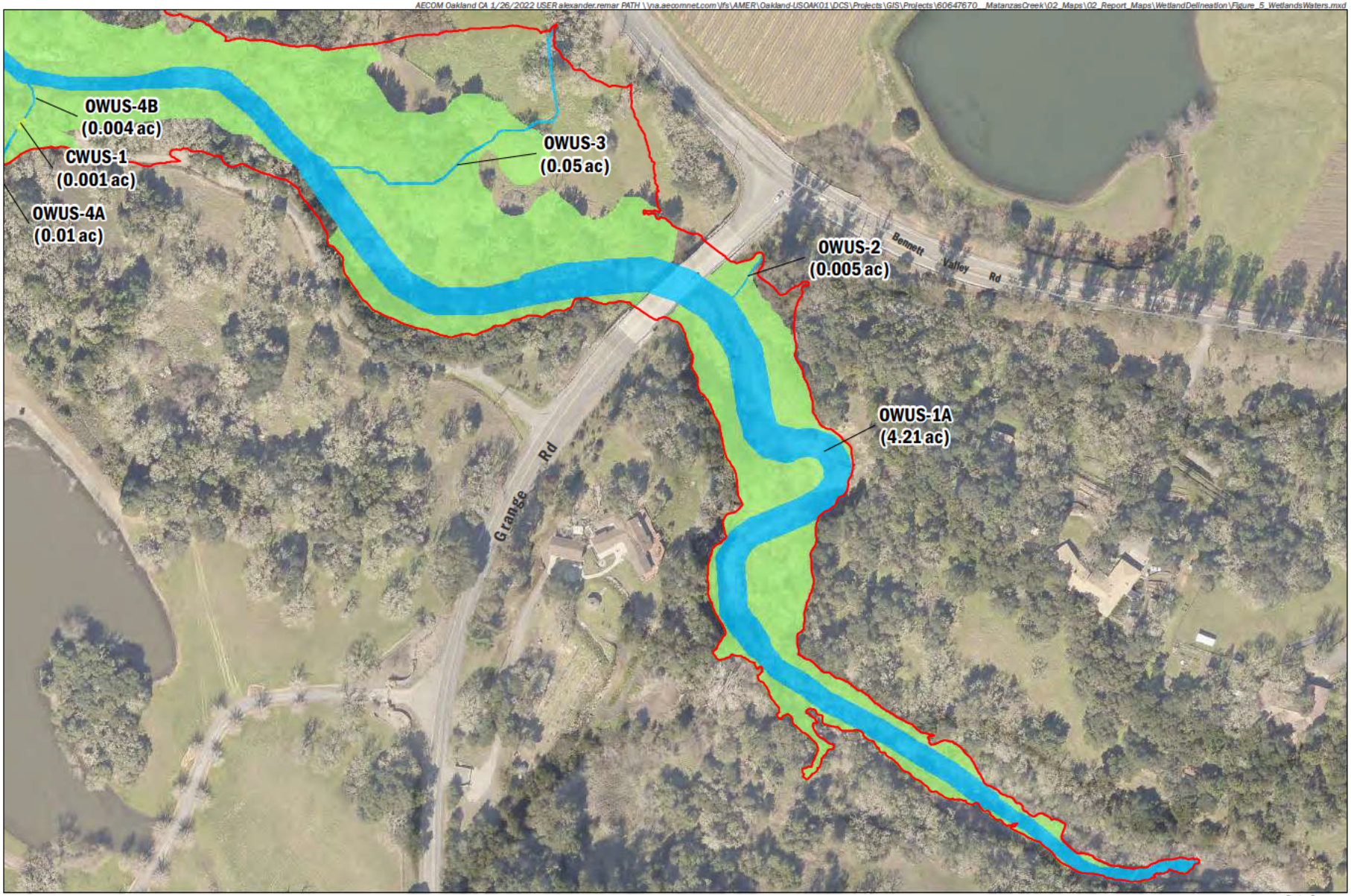
Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 4

Vegetation Communities in the Study Area

AECOM Oakland CA 1/26/2022 USER alexander.remar PATH \\na.aecomnet.com\fs\AMER\Oakland-USOAK01\DCS\Projects\GIS\Projects\60647670_MatanzasCreek\02_Maps\02_Report_Maps\WetlandDelineation\Figure_5_WetlandsWaters.mxd



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1 inch = 200 feet
1:2,400

Jurisdictional Delineation Conducted By:
Saana Delchsel and Joe Broberg.
AECOM 4/8 & 4/22/2021

Map Prepared By:
Sally Shatford, AECOM 1/26/2022

Data Sources:
AECOM, 2021
Sonoma County Aerial Imagery, 2018
Sonoma Vegetation Database, 2019

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Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

Study Area (120.68 ac)

Waters of the State (WOS)
Riparian Woodland

Other Waters of the U.S. (OWUS)
Riverine - Intermittent (5.18 ac)

Culverted Waters of the U.S. (CWUS)
Culvert (0.02 ac)

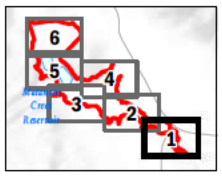
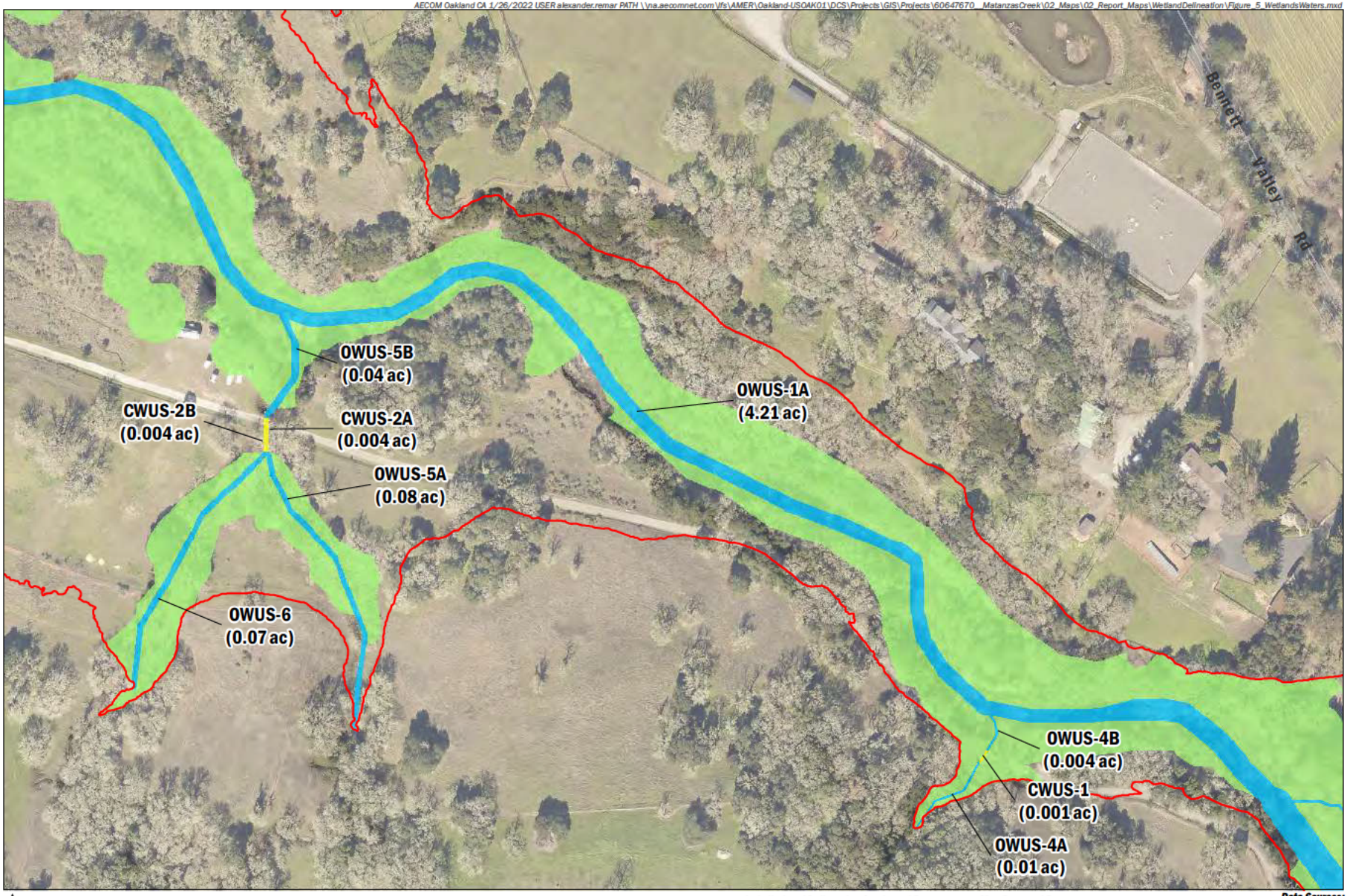


FIGURE 5

Aquatic Resources Delineated in the Study Area

Page 1 of 6

AECOM Oakland CA 1/26/2022 USER alexander.remar PATH \\na.aecomnet.com\ifs\AMER\Oakland-USOAK01\DCS\Projects\GIS\Projects\60647670_MatanzasCreek\02_Maps\02_Report_Maps\WetlandDelineation\Figure_5_WetlandsWaters.mxd



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Sonoma Vegetation Database, 2019

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Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

Study Area (120.68 ac)

Waters of the State (WOS)
Riparian Woodland

Other Waters of the U.S. (OWUS)
Riverine - Intermittent (5.18 ac)

Culverted Waters of the U.S. (CWUS)
Culvert (0.02 ac)

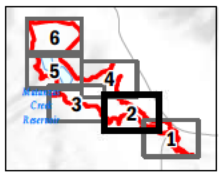

FIGURE 5

Aquatic Resources Delineated in the Study Area

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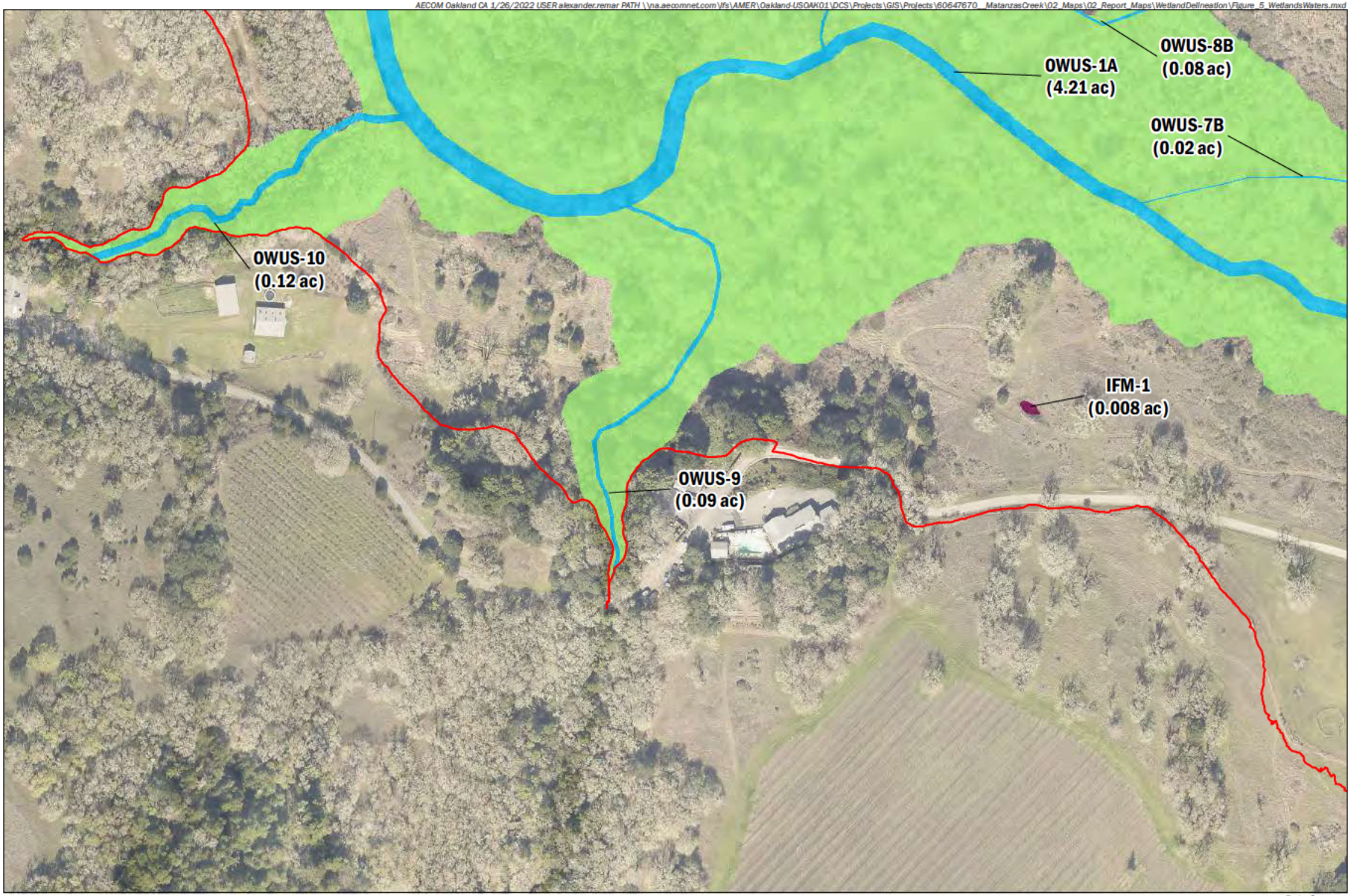

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Sonoma County Aerial Imagery, 2018
Sonoma Vegetation Database, 2019

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Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

Study Area (120.68 ac)

Waters of the State (WOS)
Riparian Woodland

Isolated Wetlands
Isolated Freshwater Marsh (0.008 ac)

Other Waters of the U.S. (OWUS)
Riverine - Intermittent (5.18 ac)

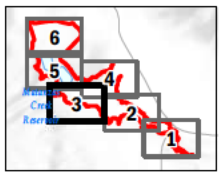
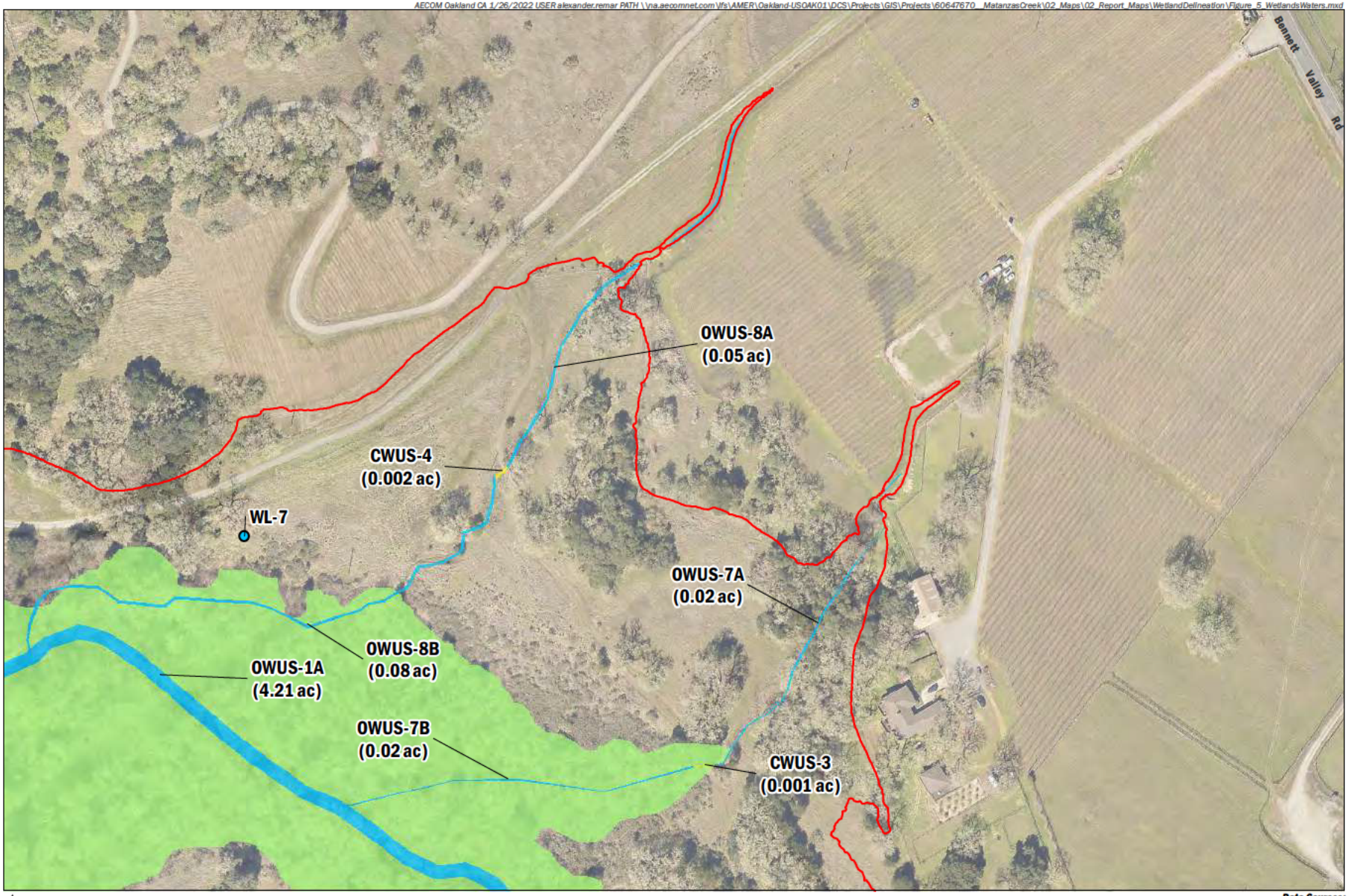


FIGURE 5

Aquatic Resources Delineated in the Study Area
Page 3 of 6

AECOM Oakland CA 1/26/2022 USER alexander.remar PATH \\na.aecomnet.com\fs\AMER\Oakland-USOAK01\DCS\Projects\GIS\Projects\60647670_MatanzasCreek\02_Maps\02_Report_Maps\WetlandDelineation\Figure_5_WetlandsWaters.mxd



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Data Sources:
AECOM, 2021
Sonoma County Aerial Imagery, 2018
Sonoma Vegetation Database, 2019

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Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

Study Area (120.68 ac)

Sample Points
Wetland Sample Point

Waters of the State (WOS)
Riparian Woodland

Other Waters of the U.S. (OWUS)
Riverine - Intermittent (5.18 ac)

Culverted Waters of the U.S. (CWUS)
Culvert (0.02 ac)

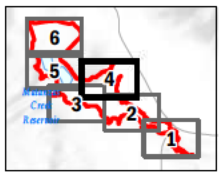
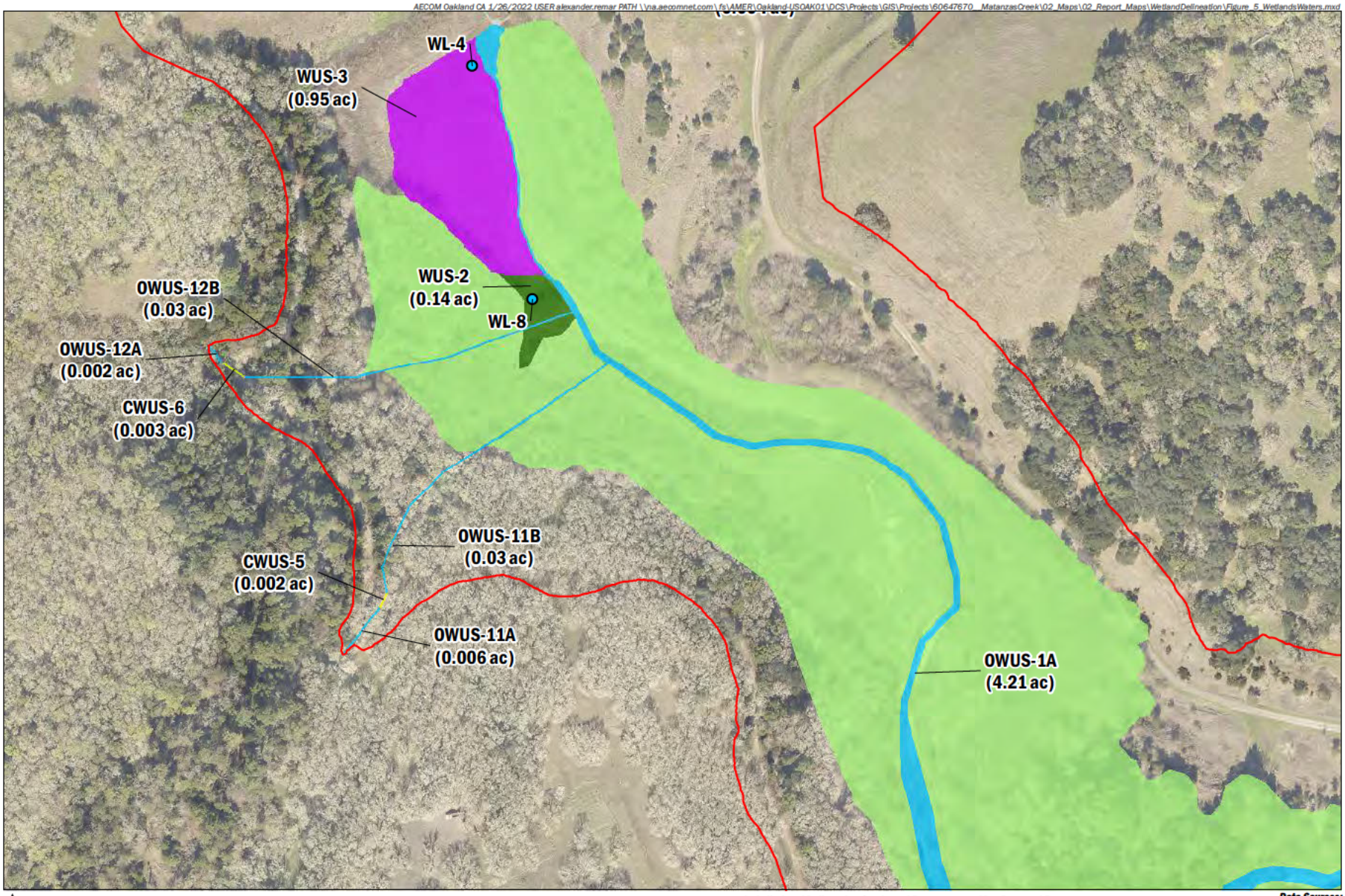


FIGURE 5

Aquatic Resources Delineated in the Study Area
Page 4 of 6



AECOM
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

Study Area (120.68 ac)

Sample Points
- Wetland Sample Point

Waters of the State (WOS)
- Riparian Woodland

Wetlands of the U.S. (WUS)
- Forested/Shrub Wetland (0.14 ac)
- Freshwater Marsh (1.10 ac)

Other Waters of the U.S. (OWUS)
- Riverine - Intermittent (5.18 ac)

Culverted Waters of the U.S. (CWUS)
- Culvert (0.02 ac)

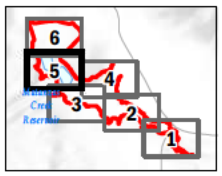
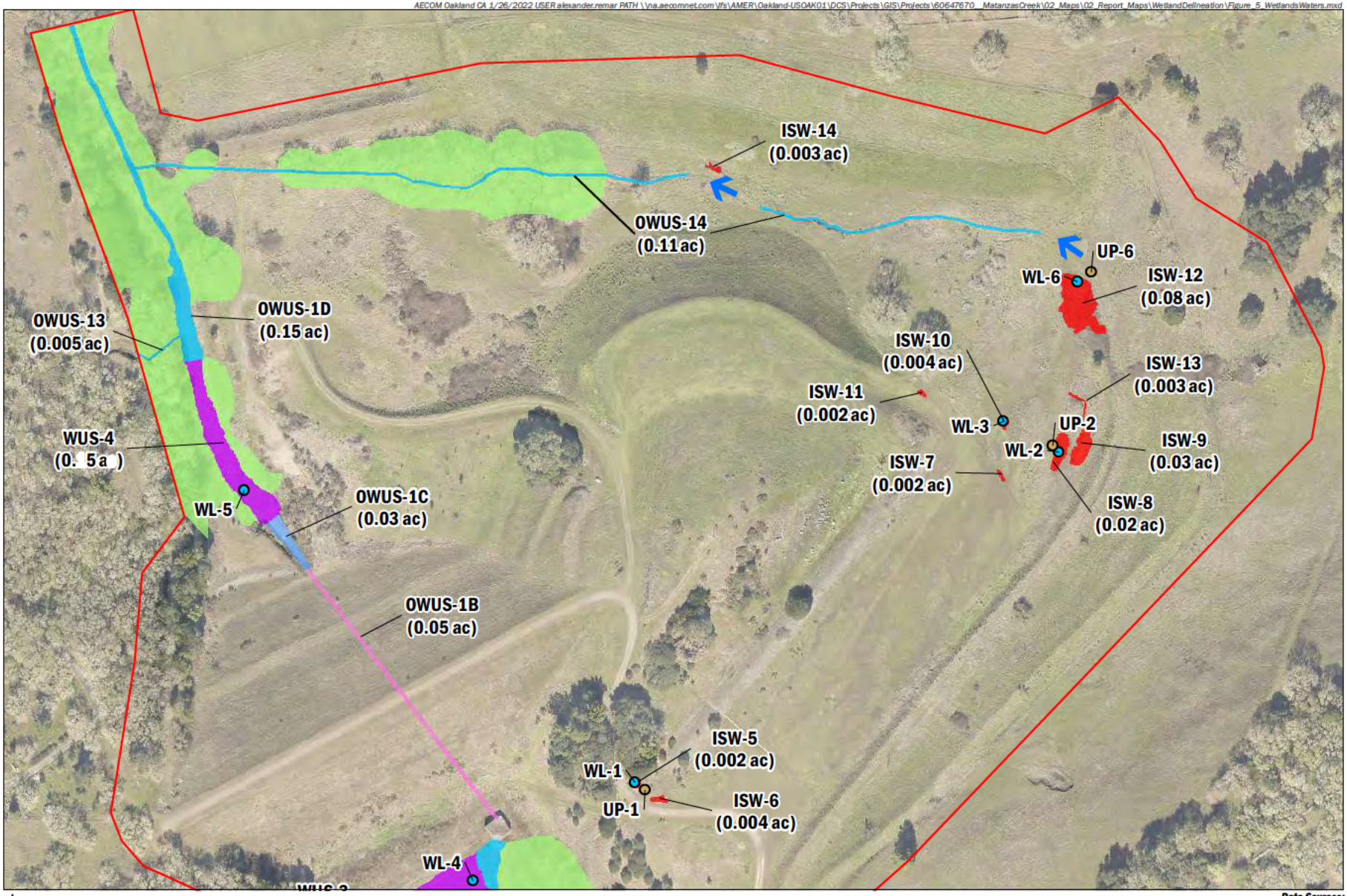


FIGURE 5

Aquatic Resources Delineated in the Study Area

AECOM Oakland CA 1/26/2022 USER alexander.remar PATH \\na.aecomnet.com\fs\AMER\Oakland-USOAK01\DCS\Projects\GIS\Projects\60647670_MatanzasCreek\02_Maps\02_Report_Maps\WetlandDelineation\Figure_5_WetlandsWaters.mxd



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Jurisdictional Delineation Conducted By:
Saana Delchsel and Joe Broberg.
AECOM 4/8 & 4/22/2021

Map Prepared By:
Sally Shatford, AECOM 1/26/2022

Data Sources:
AECOM, 2021
Sonoma County Aerial Imagery, 2018
Sonoma Vegetation Database, 2019

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Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

- Study Area (120.68 ac)
- Direction of Overland Flow

Sample Points
- Upland Sample Point
- Wetland Sample Point

Waters of the State (WOS)
- Riparian Woodland

Wetlands of the U.S. (WUS)
- Freshwater Marsh (1.10 ac)

Isolated Wetlands
- Isolated Seasonal Wetland (0.15 ac)

Other Waters of the U.S. (OWUS)
- Conduit (0.05 ac)
- Riverine - Intermittent (5.18 ac)
- Spillway (0.03 ac)

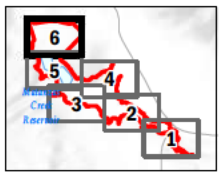

FIGURE 5

Aquatic Resources Delineated in the Study Area

Appendix B
Photographs

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Photo 1. ISW-6, isolated seasonal wetland (vernal pool), east aspect. 4/8/21.

Photo 2. ISW-9, isolated seasonal wetland, southeast aspect. 4/8/21.

Photo 3. ISW-7, isolated seasonal wetland, southeast aspect. 4/22/21.

Photo 4. WUS-3, freshwater marsh at the base of (south of) Matanzas Dam, south aspect. 4/8/21.

Photo 5. WUS-3, freshwater marsh at the base of (south of) Matanzas Dam, west aspect. 4/8/21.

Photo 6. WUS-4, freshwater marsh in Matanzas Creek by the primary spillway (OWUS-1b) for Matanzas Dam, north aspect. 4/8/21.

Photo 7. OWUS-1C, primary spillway and adjacent wetlands (WUS-4), north aspect. 4/8/21.

Photo 8. OWUS-14, flowing water in riverine intermittent channel, east aspect. 4/8/21.

Photo 9. ISW-12, isolated seasonal wetland, southwest aspect. 4/8/21.

Photo 10. ISW-13, isolated seasonal wetland, southwest aspect. 4/8/21.

Photo 11. OWUS-1A, Matanzas Creek, looking at dam, north aspect. 4/22/21.

Photo 12. OWUS-1A, Matanzas Creek, and riparian woodland, 0.6 mile south of dam, northwest aspect. 4/22/21.

Photo 13. OWUS-1A, Matanzas Creek at Grange Road 1 mile south of dam, northwest aspect. 4/22/21.

Photo 15. OWUS-5A, CWUS-2A, and CWUS-2B, intermittent riverine feature and culverts, northeast aspect. 4/22/21.

Photo 15. OWUS-10, intermittent riverine feature, east aspect. 4/22/21.

Photo 16. IFM-1, isolated freshwater marsh, northwest aspect. 4/22/21.

Appendix C
Plants Observed in the Study Area

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Table C-1: Plants Observed in the Study Area

Scientific Name	Common Name	Family	Nativity Status	Wetland Indicator Status
Acer macrophyllum	big leaf maple	Soapberry	N	FAC
Acer negundo	boxelder	Soapberry	N	FACW
Achillea millefolium	yarrow	Sunflower	N	FACU
Acmispon americanus var. *americanus*	Spanish clover	Legume	N	UPL
Adiantum capillus-veneris	common maidenhair fern	Brake	N	FACW
Aesculus californica	California buckeye	Soapberry	N	NL
Alisma triviale	northern water plantain	Water-plantain	N	OBL
Amelanchier alnifolia	service berry	Rosaceae	N	FACU
Amsinckia intermedia	common fiddleneck	Waterleaf	N	NL
Arbutus menziesii	Pacific madrone	Heath	N	UPL
Artemisia douglasiana	mugwort	Sunflower	N	FAC
Atriplex prostrata	fat-hen	Amaranth	N	FACW
Arbutus sp.	oat	Grass	I	UPL
Baccharis pilularis	coyote brush	Sunflower	N	NL
Brassica nigra	black mustard	Mustard	I	FACU
Briza minor	little quaking grass	Grass	I	FAC
Bromus diandrus	ripgut brome	Grass	I	NL
Bromus hordeaceus	soft chess	Grass	I	NL
Calendula arvensis	field marigold	Sunflower	I	NL
Callitriche sp.	water starwort	Plantain	N	OBL
Carduus pycnocephalus	Italian thistle	Sunflower	I	NL
Carex barbarae	basket sedge	Sedge	N	FAC
Carex praegracilis	clustered field sedge	Sedge	N	FACW
Carex sp.	sedge	Sedge	N	NL
Carthamus lanatus	woolly distaff thistle	Sunflower	I	NL
Castilleja attenuata	valley tassels	Broomrape	N	NL
Castilleja densiflora	owl's clover	Broomrape	N	NL
Centaurea solstitialis	yellow star-thistle	Sunflower	I	UPL
Cerastium glomeratum	sticky chickweed	Pink	I	UPL
Chlorogalum pomeridianum var. *pomeridianum*	soap plant	Century Plant	N	NL

Scientific Name	Common Name	Family	Nativity Status	Wetland Indicator Status
Cirsium vulgare	bullthistle	Sunflower	I	FACU
Claytonia perfoliata	miner's lettuce	Miner's Lettuce	N	FAC
Collinsia heterophylla	Chinese houses	Plantain	N	FACU
Conium maculatum	poison hemlock	Carrot	I	FACW
Crassula aquatica	aquatic pygmy weed	Stonecrop	N	OBL
Cynosurus echinatus	hedgehog dogtail	Grass	I	NL
Cyperus eragrostis	tall flatsedge	Sedge	N	FACW
Danthonia californica	California oat grass	Grass	N	FAC
Delphinium nudicaule	canyon larkspur	Buttercup	N	NL
Dichelostemma congestum	ookow	Brodiaea	N	NL
Diplacus aurantiacus	sticky monkeyflower	Lopseed	N	FACU
Dipsacus fullonum	teasel	Teasel	I	FAC
Dittrichia graveolens	stinkwort	Sunflower	I	NL
Eleocharis macrostachya	spike rush	Sedge	N	FACW
Elymus caput-medusae	medusa head	Grass	I	NL
Elymus glaucus	blue wildrye	Grass	N	FACU
Erodium botrys	long beaked filaree	Geranium	I	FACU
Eschscholzia californica	California poppy	Poppy	N	UPL
Eucalyptus sp.	eucalyptus	Myrtle	I	NL
Festuca californica	California fescue	Grass	N	FACU
Festuca microstachys	six-weeks fescue	Grass	N	NL
Festuca perennis	annual ryegrass	Grass	I	FAC
Foeniculum vulgare	fennel	Carrot	I	UPL
Fraxinus latifolia	Oregon ash	Olive	N	FACW
Galium aparine	cleavers	Bedstraw	N	FACU
Geranium dissectum	cut-leaf geranium	Geranium	I	UPL
Glyceria declinata	waxy mannagrass	Grass	N	FACW
Helminthotheca echioides	bristly ox-tongue	Sunflower	I	FAC
Holcus lanatus	velvet grass	Grass	I	FAC
Holodiscus discolor	oceanspray	Rose	N	FACU
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	Grass	I	FAC
Hypochaeris glabra	smooth cat's ear	Sunflower	I	NL

Scientific Name	Common Name	Family	Nativity Status	Wetland Indicator Status
Hypochaeris radicata	rough cat's ear	Sunflower	I	FACU
Iris douglasiana	Douglas iris	Iris	N	NL
Juncus bufonius	toad rush	Rush	N	FACW
Juncus effusus ssp. *pacificus*	Pacific rush	Rush	N	FACW
Juncus occidentalis	Western rush	Rush	N	FACW
Juncus patens	gray rush	Rush	N	FACW
Juncus phaeocephalus	brownhead rush	Rush	N	FACW
Juncus xiphioides	iris leaved rush	Rush	N	OBL
Lepidium latifolium	perennial pepperweed	Mustard	I	FAC
Limnanthes douglasii	meadowfoam	Meadowfoam	N	OBL
Lonicera hispidula	honeysuckle	Honeysuckle	N	FACU
Ludwigia peploides	marsh purslane	Willowherb	I	OBL
Lupinus bicolor	miniature lupine	Legume	N	UPL
Lupinus nanus	sky lupine	Legume	N	NL
Lythrum hyssopifolia	hyssop loosestrife	Loosestrife	I	OBL
Melica sp.	melic grass	Grass		NL
Melilotus albus	sweet clover	Legume	I	UPL
Mentha pulegium	pennyroyal	Mint	N	OBL
Montia fontana	water montia	Miner's Lettuce	N	OBL
Nemophila heterophylla	canyon nemophila	Waterleaf	N	NL
Parentucellia viscosa	yellow parentucellia	Broomrape	I	FAC
Pellaea andromedifolia	coffee fern	Brake	N	NL
Pentagramma triangularis	goldenback fern	Brake	N	NL
Perideridia sp.	yampah	Carrot	N	NL
Phacelia distans	common phacelia	Waterleaf	N	NL
Phalaris aquatica	Harding grass	Grass	I	FACU
Plagiobothrys nothofulvus	rusty popcornflower	Waterleaf	N	FAC
Pleuropogon californicus	California semaphore grass	Grass	N	OBL
Polypodium californicum	California polypody	Polypody	N	NL
Polypogon monspeliensis	annual rabbitsfoot grass	Grass	I	FACW
Primula hendersonii	shooting star	Primrose	N	NL
Prunus cerasifera	wild plum	Rose	I	NL

Scientific Name	Common Name	Family	Nativity Status	Wetland Indicator Status
Pteridium aquilinum var. *pubescens*	bracken fern	Bracken	N	FACU
Quercus agrifolia	coast live oak	Oak	N	NL
Quercus garryana	Oregon oak	Oak	N	UPL
Quercus kelloggii	black oak	Oak	N	NL
Quercus lobata	valley oak	Oak	N	FACU
Ranunculus californicus	California buttercup	Buttercup	N	FACU
Ranunculus lobbii	Lobb's aquatic buttercup	Buttercup	N	OBL
Ranunculus muricatus	spiny buttercup	Buttercup	I	FACW
Raphanus sativus	radish	Mustard	I	NL
Rosa californica	California rose	Rose	N	FAC
Rubus armeniacus	Himalayan blackberry	Rose	I	FAC
Rubus ursinus	California blackberry	Rose	N	FAC
Rumex crispus	curly dock	Buckwheat	I	FAC
Rumex sp.	dock	Buckwheat		NL
Salix exigua	sandbar willow	Willow	N	FACW
Salix lasiolepis	arroyo willow	Willow	N	FACW
Sambucus nigra ssp. *caerulea*	blue elderberry	Muskroot	N	FACU
Sanicula bipinnatifida	purple sanicle	Carrot	N	NL
Sanicula crassicaulis	Pacific sanicle	Carrot	N	NL
Scandix pecten-veneris	shepherd's needle	Carrot	I	NL
Scrophularia californica	bee plant	Figwort	N	FAC
Sidalcea calycosa ssp. *calycosa*	checkerbloom	Checkerbloom	N	OBL
Sisyrinchium bellum	blue-eyed grass	Iris	N	FACW
Stipa pulchra	purple needle grass	Grass	N	NL
Symphoricarpos albus	snowberry	Honeysuckle	N	FACU
Taeniatherum caput-medusae	medusahead	Grass	I	NL
Taraxia ovata	sun cups	Evening-Primrose	N	NL
Thalictrum fendleri	meadow rue	Buttercup	N	FAC
Toxicodendron diversilobum	poison oak	Sumac	N	UPL
Trifolium depauperatum var. *depauperatum*	dwarf sack clover	Legume	N	FAC
Trifolium dubium	little hop clover	Legume	I	UPL
Trifolium subterraneum	subterranean clover	Legume	I	NL

Scientific Name	Common Name	Family	Nativity Status	Wetland Indicator Status
Typha angustifolia	narrow leaf cattail	Cattail	N	OBL
Umbellularia californica	California bay	Laurel	N	FAC
Urtica dioica	stinging nettle	Nettle	N	FAC
Vicia benghalensis	purple vetch	Legume	I	NL
Vicia sativa	spring vetch	Legume	I	FACU
Vicia villosa	winter vetch	Legume	I	FACU
Vinca major	periwinkle	Legume	I	NL
Wyethia angustifolia	narrow leaf mule ears	Sunflower	N	FACU
Wyethia glabra	smooth mule ears	Sunflower	N	NL
Xanthium strumarium	rough cocklebur	Sunflower	N	FAC

Notes:

FAC = Facultative plant species – plants with a similar likelihood (estimated probability 33 percent to 67 percent) of occurring in both wetlands and nonwetlands

FACU = Facultative upland plant species – Plants that occur sometimes (estimated probability 1 percent to <33 percent) in wetlands, but occur more often in nonwetlands

FACW = Facultative wetland plant species – plants that occur usually (estimated probability >67 percent to 99 percent) in wetlands, but also occur in nonwetlands

NL = Not Listed – plant species for which insufficient information was available to determine an indicator status and are treated as upland species because they do not occur on the wetland plant list

OBL = Obligate wetland plant species – plants that almost always occur in wetlands under natural conditions (estimated probability >99 percent), but which rarely occur in nonwetlands

UPL = Upland plant species - plants that occur rarely (estimated probability <1 percent) in wetlands, but occur almost always in nonwetlands

Sources: Calflora 2021; Baldwin et al. 2012; Jepson Flora Project 2014

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Appendix D
USACE Arid West Manual Data Sheets

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WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: WL-1
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Depression Local relief (concave, convex, none): Concave Slope (%): 3
Subregion (LRR): LRR-C Lat: 38.40562103 Long: -122.6518524 Datum:
Soil Map Unit Name: Goulding cobble clay loam, 5-15% slopes NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes No

Remarks:
Depression on side of road, filled with cow hoof marks, small frogs observed. Likely underlain with volcanic rock.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5x5)			
1. *Pleuropogon californicus* / Semaphore grass	20	Yes	OBL
2. *Eleocharis macrostachya* / Spike rush	15	Yes	
3. *Lythrum hyssopifolium* / Hyssop loosestrife	10	Yes	OBL
4. *Festuca perennis* / Italian rye grass	10	Yes	
5. *Crassula aquatica* / Aquatic pygmy weed	10	Yes	OBL
6. *Juncus occidentalis* / Slender juncus, Western rush	10	Yes	FACW
7.			
8.			
	75	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust 10

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	25	x 5 =	125
Column Totals:	75 (A)		185 (B)

Prevalence Index = B/A = 2.47

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index ≤3.0[1]
Morphological Adaptations[1] (Provide supporting
Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No

Remarks:

SOIL

Sampling Point: WL-1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	90	10YR 3/6	10	C	PL	Clay silt loam	
2-12	10YR 3/2	60	10YR 4/2	40	D	M	Clay silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: Volcanic rock

Depth (inches): 12

Hydric Soil Present? Yes X No ___

Remarks:

Large volcanic boulders around edge of wetland .

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes X No ___

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

Depression in road bend where water pools.

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: UP-1
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): None Local relief (concave, convex, none): None Slope (%): 2
Subregion (LRR): LRR-C Lat: 38.40559234 Long: -122.6518023 Datum:
Soil Map Unit Name: Goulding cobble clay loam, 5-15% slopes NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes No X

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Hypochaeris radicata* / Hairy cats ear, Rough cat's-ear	15	Yes	FACU
2. *Bromus hordeaceus* / Soft chess	15	Yes	FACU
3. *Erodium botrys* / Big heron bill	15	Yes	FACU
4.			
5. *Briza minor* / Little rattlesnake grass, Annual quaking grass	10	No	FAC
6. *Lupinus bicolor* / Lupine, Miniature lupine	5	No	
7.			
8.			
	60	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

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

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	45	x 4 =	180
UPL species	15	x 5 =	75
Column Totals:	70 (A)		285 (B)

Prevalence Index = B/A = 4.07

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No X

Remarks:

SOIL

Sampling Point: UP-1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 4/3	90	7.5YR 5/8	5			Sandy loam	Lots of gravel

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: Road fill

Depth (inches): 6

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ___ No X

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: WL-2
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): LRR-C Lat: 38.40690566 Long: -122.6497875 Datum:
Soil Map Unit Name: Goulding cobbly clay loam, 5-15 NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes X No

Remarks:
Two adjacent vernal pools, one still with standing water. At base of hill. No volcanic rocks in immediate vicinity.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Pleuropogon californicus* / Semaphore grass	50	Yes	OBL
2. *Eleocharis macrostachya* / Spike rush	25	Yes	
3. *Mentha pulegium* / Pennyroyal	10	No	OBL
4. *Ranunculus lobbii* / Lobb's aquatic buttercup	2	No	OBL
5. *Juncus xiphioides* / Iris leaved rush, Iris-leaved rush	2	No	OBL
6.			
7.			
8.			
	89	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 5

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	64	x 1 =	64
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	25	x 5 =	125
Column Totals:	89 (A)		189 (B)

Prevalence Index = B/A = 2.12

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
X Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No

Remarks:

SOIL

Sampling Point: WL-2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	90	2.5YR 3/6	10	RM	PL	Clay	
5-16	2.5Y 4/2	95	2.5YR 3/6	5	C	M	Sandy clay loa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 1

Wetland Hydrology Present? Yes X No ___

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

Remarks:

Filled with dead tadpoles.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: UP-2
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR-C Lat: 38.40693133 Long: -122.651771 Datum:
Soil Map Unit Name: Goulding cobble clay loam, 5-15% slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5x5)			
1. *Unknown*	80	Yes	
2. *Vicia villosa* / Hairy vetch, Hairy vetch, Winter vetch	10	No	
3. *Trifolium subterraneum* / Subterranean clover	10	No	
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No X

Remarks:

SOIL

Sampling Point: UP-2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/4	95	2.5YR 4/6	5	C	M	Clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: WL-3
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR-C Lat: 38.4070219 Long: -122.6500608 Datum:
Soil Map Unit Name: Goulding cobbly clay loam, 5 to 15 percent slopes NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes X No

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Juncus patens* / Rush, Spreading rush	40	Yes	FACW
2. *Juncus xiphioides* / Iris leaved rush, Iris-leaved rush	15	Yes	OBL
3. *Festuca perennis* / Italian rye grass	15	Yes	FAC
4. *Lythrum hyssopifolium* / Hyssop loosestrife	10	No	OBL
5. *Geranium dissectum* / Wild geranium	10	No	
6.			
7.			
8.			
	90	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum % Cover of Biotic Crust

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	40	x 2 =	80
FAC species	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column Totals:	90 (A)		200 (B)

Prevalence Index = B/A = 2.22

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No

Remarks:

SOIL

Sampling Point: WL-3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
4-12	10YR 3/2	93	5YR 5/8	5	C	M	Silty clay loam	
4-12			10YR 2/1	2	D	M		
0-4	10YR 3/2	95	5YR 5/8	5	C	M		

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes X No ___

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation | City/County: Santa Rosa, Sonoma | Sampling Date: 04/08/2021
Applicant/Owner: | State: CA | Sampling Point: WL-4
Investigator(s): S. Deichsel, J. Broberg | Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): River | Local relief (concave, convex, none): Concave | Slope (%): 2
Subregion (LRR): LRR-C | Lat: 38.40523652 | Long: -122.6526426 | Datum:
Soil Map Unit Name: Water | NWI classification: RP1EM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil X, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes X No

Remarks:
Data point within the basin mapped as Matanzas Reservoir. Due to hydrologic modification, marsh has formed in what was a seasonal pool. Area was dredged of sediment within the last 15 years.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Polypogon monspeliensis* / Annual beard grass, Annual bear	25	Yes	FACW
2. *Glyceria declinata* / Waxy mannagrass, Low manna grass	15	Yes	FACW
3. *Lythrum hyssopifolium* / Hyssop loosestrife	10	No	OBL
4. *Claytonia perfoliata* / Miner's lettuce	5	No	FAC
5. *Xanthium strumarium* / Cocklebur	5	No	FAC
6. *Ranunculus muricatus* / Buttercup	5	No	FACW
7.			
8.			
	65	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

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

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	45	x 2 =	90
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	65 (A)		130 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index ≤3.0[1]
Morphological Adaptations[1] (Provide supporting
Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No

Remarks:

SOIL

Sampling Point: WL-4

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Sand	Sand and gravel
8-12	2.5Y 3/1	100					Sandy clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

River rock and gravel. Marsh is part of creek floodplain, due to flooding during part of year and moving water, typical hydric soil identifying features have not formed.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 3

Wetland Hydrology Present? Yes X No ___

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: WL-5
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): River Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR): LRR-C Lat: 38.4067443 Long: -122.65377129 Datum:
Soil Map Unit Name: Riverwash NWI classification: RP1EM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes X No

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Ludwigia peploides* / Marsh purslane	25	Yes	OBL
2. *Typha angustifolia*	25	Yes	OBL
3. *Alisma triviale* / Northern water plantain	20	Yes	OBL
4. *Cyperus eragrostis* / Tall cyperus	10	No	FACW
5. *Salix exigua* / Narrowleaf willow	5	No	FACW
6.			
7.			
8.			
	85	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum % Cover of Biotic Crust

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70	x 1 =	70
FACW species	15	x 2 =	30
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	85 (A)		100 (B)

Prevalence Index = B/A = 1.18

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No

Remarks:

SOIL

Sampling Point: WL-5

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 3/2	90	7.5YR 4/6	10	C	M	Clay loam	River rock belle 3”

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: River cobbles

Depth (inches): 3

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2 inches deep p

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

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

Wetland Hydrology Present? Yes X No ___

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation | City/County: Santa Rosa, Sonoma | Sampling Date: 04/08/2021
Applicant/Owner: | State: CA | Sampling Point: WL-6
Investigator(s): S. Deichsel, J. Broberg | Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Hill slope | Local relief (concave, convex, none): None | Slope (%): 3
Subregion (LRR): LRR-C | Lat: 38.40759707 | Long: -122.64970045 | Datum:
Soil Map Unit Name: Goulding cobbly clay loam, 5 to 15 percent slopes | NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Juncus effusus* / Common bog rush, Soft or lamp rush	35	Yes	FACW
2. *Cyperus eragrostis* / Tall cyperus	15	Yes	FACW
3. *Geranium dissectum* / Wild geranium	15	Yes	
4. *Mentha pulegium* / Pennyroyal	10	No	OBL
5. *Rumex* / Dock	10	No	
6. *Phalaris aquatica* / Harding grass	5	No	FACU
7.			
8.			
	90	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

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

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10	
FACW species	50	x 2 =	100	
FAC species	0	x 3 =	0	
FACU species	5	x 4 =	20	
UPL species	25	x 5 =	125	
Column Totals:	90	(A)	255	(B)

Prevalence Index = B/A = 2.83

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No

Remarks:

SOIL

Sampling Point: WL-6

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	5Y 3/1	100						
3-12	5Y 5/1	85	7.5YR 4/6	15	C	M	Loamy clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes X No ___

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

Remarks:

Algal matting

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/08/2021
Applicant/Owner: State: CA Sampling Point: UP-6
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Hillslope Local relief (concave, convex, none): None Slope (%): 10
Subregion (LRR): LRR-C Lat: 38.40761631 Long: -122.64963959 Datum:
Soil Map Unit Name: Goulding cobble clay loam, 5-15% slopes NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes No X

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Phalaris aquatica* / Harding grass	40	Yes	FACU
2. *Geranium dissectum* / Wild geranium	20	Yes	
3. *Trifolium subterraneum* / Subterranean clover	10	No	
4. *Vicia villosa* / Hairy vetch, Hairy vetch, Winter vetch	5	No	
5. *Juncus occidentalis* / Slender juncus, Western rush	5	No	FACW
6. *Taeniatherum caput-medusae* / Medusahead	5	No	
7.			
8.			
	85	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	0	x 3 =	0
FACU species	40	x 4 =	160
UPL species	40	x 5 =	200
Column Totals:	85 (A)		370 (B)

Prevalence Index = B/A = 4.35

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No X

Remarks:

SOIL

Sampling Point: UP-6

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
	10YR 3/3	98	7.5YR 4/6	2		M	Silt	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: CA Sampling Date: 04/22/2021
Applicant/Owner: State: CA Sampling Point: WL-7
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Hillslope Local relief (concave, convex, none): None Slope (%): 10
Subregion (LRR): LRR-C Lat: 38.40263234 Long: -122.64718831 Datum:
Soil Map Unit Name: Haire clay loam 0 -9% slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes No

Remarks:
Data point taken to verify whether area was a wetland. Based on topography and conditions during January 2021 site visit, site appeared to be a seep wetland. However, no hydrophytic veg, hydric soils, or wetland hydrology was present.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Quercus lobata* / Valley oak, Valley oak, Roble	5	Yes	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size:)			
1. *Carex barbarae* / Valley sedge, Whiteroot or santa barbara s	60	Yes	FAC
2. *Galium aparine* / Cleavers, Goose grass	10	No	FACU
3. *Vicia sativa* / Spring vetch	10	No	FACU
4. *Phalaris aquatica* / Harding grass	10	No	FACU
5. *Carduus pycnocephalus* / Italian thistle	5	No	
6.			
7.			
8.			
	95	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

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

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	35	x 4 =	140
UPL species	5	x 5 =	25
Column Totals:	100 (A)		345 (B)

Prevalence Index = B/A = 3.45

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes No X

Remarks:

SOIL

Sampling Point: WL-7

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: Rock/cobble (road fill?)

Depth (inches): 8

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ___ No X

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

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Matanzas Creek Dam Watershed Rehabilitation City/County: Santa Rosa, Sonoma Sampling Date: 04/22/2021
Applicant/Owner: State: CA Sampling Point: WL-8
Investigator(s): S. Deichsel, J. Broberg Section, Township, Range: S32 T7N R7W
Landform (hillslope, terrace, etc): Terrace Local relief (concave, convex, none): None Slope (%): 2
Subregion (LRR): LRR-C Lat: 38.40430893 Long: -122.65231895 Datum:
Soil Map Unit Name: Water NWI classification: RP1FO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Is the Sampled Area within a Wetland? Yes X No

Remarks:
Data point collected in forested/shrub wetland, floodplain of Matanzas Creek in area mapped as marsh and riparian woodland.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix lasiolepis* / Arroyo willow	75	Yes	FACW
2.			
3.			
4.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size:)			
1. *Atriplex prostrata* / Fat-hen	20	Yes	FACW
2. *Urtica dioica* / Stinging nettle	15	Yes	FAC
3. *Rumex crispus* / Curly dock	10	Yes	FAC
4.			
5.			
6.			
7.			
8.			
	45	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 55 % Cover of Biotic Crust

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	95	x 2 =	190
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	120 (A)		265 (B)

Prevalence Index = B/A = 2.21

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No

Remarks:

SOIL

Sampling Point: WL-8

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	90	10YR 5/8	10	C	PL	Silty clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

Hydrology has been altered in this area in recent years, with less water pooling to form a Reservoir than in the past. That fact, coupled with recent drought, may make hydric soil indicators less identifiable.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes X No ___

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

Remarks:

Appendix E
WETS Table for Santa Rosa Station

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WETS Table

WETS Station: SANTA ROSA, CA								
Requested years: 1971 - 2021								
Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	58.2	38.6	48.4	5.63	2.83	6.88	9	0.0
Feb	62.3	40.8	51.5	5.65	2.59	6.79	8	0.0
Mar	65.1	42.4	53.8	4.35	1.84	5.29	8	0.0
Apr	69.3	44.2	56.8	1.85	0.84	2.25	4	0.0
May	74.0	47.9	60.9	1.09	0.20	1.06	2	0.0
Jun	79.8	51.4	65.6	0.17	0.00	0.13	1	0.0
Jul	81.9	52.5	67.2	0.04	0.00	0.00	0	0.0
Aug	82.3	52.7	67.5	0.08	0.00	0.02	0	0.0
Sep	82.4	51.7	67.1	0.36	0.07	0.29	1	0.0
Oct	77.1	48.0	62.6	1.70	0.78	1.95	3	0.0
Nov	65.5	42.5	54.0	4.02	1.62	4.88	6	0.0
Dec	58.1	38.4	48.3	5.51	2.60	6.65	8	0.0
Annual:					23.97	34.46		
Average	71.3	45.9	58.6	-	-	-	-	-
Total	-	-	-	30.44			49	0.0

GROWING SEASON DATES			
Years with missing data:	24 deg = 10	28 deg = 10	32 deg = 10
Years with no occurrence:	24 deg = 39	28 deg = 9	32 deg = 0
Data years used:	24 deg = 41	28 deg = 41	32 deg = 41
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	1/19 to 12/24: 339 days	2/26 to 12/6: 283 days
70 percent *	No occurrence	1/4 to 1/9: 370 days	2/15 to 12/18: 306 days
* Percent chance of the growing season occurring between the Beginning and Ending dates.			

STATS TABLE - total precipitation (inches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1902						0.00	MT	T	0.00	M3.72	M5.02	M3.93	12.67
1903	6.38	2.58	6.49	0.60	T	0.03	0.00	T	T	0.64	9.65	3.59	29.96
1904	1.77	12.23	12.93	2.99	0.24	0.07	T	T	4.39	4.60	2.74	4.50	46.46
1905	5.53	4.26	5.59	1.45	2.93	0.00	0.00	0.00	T	T	1.97	M1.81	23.54
1906	10.95	5.24		0.72	3.31	1.23	0.00		0.16	0.00	1.88	6.79	30.28
1907	M7.27	5.17	M10.61	0.34	0.32	1.00	0.00	0.00	0.46	0.87	0.13	M6.46	32.63
1908	M5.51	M2.39	1.45	0.30	M0.59	0.08	0.02	0.00	T	1.37	2.12	4.00	17.83
1909	18.45	8.74	M3.22	0.00	T	0.07	0.00	T	1.29	1.73	M3.35	7.61	44.46

1910	4.94	3.75	4.17	0.85	0.08	0.05	0.00	0.00	M0.01	0.68	M1.70	1.68	17.91
1911	14.20	2.75	4.96	3.04	0.44	0.02	T	0.00	T	0.58	0.72	2.41	29.12
1912	3.39	1.09	4.69	1.54	2.88	1.14	0.00	0.00	2.99	1.47	5.11	1.78	26.08
1913	6.11	0.58	2.73	1.91	1.28	0.05	0.07	0.00	0.00	0.00	7.50	M8.90	29.13
1914	14.00				0.95	0.41			0.07	1.91	1.30	7.23	25.87
1915	9.08	13.52	3.98	0.65	4.82			0.00		0.20	1.71	M6.04	40.00
1916	M15.22	3.53	1.89		0.65	0.06	0.61	0.32		1.17	2.68	M5.92	32.05
1917		M5.15	M1.22	M2.52	0.14	0.02		0.00	M0.33	0.00	1.49	2.25	13.12
1918	1.43	7.06	4.73	0.86	M0.03	MT		M0.03	M2.52	1.04	3.96	M2.55	24.21
1919	M5.59	M8.52	M2.30	M0.50	M0.20				0.58	M0.25	M0.30	4.35	22.59
1920	M0.40	M1.35	M3.06	M2.46		M0.50	M0.06		0.10	M3.00	M7.78	8.65	27.36
1921	M9.60	1.83	M5.26	M1.47	M1.19	MT			M0.15	0.63	M2.03	M8.78	30.94
1922	M1.10	M6.81	M3.46	M0.25	0.52	M0.06	MT			M2.79	4.92	M10.84	30.75
1923	M2.27	M1.14	M0.05	5.24	M0.22	0.44		M0.22	1.78	0.50	M0.48	1.25	13.59
1924	4.50	M5.58	0.83	0.43	0.33	0.01	0.01	0.01	0.01	4.34	M2.35	M7.02	25.42
1925	1.88	14.42	3.93	1.77	5.11	0.01	0.07	0.01	1.17	0.19	3.53	1.53	33.62
1926	8.84	6.88	0.25	9.58	0.40	T	0.02	0.03	0.02	1.37	12.64	2.83	42.86
1927	6.82	M11.03	M3.47	3.47	0.43	0.40	0.01	0.01	0.01	1.98	7.48	M3.24	38.35
1928	3.10	3.52	6.96	1.97	0.18	0.00	0.00	0.00	T	0.34	4.28	M3.21	23.56
1929	1.48	2.10	2.10	1.30	0.13	M2.43	0.00	0.00	0.00	0.04	0.00	12.47	22.05
1930	5.40	3.91	2.53	1.53	0.62	0.00	0.00	0.00	0.44	0.87	1.40	0.62	17.32
1931	M3.48	1.87	2.94	0.49	0.90	0.67	0.00	0.00	0.00	1.40	2.27	11.29	25.31
1932	3.45	1.49	1.21	1.43	1.65	0.00	T	0.00	0.00	0.08	1.69	4.06	15.06
1933	6.40	1.51	4.64	0.12	2.23	T	0.02	0.00	0.17	2.02	0.00	8.14	25.25
1934	1.75	4.69	1.13	0.73	1.39	1.00	0.00	T	0.03	2.28	5.19	3.45	21.64
1935	7.36	3.50	6.31	6.87	0.00	0.00	0.00	0.12	0.23	1.02	1.47	M2.95	29.83
1936	7.77	11.81	1.58	1.86	0.61	0.80	0.00	0.03	0.00	0.22	0.02	2.90	27.60
1937	4.92	8.59	6.31	1.87	0.19	1.28	0.05	0.00	T	1.06	M7.46	5.40	37.13
1938	4.77	9.66	8.03	2.45	0.06	0.00	0.02	0.00	0.38	2.18	2.22	2.14	31.91
1939	3.36	1.61	2.41	0.14	1.12	T	0.00	0.00	0.08	0.52	0.46	2.88	12.58
1940	10.87	12.31	7.14	1.84	1.96	0.07	0.00	0.00	0.50	1.82	2.59	13.56	52.66
1941	11.02	8.22	5.59	6.71	1.84	0.30	0.00	T	0.13	1.53	3.58	9.12	48.04
1942	6.50	8.65	3.78	5.58	1.67	T	0.02	0.00	0.15	1.23	5.75	5.80	39.13
1943	9.28	2.73	4.85	2.67	0.05	T	0.03	0.00	0.00	0.68	1.16	2.38	23.83

1944	5.07	7.66	2.25	2.15	1.58	0.28	0.00	0.00	0.02	2.45	5.90	4.22	31.58
1945	3.13	4.92	5.82	0.33	1.39	T	T	0.00	T	2.91	4.23	10.37	33.10
1946	2.32	2.98	2.20	0.10	0.47	0.00	0.20	0.00	0.06	0.28	4.08	3.66	16.35
1947	0.76	3.82	4.94	0.65	0.40	1.63	0.00	0.00	T	5.28	1.55	1.22	20.25
1948	4.18	1.51	5.57	7.61	1.03	0.25	0.06	T	0.13	0.85	1.87	4.67	27.73
1949	1.39	3.32	6.83	0.08	0.74	0.00	0.05	0.04	0.02	0.02	2.12	2.79	17.40
1950	10.12	5.15	3.29	1.31	0.56	0.06	0.00	0.00	0.00	3.46	7.19	9.38	40.52
1951	5.14	2.84	1.25	1.27	1.48	T	0.00	0.01	0.04	2.68	6.26	8.01	28.98
1952	10.19	2.88	4.62	0.84	0.57	1.38	0.04	0.00	0.05	0.08	2.73	14.72	38.10
1953	6.74	0.08	3.17	3.91	0.57	0.97	0.00	0.17	0.00	1.31	M4.15	0.96	22.03
1954	7.80	3.19	5.74	3.23	0.37	0.26	T	1.35	T	0.90	5.64	4.43	32.91
1955	3.63	1.22	0.60	3.68	0.01	0.00	0.00	0.00	0.45	0.51	3.28	17.89	31.27
1956	11.78	6.15	0.31	2.48	1.28	0.10	0.00	0.00	0.17	2.28	0.23	0.38	25.16
1957	3.85	5.57	2.49	2.32	3.93	0.08	0.00	0.00	2.16	6.16	0.93	3.99	31.48
1958	7.18	11.94	6.87	5.43	0.45	0.44	0.01	0.01	0.03	0.15	0.29	1.96	34.76
1959	7.75	6.24	1.60	0.25	0.16	0.00	0.00	T	3.16	0.14	0.08	1.80	21.18
1960	5.65	8.46	6.05	1.38	0.80	M0.00	0.00	T	0.01	M0.71	3.81	4.50	31.37
1961	5.22	3.29	4.60	1.07	0.77	0.16	0.00	0.03	0.57	0.17	2.88	M3.93	22.69
1962	2.02	8.79	4.34	M0.51	0.06	T	0.00	0.08	0.36	9.47	0.95	4.64	31.22
1963	3.75	4.22	4.94	6.57	0.66	0.00	0.00	0.01	0.09	2.61	7.53	0.81	31.19
1964	5.19	0.33	1.97	0.33	0.40	1.10	T	0.02	0.00	2.31	6.12	8.64	26.41
1965	6.63	1.24	0.97	5.04	T	0.00	0.01	0.50		0.23	6.11	3.74	24.47
1966	8.62	3.30	0.97	1.31	0.21	0.13	0.00	0.12	0.35	0.01	7.61	6.55	29.18
1967	12.42	0.58	5.86	6.72	0.17	1.94	0.00	0.00	0.07	0.86	2.68	4.01	35.31
1968	7.63	4.82	4.20	0.48	0.26	0.00	0.00	1.68	0.02	2.07	3.39	9.09	33.64
1969	13.25	8.23	1.79	3.23	0.03	0.04	0.00	0.00	0.03	2.42	1.19	11.79	42.00
1970	15.89	3.17	3.44	0.07	0.00	0.44	0.00	0.00	0.00	2.24	8.97	10.78	45.00
1971	3.13	0.19	4.05	1.22	0.24	0.05	0.00	0.03	0.34	0.49	2.39	5.49	17.62
1972	1.89	3.49	1.02	1.79	0.09	0.13	0.05	0.11	0.66	3.47	6.87	5.12	24.69
1973	15.38	7.17	3.48	0.65	0.03	T	0.00	0.00	0.74	2.37	13.23	5.33	48.38
1974	6.48	3.54	6.67	2.87	0.09	T	1.61	T	0.00	1.27	1.20	3.80	27.53
1975	1.98	9.88	7.84	1.71	0.02	0.10	0.00	0.21	0.02	6.44	1.58	0.89	30.67
1976	0.39	2.61	0.92	2.62	0.00	0.03	0.00	0.78	0.66	0.46	1.76	1.15	11.38
1977	2.01	1.93	2.65	0.23	1.43	T	0.00	T	1.16	0.65	0.03	5.22	15.31

1978	9.81	M2.44		2.29	0.08	T	0.00	0.00	1.38	0.00		0.41	16.41
1979							0.01	0.00	0.09	4.14	5.99	7.71	17.94
1980	7.09	8.82	1.52	2.00	0.19	0.27	T	0.00	T	0.38	0.50	M6.60	27.37
1981	7.81	2.60	3.58	0.20	0.63	0.00	0.02	0.00	0.24	2.76	8.91	11.29	38.04
1982	8.72	5.23	6.50	4.00	T	0.03	0.00	0.00	0.97	M4.30	8.44	3.61	41.80
1983	8.39	9.83	15.74	3.46	0.92	0.00	T	0.75	0.24	M1.20	11.21	11.33	63.07
1984	0.65	2.45	2.25	1.18	0.11	0.13	0.00	0.17	0.09	2.36	10.92	2.60	22.91
1985	1.87	3.01	4.61	M0.20	0.04	0.02	0.03	0.00	1.18	1.40	4.50	3.72	20.58
1986	6.64	15.94	5.90	0.83	0.82	0.00	0.00	0.00	2.75	0.55	0.20	2.65	36.28
1987	5.01	M5.45	4.83	0.16	0.08	0.01	0.01	0.00	0.00	1.37	4.14	6.11	27.17
1988	6.99	0.40	0.02	1.53	0.73	0.49	0.00	0.00	0.00	0.11	4.89	4.07	19.23
1989	1.47	M1.53	10.22	1.22	0.13	0.22	0.00	0.04	2.72	2.65	1.71	0.00	21.91
1990	5.74	3.27	2.03	0.24	5.46	0.01	0.00	T	0.27	0.62	0.44	1.16	19.24
1991	0.75	4.72	13.74	0.33	0.13	0.72	0.00	0.05	0.01	1.74	1.15	2.91	26.25
1992	2.03	9.34	4.69	1.64	0.00	0.79	0.00	0.00	0.00	3.65	0.31	8.73	31.18
1993	11.48	M5.58	3.44	1.60	1.43	1.06	0.00	0.00	0.00	3.06	3.39	3.94	34.98
1994	3.38	4.80	0.34	1.56	0.89	0.00	0.02	0.00	0.01	1.02	7.21	3.37	22.60
1995	17.08	1.54	11.52	3.01	1.78	0.76	0.00	0.00	0.00	T	0.41	9.38	45.48
1996	8.94	9.43	2.58	3.89	3.69	0.00	0.00	0.00	0.05	0.89	3.47	11.83	44.77
1997	11.40	0.86	1.37	1.28	0.87	0.42	0.00	1.01	0.46	1.48	7.42	3.29	29.86
1998	10.70	19.42	3.89	2.65	4.04	T	T	0.00	0.05	1.06	5.88	1.35	49.04
1999	5.12	12.37	4.29	2.13	0.13	0.15	0.00	0.00	0.17	0.99	3.59	0.70	29.64
2000	5.44	11.65	3.07	M2.43	1.48	0.25	T	0.01	0.54	3.45	1.65	0.86	30.83
2001	5.27	5.94	1.51	1.41	0.00	0.48	T	0.00	0.13	0.96	9.00	11.49	36.19
2002	5.02	1.84	2.43	0.64	1.13	0.00	0.00	0.00	0.00	0.00	3.48	16.18	30.72
2003	3.70	2.18	2.81	4.89	1.48	0.05	0.03	0.01	0.07	0.04	3.22	11.42	29.90
2004	3.44	9.24	1.14	0.68	0.03	0.00	0.02	0.01	0.11	3.27	1.81	10.46	30.21
2005	4.12	4.29	5.75	1.61	5.55	M0.85	0.00	0.02	T	1.00	2.47	17.65	43.31
2006	5.36	3.63	9.97	5.05	0.49	0.02	0.02	0.00	0.00	0.57	3.66	5.46	34.23
2007	0.57	7.10	0.31	2.58	0.36	0.00	0.17	0.00	0.05	3.26	0.81	5.06	20.27
2008	11.21	3.09	0.32	0.30	0.03	0.00	0.00	0.00	0.03	0.78	2.57	3.26	21.59
2009	0.63	8.76	2.77	0.49	3.10	0.06	0.00	0.00	0.16	3.34	1.05	3.34	23.70
2010	8.88	4.46	3.74	4.29	2.68	0.11	0.01	0.01	0.10	5.14	3.13	8.38	40.93
2011	M1.68	M5.71	M10.44	M0.66	M2.41	M1.62	0.00	0.00	M0.01	M2.07	M2.07	M0.09	26.76

2012	M6.31	M2.16	M7.79	M2.43	M0.08	M0.04	0.00	MT	M0.00	1.48	M8.42	M7.18	35.89
2013	M0.57												0.57
2014													
2015													
2016													
2017								M0.00	0.52	M0.40	5.42	0.12	6.46
2018	5.98	0.30	M6.82	4.22	M0.12	0.00	M0.00	0.00	M0.06	M1.37	M5.29	3.23	27.39
2019	M7.45	17.15	7.11	M1.40	M3.42	M0.00	M0.00	0.00	M0.12	M0.00	M1.48	8.96	47.09
2020	2.59	0.00	M1.94	1.19	1.69	M0.00	M0.01	M0.18	M0.00	0.00	1.69	2.86	12.15
2021	4.16	M2.06	3.15	M0.03	M0.00								9.40
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													

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Appendix F
NRCS Custom Soils Report

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Sonoma County, California

Matanzas Creek Dam Watershed Rehabilitation Project

May 7, 2021

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

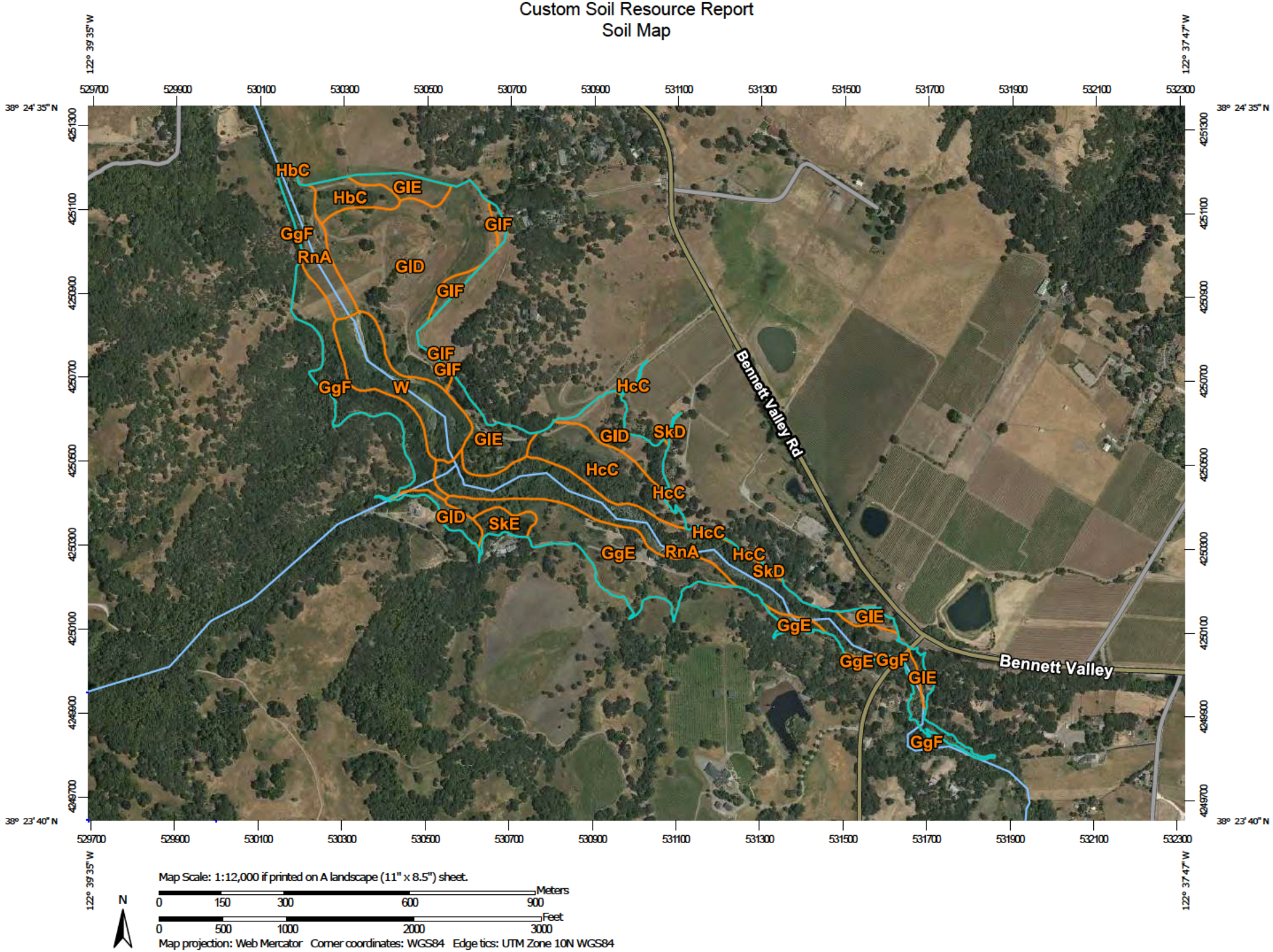
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 14, May 29, 2020

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

Date(s) aerial images were photographed: Jun 1, 2020—Jun 5, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GgE	Goulding clay loam, 15 to 30 percent slopes	15.5	12.8%
GgF	Goulding clay loam, 30 to 50 percent slopes	9.9	8.2%
GlD	Goulding cobbly clay loam, 5 to 15 percent slopes	32.6	27.0%
GlE	Goulding cobbly clay loam, 15 to 30 percent slopes	9.3	7.7%
GlF	Goulding cobbly clay loam, 30 to 50 percent slopes	1.6	1.3%
HbC	Haire gravelly loam, 0 to 9 percent slopes	3.3	2.8%
HcC	Haire clay loam, 0 to 9 percent slopes	9.0	7.4%
RnA	Riverwash	27.5	22.7%
SkD	Spreckels loam, 9 to 15 percent slopes	0.2	0.2%
SkE	Spreckels loam, 15 to 30 percent slopes	1.9	1.6%
W	Water	9.9	8.2%
Totals for Area of Interest		**120.7**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

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

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

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

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

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

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

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

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

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

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

Sonoma County, California

GgE—Goulding clay loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hfd6
Elevation: 1,500 to 5,000 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 220 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Goulding

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from metavolcanics

Typical profile

H1 - 0 to 11 inches: gravelly clay loam
H2 - 11 to 20 inches: very gravelly clay loam
H3 - 20 to 30 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R015XD126CA - LOAMY UPLAND
Hydric soil rating: No

Minor Components

Toomes

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

Boomer

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

Spreckels

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

Rock outcrop

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

GgF—Goulding clay loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hfd7
Elevation: 1,500 to 5,000 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 220 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Goulding

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from metavolcanics

Typical profile

H1 - 0 to 9 inches: gravelly clay loam
H2 - 9 to 18 inches: very gravelly clay loam
H3 - 18 to 24 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XD126CA - LOAMY UPLAND
Hydric soil rating: No

Minor Components

Spreckels

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

Toomes

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

Rock outcrop

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

Henneke

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

GID—Goulding cobbly clay loam, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfdb
Elevation: 1,500 to 5,000 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 220 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Goulding

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from metavolcanics

Typical profile

H1 - 0 to 11 inches: cobbly clay loam
H2 - 11 to 20 inches: very gravelly clay loam
H3 - 20 to 30 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R015XD129CA - SHALLOW LOAMY UPLANDS
Hydric soil rating: No

Minor Components

Spreckels

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

Toomes

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

Rock outcrop

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

Henneke

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

GIE—Goulding cobbly clay loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hfdc
Elevation: 1,500 to 5,000 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 220 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Goulding

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from metavolcanics

Typical profile

H1 - 0 to 9 inches: cobbly clay loam
H2 - 9 to 18 inches: very gravelly clay loam
H3 - 18 to 24 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R015XD129CA - SHALLOW LOAMY UPLANDS
Hydric soil rating: No

Minor Components

Toomes

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

Rock outcrop

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

Spreckels

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

Boomer

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

Unnamed

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

GIF—Goulding cobbly clay loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hfdd
Elevation: 1,500 to 5,000 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 220 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Goulding

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from metavolcanics

Typical profile

H1 - 0 to 9 inches: cobbly clay loam
H2 - 9 to 18 inches: very gravelly clay loam
H3 - 18 to 28 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D
Ecological site: R015XD130CA - STEEP SHALLOW LOAMY UPLANDS
Hydric soil rating: No

Minor Components

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

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

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

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

HbC—Haire gravelly loam, 0 to 9 percent slopes

Map Unit Setting
National map unit symbol: hfdn
Elevation: 20 to 2,400 feet
Mean annual precipitation: 20 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Farmland of statewide importance

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

Description of Haire

Setting
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile
H1 - 0 to 24 inches: gravelly loam
H2 - 24 to 36 inches: clay
H3 - 36 to 60 inches: very gravelly clay loam

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R014XC010CA - CLAYPAN
Hydric soil rating: No

Minor Components

Diablo

Percent of map unit: 7 percent
Hydric soil rating: No

Arbuckle

Percent of map unit: 6 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

HcC—Haire clay loam, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: hfds
Elevation: 20 to 2,400 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Haire

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 24 inches: clay loam
H2 - 24 to 36 inches: clay
H3 - 36 to 60 inches: very cobbly clay loam

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R014XC010CA - CLAYPAN
Hydric soil rating: No

Minor Components

Unnamed

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

Diablo

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

Arbuckle

Percent of map unit: 2 percent
Hydric soil rating: No

Zamora

Percent of map unit: 2 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

RnA—Riverwash

Map Unit Setting

National map unit symbol: hfj7
Elevation: 700 to 2,900 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 110 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Riverwash

Setting

Landform: Flood plains
Parent material: Sandy and gravelly alluvium

Typical profile

H1 - 0 to 6 inches: very gravelly sand
H2 - 6 to 60 inches: stratified very gravelly coarse sand to very gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: FrequentNone
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 15 percent
Hydric soil rating: No

SkD—Spreckels loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfjq
Elevation: 100 to 800 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Spreckels

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from metavolcanics

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 18 inches: clay loam
H3 - 18 to 37 inches: clay
H4 - 37 to 60 inches: cemented

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R015XD115CA - CLAYPAN
Hydric soil rating: No

Minor Components

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

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

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

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

SkE—Spreckels loam, 15 to 30 percent slopes

Map Unit Setting
National map unit symbol: hfjr
Elevation: 100 to 800 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 210 days
Farmland classification: Not prime farmland

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

Description of Spreckels

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from metavolcanics

Typical profile
H1 - 0 to 9 inches: loam
H2 - 9 to 18 inches: clay loam
H3 - 18 to 37 inches: clay
H4 - 37 to 60 inches: cemented

Properties and qualities
Slope: 15 to 30 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XD115CA - CLAYPAN
Hydric soil rating: No

Minor Components

Felta

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

Suther

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

Rock outcrop

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

Toomes

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

Laniger

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

W—Water

Map Unit Composition

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

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Appendix G
Aquatic Resources Spreadsheet
(submitted as an electronic attachment)

Appendix D.7. Cultural Resource Survey Reports

ARCHAEOLOGICAL SURVEY REPORT

MATANZAS CREEK DAM WATERSHED REHABILITATION PROJECT BENNETT VALLEY, SONOMA COUNTY, CALIFORNIA

Prepared for:

Natural Resources Conservation Service,
as a subconsultant to Jones & DeMille Engineering,
in coordination with AECOM and Sonoma Water

Prepared by:

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ALTA 2020-107

Key Words: USGS 7.5' Santa Rosa Quadrangle; 120.7-acre survey area; T7N R7W Secs. 32 and 33, T6N R7W Secs. 4 and 5, Mount Diablo Base and Meridian; 4 cultural resources; 8 isolated finds; 5 noted finds.

March 2022

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ATTACHMENTS

Attachment A – Preparer Resume
Attachment B – Records Search Results
Attachment C – Photo Sheet
Attachment D – Site Records

LIST OF ACRONYMS AND ABBREVIATIONS

ALTA	Alta Archaeological Consulting
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
cm	centimeter
DPR	California Department of Parks and Recreation
GLO	General Land Office
Lewis	Lewis Publishing Company
mm	millimeter
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
OHP	California Office of Historic Preservation
PWD	Public Works Department (Santa Rosa)
SCFCWCD	Sonoma County Flood Control and Water Conservation District
SRSCD	Santa Rosa Soil Conservation District
USDA	United States Department of Agriculture
USGS	United States Geological Survey

I. SUMMARY OF FINDINGS

This Archaeological Survey Report documents the adequacy of identification efforts and presents the results of investigations within the limits of the proposed project and surrounding lands. The study was designed to identify archaeological, historical, or cultural resources in the project area or Study Area, which is 120.7 acres and captures the potential project footprint of multiple design alternatives. Fieldwork was conducted on February 22, February 25, and April 8, 2021, by Alex DeGeorgey and Jamie Frattarelli of Alta Archaeological Consulting (ALTA) and Karin Beck of AECOM. The survey entailed a cultural resources inventory of 110.1 acres of accessible lands in the Study Area. Ground surface visibility was poor, about 10 percent, throughout the Study Area, due to dense grasses and underbrush. Exposed mineral soils were inspected for evidence of cultural materials. Four cultural resources, eight isolates, and four noted finds were identified in the Study Area during the archaeological field survey.

The cultural resource inventory was performed based on information obtained at the Northwest Information Center (NWIC) of the California Historical Resources Information System, on direct observation of site conditions, and on other information generally available as of February 2021. The conclusions and recommendations herein are based on information available at the time of the records search and field survey. Further information may be identified in the future that could substantially change the conclusions found herein.

Information obtained from these sources in this timeframe is assumed to be correct and complete. ALTA does not assume any liability for findings or lack of findings based upon misrepresentation of information presented to ALTA or for items that are not visible, made visible, accessible, or present at the time of the Study Area inventory.

II. INTRODUCTION

ALTA was retained to conduct a cultural resources inventory as part of the permitting process for the rehabilitation of the Matanzas Creek Dam. An archaeological field survey was completed by ALTA on February 22, February 25, and April 8, 2021, for the purpose of identifying cultural resources in the project's 120.7-acre Study Area. For the purposes of this investigation, all accessible lands in the Study Area were surveyed, totaling approximately 110.1 acres. Four cultural resources, eight isolates, and four noted finds were identified during the archaeological field survey. This archaeological survey report documents the adequacy of identification efforts, presents the results of investigations in the Study Area, and makes recommendations for management, if necessary, of resources present on the property. This report addresses the responsibilities of the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) (36 Code of Federal Regulations [CFR] Part 800).

Qualifications of Preparer

Mr. DeGeorgey holds a Master of Arts degree in Anthropology from California State University, Chico. He has 25 years of professional archaeological experience, working for both the public sector and private agencies engaged in the management of cultural resources in Northern California. Mr. DeGeorgey meets the Secretary of the Interior's standard for cultural resource specialists involved in preservation activities at all levels of government involving historic-era and prehistoric-era archaeological resources. Mr. DeGeorgey currently serves as an elected official on the Standards Board of the Registry of Professional Archaeologist, where he is responsible for

enforcement of the organization's code of conduct and standards of research performance. He also plays an active role in the Society for California Archaeology, Society for American Archaeology, the Register of Professional Archaeologists, and local historical organizations.

III. PROJECT DESCRIPTION AND LOCATION

The Matanzas Creek Dam was constructed in 1963-64 to prevent flooding in the Santa Rosa Creek watershed. An assessment conducted on this dam in 2016 concluded that it does not currently meet safety standards. Its unlined auxiliary spillway would activate prior to the flood event for which it was designed. The Natural Resources Conservation Service, in coordination with Sonoma Water, is developing alternatives to bring the dam into compliance with applicable design criteria.

The project is southeast of the City of Santa Rosa, in central Sonoma County (Figure 1). It is situated on the United States Geological Survey (USGS) 7.5' *Santa Rosa* Quadrangle in Township 6 North, Range 7 West, in sections 4, 5 32, and 33, Mount Diablo Base and Meridian (Figure 2). The Study Area encompasses about 121 acres on numerous parcels. The project site is situated on the eastern foot of Taylor Mountain, along the western edge of Bennett Valley (Figure 3). The nearest water source is Matanzas Creek, an intermittent stream that flows northwest through the Study Area. The Study Area is in a rural residential area populated with native and nonnative annual and perennial grasses (AECOM 2020). The area is zoned for Resources and Rural Development in Planning Area 5 of the Sonoma County General Plan.

IV. REGULATORY CONTEXT

This section briefly discusses the nature and extent of state and federal regulations that apply to cultural and tribal resources in the project's Study Area.

National Environmental Policy Act

Under NEPA, federal agencies are required to consider the environmental impacts of their proposed actions and incorporate reasonable alternatives to those actions. NEPA requires discussion of significant environmental impacts and reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. NEPA recognizes direct, indirect, and cumulative effects. As defined by NEPA, direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action but are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative effects are the effects on the environment that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. NEPA recognizes both detrimental and beneficial effects.

One of the requirements of NEPA is to "preserve important historic, cultural, and natural aspects of our national heritage" (Sec. 101 [42 USC § 4331]). According to NEPA regulations, in considering whether an action may "significantly affect the quality of the human environment," an agency must consider the following, among other things:

- Unique characteristics of the geographic area such as proximity to historic or cultural resources (40 CFR 1508.27(b)(3))
- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the NRHP (40 CFR 1508.27(b)(8))

National Historic Preservation Act

As part of the compliance process, the project must comply with Section 106 of the NHPA, described in 36 CFR 800. The NHPA established the federal government's policy on historic preservation and the programs, including the National Register of Historic Places (NRHP), through which the policy is implemented. Section 106 (16 United States Code 470f) of the NHPA requires federal agencies, prior to implementing an "undertaking" (e.g., issuing a federal permit or allocating federal funds), to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that could adversely affect historic properties eligible for listing on the NRHP. As defined in 36 CFR 800.5(a)(1), "Adverse effects occur when an undertaking may directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the National Register."

Under the NHPA, the quality of significance in cultural resources is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of significant persons in or past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

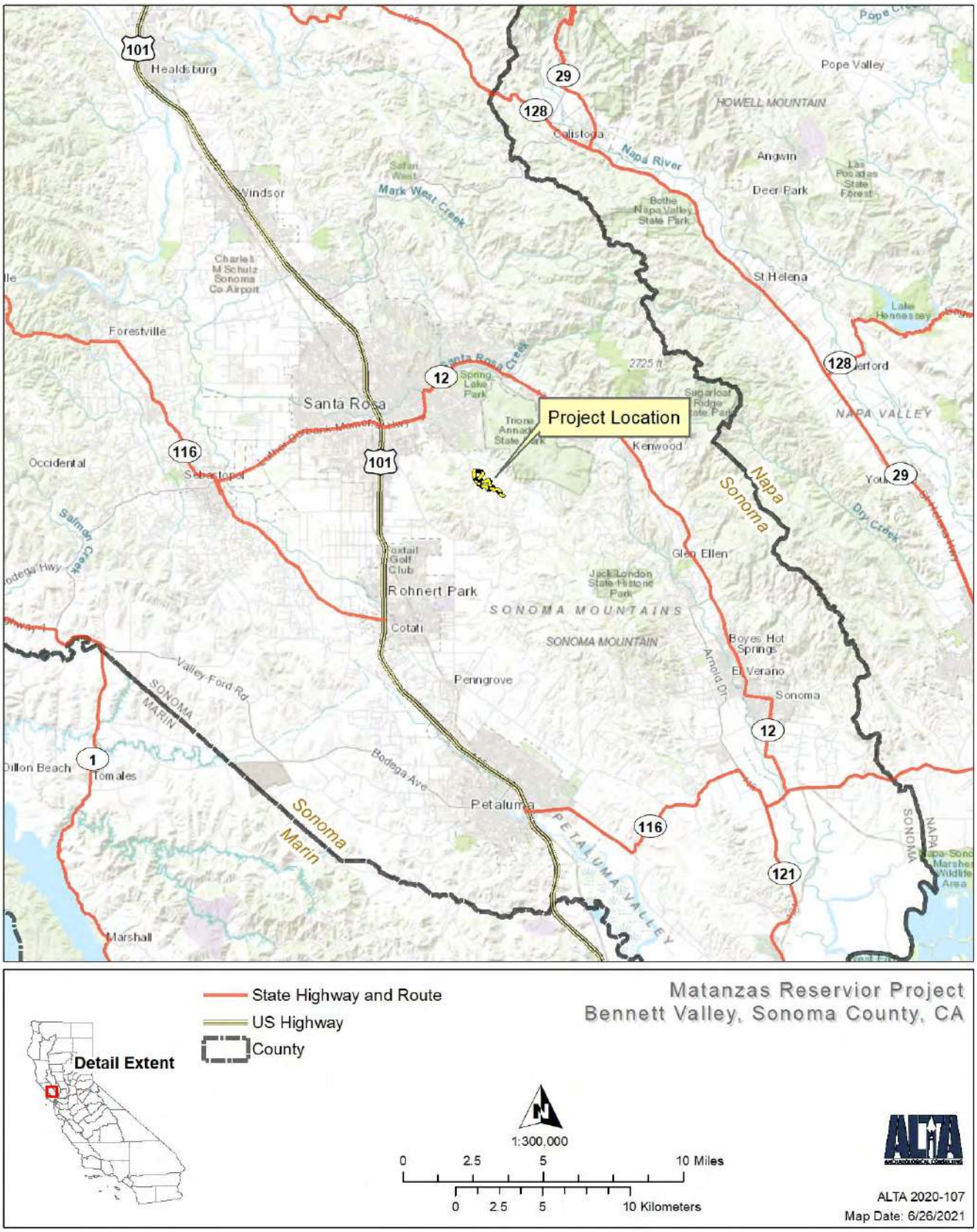

Figure 1. Project Vicinity

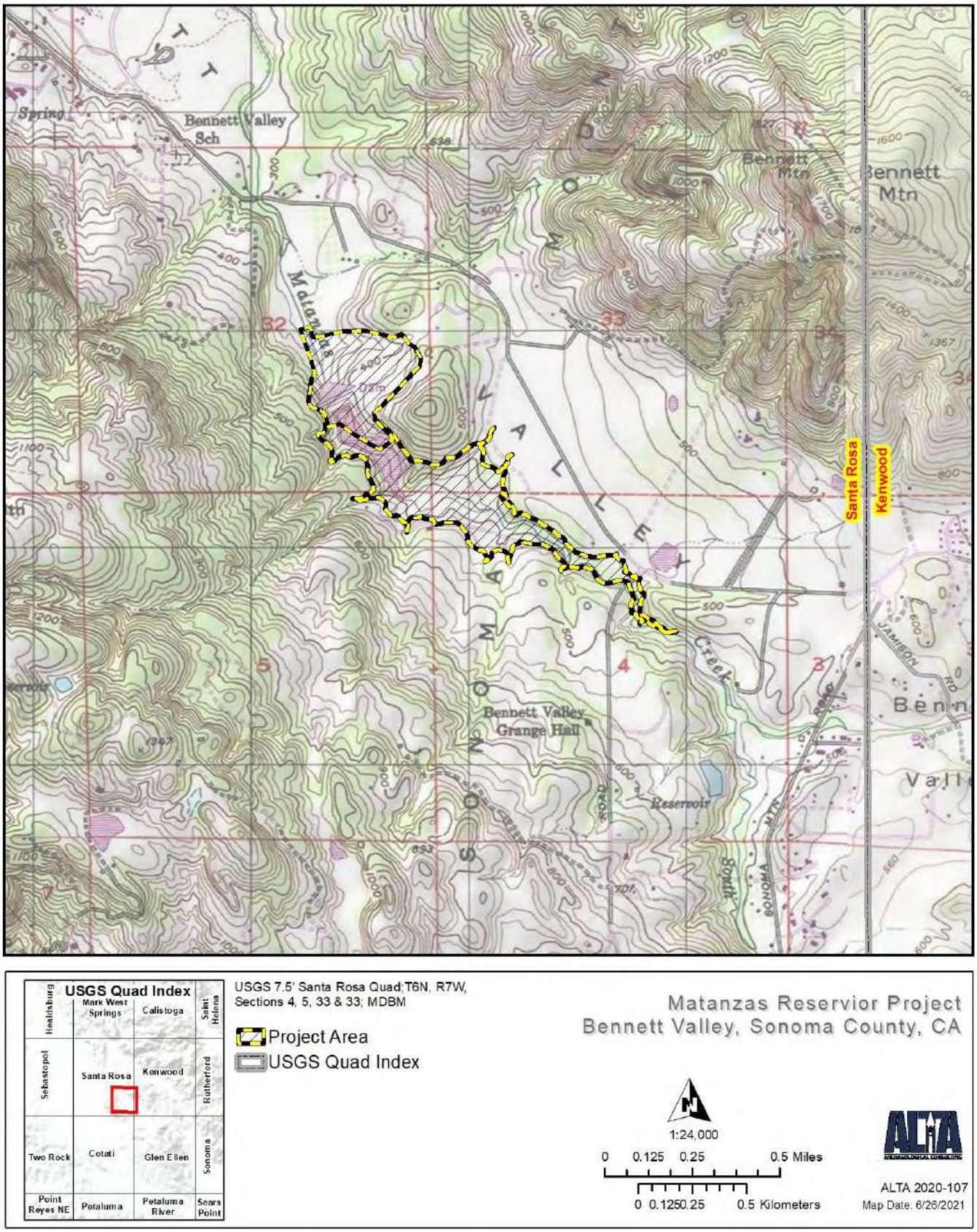

Figure 2. Project Location

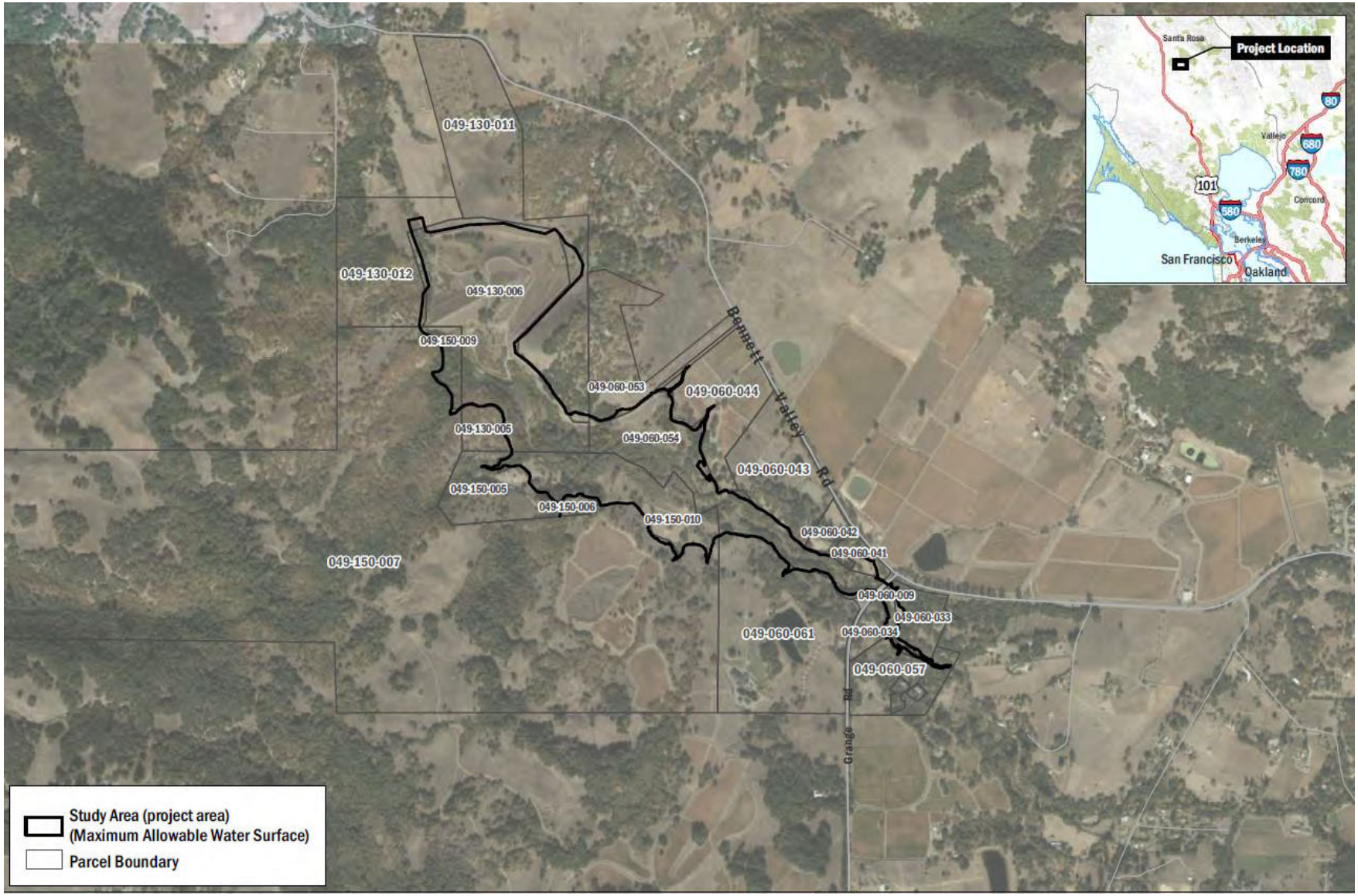

Figure 3. Study Area (adapted from AECOM 2021)

In general, historic sites are evaluated in terms of Criteria A through C; prehistoric sites are most often evaluated in terms of Criterion D, which refers to the research potential of the site (36 CFR 60.4). The importance of a site is determined by its capacity to address pertinent local and regional research themes.

V. BACKGROUND

Because the significance of cultural resources is best assessed with regard to environmental and cultural contexts, descriptions of the natural and cultural setting of the project region are presented below.

Environmental Setting

The Study Area is situated southeast of the City of Santa Rosa, in central Sonoma County, in the Coast Range geologic province (Jennings et al. 1977). The northern Coast Ranges are a geologic province comprising numerous rugged north-south trending ridges and valleys that run parallel to a series of faults and folds. Formation of these ranges is generally attributed to events associated with subduction of the Pacific Plate beneath the western border of North America. The bedrock that underlies the region is a complex assemblage of highly deformed, fractured, and weathered sedimentary, igneous, and metamorphic rocks. The bedrock geology of the Study Area consists of Jurassic-Cretaceous age Franciscan Formation rock (Jennings et al. 1977; Schoenherr 1995:7). Rocks of this formation, the oldest in the area, are often weakly metamorphosed and consist of greywacke shale interspersed with discontinuous bodies of ultramafic rock such as greenstone, schist, and serpentine. The repeated folding and faulting is reflected in the complex structure of Franciscan rocks and area topography (Schoenherr 1995:265). The specific bedrock geology of the Study Area is composed of two distinct formations. Tertiary volcanic flow rocks, composed of dacite and rhyolite, define the bedrock of the northwestern portion of the Study Area. In the southeastern portion of the Study Area, relatively younger Plio-Pleistocene and Pliocene deposits predominate. This is a sedimentary formation dating to between the Miocene and Pleistocene, whose major lithologic constituents are conglomerate and sandstone, with minor inclusions of mudstone and siltstone. (Koenig 1963).

Soils in the Study Area consist primarily of Goulding series gravelly loam. Soils of this series are deep, excessively drained soils formed in material weathered from metavolcanic rocks. The A horizon extends to approximately 4 inches below surface and consists of brown (7.5YR 5/4) gravelly loam. The B horizon continues from the A horizon to approximately 17 inches below surface and consists of weathered, brown (7.5YR 5/4), very gravelly loam. At this depth, fractured metavolcanic bedrock occurs (USDA 1999). Haire series clay loam defines the northern bank of Matanzas Creek. This series' roughly 24-inch A horizon consists of gray (10YR 5/1) to grayish brown (10YR 5/2) light clay loam. From the A horizon, the B horizon extends to 36 inches deep and consists of pale brown (10YR 6/3) clay. The C horizon follows the B horizon to a depth of 60 inches, and features pale yellow (5Y 7/3) and pale brown (10YR 6/3) very gravelly clay loam (USDA 2003).

Elevations in the Study Area vary from approximately 280 to 400 feet above mean sea level. The project is situated on the eastern foot of Taylor Mountain, along the western edge of Bennett Valley. The nearest water source is Matanzas Creek, an intermittent stream in the Study Area, which flows northwest. The Study Area is in a rural residential area populated with native and nonnative annual and perennial grasses. Other vegetation in the Study Area includes shrubland dominated by coyote brush; forest and woodland dominated by California bay and nonnative Eucalyptus; and blackberry

patches dominated by invasive Himalayan blackberry (AECOM 2021). This area is characterized by a Mediterranean climate that averages between 20 and 45 inches of rainfall annually (USDA 2003). The winters are cool and wet, and the summers are warm and dry.

Prehistory

More than half a century of archaeological investigations in the North Coast Ranges has revealed a record of hunter-gatherer occupation spanning more than 10,000 years. The cultural chronology of the Study Area is best described as part of the overall cultural chronology for the central North Coast Ranges. David A. Fredrickson's 1973 doctoral dissertation proposed the first dated synthetic chronological periods and related cultural patterns for the region, and formed the present basis for understanding of coastal chronologies.

Paleo-Indian Period (12000-8000 BP)

The earliest documented human occupation in California, the Paleo-Indian Period, was a time of variable climate, rising sea levels, and other broad-scale environmental change. People lived in small, highly mobile groups, moving through broad geographic areas and leaving relatively meager archaeological remains. Archaeological sites dating to the Paleo-Indian period are rare and a small number of sites dating to this period have been identified in Northern California. The Paleo-Indian Period is recognized locally as the Post Pattern (Frederickson 1974).

Archaic Period (8000-1500 BP)

With the more stable climate of the long Archaic period, people gradually became more sedentary, new groups entered the area, and regional cultural distinctions developed. The Archaic has been divided into three sub-periods (Lower, Middle, and Upper), based on changes in sociopolitical complexity, trade networks, populations, and the introduction of new artifact types (Fredrickson 1974, 1984). Many of the archaeological sites in the northern Coast Ranges were first used in the Middle and Upper Archaic, when populations were increasing and groups moved into new areas to exploit a more diverse range of resources. By the beginning of the Upper Archaic period around 500 B.C., mobility decreased as the region's inhabitants became more sedentary. Subsistence strategies shifted to focus on intensive processing and storage. Numerous small villages and the beginnings of a more complex society and economy characterize the end of this period.

Emergent Period (1500 BP-colonization)

During the Emergent Period (ca. A.D. 1000 to the historic period), social complexity further developed. Settlement patterns included large centrally based villages where political leaders resided, associated hamlets, and specialized activity areas. Innovations associated with the period include the bow and arrow, small corner-notched points, and a diversity of beads and ornaments. Archaeological sites dating to this period are common throughout the northern Coast Ranges and include sites of ritual significance, such as rock art; small resource-processing areas marked by stone-tool manufacturing debris (debitage) and flaked-stone tools or milling equipment (such as mortars and pestles); or moderate- to large-sized occupation sites marked by midden soils, dietary bone and shell, and a diversity of artifacts (Fredrickson 1974, 1984).

A number of cultural chronologies have been developed for this region (cf. Basgall 1982; Fredrickson and White 1988; Hildebrandt and Hayes 1984; Jones and Hayes 1993; Layton 1990; Meighan 1955; White and King 1992; White et al. 2002). The published volume *Cultural Diversity and Cultural Change in Prehistoric Clear Lake Basin: Final Report of the Anderson Flat Project*

(White et al. 2002) provides the most comprehensive summary of relevant research themes and the current state of knowledge concerning prehistoric hunter-gatherer studies in the North Coast Ranges.

Ethnography

The Study Area lies in a transitional region between three major ethnographically known groups. The primary group to hold the region in ethnographic times was the Southern Pomo, who occupied the Santa Rosa Plain and surrounding region, including Bennett Valley. The Wappo held lands just to the east of the Study Area, extending into Napa County. The Coast Miwok occupied Marin and Southern Sonoma Counties. Because this transition is near the Study Area, this section discusses ethnographic data for all three of these groups. The following ethnographic summary is not intended as a comprehensive overview of North Bay cultures, but instead is meant to provide a background to the present cultural resource investigation, with specific references to the Study Area. In this section, the past tense is sometimes used when referring to Native peoples because this is a historical study. This convention is not intended to suggest that Native people only existed in the past. To the contrary, many Native groups have strong cultural and social identities today.

Southern Pomo

The Southern Pomo, who inhabited this region prior to Euro-American intrusion, were one of several groups of Pomo Indians distributed over the lands of Mendocino, Lake, and Sonoma Counties. Seven distinct and mutually unintelligible languages are recognized under the rubric of Pomo (Barrett 1908; Kroeber 1925; McLendon and Oswalt 1978). These languages are delineated by geographic divisions, which include Northern, Central, Southern, Eastern, Southeastern, Northeastern, and Southwestern (Kashaya) (Barrett 1908; Stewart 1943).

Southern Pomo speakers occupied central to southern Sonoma County from the coast to the Russian River, extending from just south of Gualala in the north to Sebastopol in the south (McLendon and Oswalt 1978:278). Generally, little is known of Southern Pomoan culture because their population was decimated early by missionization, slave raids, massacres, and disease (McLendon and Oswalt 1978:279). Neighboring groups referred to the bands around Santa Rosa and Sebastopol as *ʔiy·oko-hčamay,* “southerners” (McLendon and Oswalt 1978:280). Permutations of variant names for the Southern Pomo usually originate from the word Gallinomero, apparently a word derived from the name of a Southern Pomo leader (Powers 1877:174).

The current Study Area lies within the ethnographic territory of the *Bitakomtara* tribelet of the Southern Pomo linguistic affiliation (Stewart 1943). According to Stewart (1943:53), the tribal area of the *Bitakomtara* includes about 200 square miles. It is bounded on the north by Mark West Creek; on the east by Sonoma Canyon, Bear Creek, and the summit of the Mayacamas Mountains; on the south by Sonoma Mountain (north of Cotati) and the end of the Laguna de Santa Rosa Creek; and on the west by Laguna de Santa Rosa (Stewart 1943:53). In historical documents, the Indians of the Santa Rosa Plain are often referred to as the Gualomi tribelet. Gualomi is the Coast Miwok name for the people that inhabited the Santa Rosa area; because the missionaries used Coast Miwok guides, the people were referred to by their Coast Miwok name. Gualomi is also used in reference to a main village site along Santa Rosa Creek.

The Southern Pomo, like the Wappo and neighboring Pomo groups, primarily subsisted on freshwater fish, acorns, and game. The Southern Pomo had a narrow extension of territory in the north that allowed them access to the coast, where they went to in the summer to collect seafood.

In the winter, the Southern Pomo would move inland to fish in the Russian River, hunt deer, and gather acorns (McLendon and Oswalt 1978:276).

Wappo

The Wappo language belongs to a small family of four languages, including Yuki, Coast Yuki, and Huchnom. However, the Wappo are geographically isolated from these groups, and as a result their language has evolved divergently (Barrett 1908; Sawyer 1978). The Wappo were close neighbors with Pomo, Wintun, and Miwok groups, and it is hypothesized that the Wappo migrated into the area late in the prehistoric period (Bennyhoff 1994:56). This language has been influenced by many of these neighbors, as well as by Spanish. The name Wappo likely is of Spanish origin, from *guapo*, for "handsome." The Wappo have had a multitude of names given by surrounding cultures, but they refer to themselves as *ʔonaʔcáṭis*, "the outspoken ones" (Sawyer 1978:263).

The Wappo primarily inhabited lands east of the Mayacamas Mountains, from Cobb Mountain to the present city of Napa (Barrett 1908:264). The basis of Wappo social life was the family and the village community. Settlements of Wappo peoples consisted of small villages. These villages consisted of up to 100 people. Families lived in grass houses, averaging around nine individuals per family unit. For each village community, there was an individual leader. The role of leader was not hereditary, but was a lifetime appointment. Attainment of this role simply emerged from the amount of followers one acquired over time. This role was fulfilled by both genders. These villages moved frequently, responding to winter waterway fluctuations and seasonal gathering rounds (Sawyer 1978:259).

Subsistence activities were based on the availability of seasonal resources. In spring and summer, groups of Wappo would travel south and west through Miwok and Pomo lands to harvest on the coast. These trips entailed the gathering of abalone, clams, mussels, fish, and seaweed. Additionally, the Wappo traveled north to Clear Lake to fish and collect magnesite. Neither Miwok nor Pomo groups are known to have impeded the Wappo's passage, and these groups often traded. Hunting of small game and deer occurred as well. The Wappo seem to have depended on drying fish, and the length of their trips often were dictated by the amount of time needed to dry. Terrestrial plants, primarily oak acorns (*Quercus*), and animals were procured primarily in the interior (Sawyer 1978:260-261).

In the North Coast Ranges, networks of trade and exchange developed to meet the various ceremonial, religious, economic, political, and subsistence needs of Wappo society. The Wappo received many items of their material culture through trade, namely clamshell disk beads and magnesite tube beads. Sometimes trading with outside groups was incidental; other times, it was preconceived and regularized. Pure barter was occasionally practiced, and trade goods were generally exchanged using fixed prices measured in clamshell disc bead money. Obsidian, a valuable resource throughout northern California, was obtained in Wappo territory at Glass Mountain, near present day Calistoga (Sawyer 1978:260).

Coast Miwok

The Coast Miwok, who inhabited this region prior to European-American intrusion, were distributed across Sonoma and Marin Counties. The Coast Miwok were one of the California-Penutian-Language-speaking groups and were closely related to the Lake Miwok (Kelly 1978:414). The Coast Miwok occupied the northwestern coast of California, from the mouth of the Golden Gate in the south, to approximately 5 miles north of Bodega Bay in the north, to approximately 4 miles east of

Sonoma Creek (Barrett 1908; Kelly 1978). Barrett (1908) divides Coast Miwok speakers into two distinct dialects: Western/Bodega and Southern/Marin.

There were historically 44 recorded villages in the Coast Miwok territory, many of which provide present place names (Kelly 1978:415). Ethnographic accounts indicate that the Coast Miwok resided in large villages, each of which had a headman, but cannot be said to have a universal tribal organization. According to informant Tom Smith, a headman (*hóypuh*), a "woman chief" (*hóypuh kulé(·)yih*) and a third female leader (*máien*) split responsibilities of tending to people and organizing religious ceremonies (Kelly 1978:419).

The Coast Miwok were among the first California Native peoples to encounter Euro-Americans, greeting Sir Francis Drake in 1579. During the late 18th and early 19th centuries, many Coast Miwoks were subjected to missionization at San Francisco, San Rafael, and Sonoma, as well as labor at Fort Ross under the Russians. In 1850, a year after the end of the American conquest of California, the Coast Miwok population was estimated at 250 (Kelly 1978:414).

The Coast Miwok followed a cyclical pattern of subsistence, exploiting resources that were available on a seasonal basis. The Coast Miwok had a diversified subsistence economy based on fishing, hunting, and gathering, with a particular dependence on acorns. Important marine resources included fish, eels, clams, mussels, and seaweed; terrestrial resources included acorns, bear, deer, elk, and small game (Kelly 1978:416). The Coast Miwok had a rich culture of religion, ritual, and dance, with music and games being a large part of their cultural expression.

The nearest ethnographically known habitation site to the Study Area is the Coast Miwok village of *lumen laká·lu* (Barrett 1908:314; Kelly 1978:415). This place is located indefinitely at a point just within the bounds of Coast Miwok territory, and is plotted near the southern slopes of Sonoma Mountain. No ethnographically known sites are described in the Study Area.

History

Early Exploration

The first nonnative peoples to explore the inland areas of Sonoma County were Russian and Aleutian trappers staged from Fort Ross on the Sonoma Coast. Fort Ross was the southernmost outpost of Russian settlement in North American from 1812 to 1842 (Beck and Haase 1974). The Russians did not establish settlements in the interior of Sonoma County, instead deriving their income from the fur trades on the coast.

Worried that Russians may take control of the interior lands, two Spanish missions were established—San Rafael (1817) and Sonoma (1823)—in an effort to push the Russians out of the province (Johnson 1979:301; Smilie 1975). Spanish missionization efforts toward the Pomo living on the Santa Rosa plain began in 1821. By 1826, nearly all Natives living in the region had been baptized (Milliken 2008:58-63). In 1829, Father Juan Amoros came to the territory of the *Cainemeros* tribe, who resided on *Chocoalomi*, the Native name for Santa Rosa Creek. Near there he captured a *Cainemeros* girl, baptized her in the stream and gave her the name Santa Rosa, from the fact that the Church was celebrating the feast of Santa Rosa de Lima that day (Gregory 1911:153; Thompson 1877).

Mexican Period

The Mexican War of Independence was an armed conflict that ended Spanish control of the territory of Alta California in 1821. General Mariano Guadalupe Vallejo served as Commander of the Mexican forces north of the Presidio of San Francisco. Working on behalf of the Mexican Government, Vallejo was charged with the task of selecting sites to establish *pueblos* (towns) on which fortifications might be erected. The Mexican Government wanted to prevent the Russians stationed at Fort Ross from encroaching farther south into Mexican domain (Menefee 1873:165).

The Mexican government continued the Spanish government's tradition of granting large tracts of land (*ranchos*) to prominent citizens, especially those who had undertaken military service (Gates 1971:396). In 1844, Lieutenant Miguel Alvarado applied to the Mexican government for Rancho Yulupa, 3 square leagues between the Petaluma, Cotate, Los Guilicos, and Cabeza de Santa Rosa ranchos. This grant was issued by Governor Manuel Micheltorena on November 23, 1844, by which time Alvarado had built a house and established a stock-raising operation on the land (Hoffman 1862:174-175). Mariano Vallejo purchased the rancho from Alvarado for $3000 in 1849.

The meaning of the word *yulupa* is disputed. Sawyer (1978) suggests that the word is derived from the Wappo word for "bird," though this is speculative. Rancho Yulupa was one of many holdings Vallejo owned, including the *pueblo* lands of Sonoma, Rancho Petaluma, Rancho Suscol, and Rancho Agua Caliente (Hoffman 1862). These ranchos supported the hide and tallow trade that fed the Alta California economy during the Mexican period.

American Period

As American settlers moved into Mexico-controlled California, many of them settled in the Sonoma-Napa area, or north of Sutter's Fort near Sacramento. Few American settlers were permitted to purchase or rent land by Mexican authorities. The Mexican government was concerned about American settlers encroaching on Mexican territory. Tensions between American settlers and Mexican nationalists grew. In April 1846, Mexican Governor José Castro proclaimed that foreigners who had not been naturalized as Mexicans would be expelled from the country. Governor Castro began to organize forces to uproot American settlers. American settlers heard rumors of the pending attack.

In June 1846, a number of American immigrants rebelled against the Mexican government in what became known as the Bear Flag Revolt. On the morning of June 14, 1846, a party of 33 armed American settlers entered the town of Sonoma and captured General Mariano Vallejo, along with several Mexican officers. The prisoners were brought to Sutter's Fort and all were incarcerated. American forces, led by U.S. Captain John C. Fremont, soon came to aid the Bear Flaggers. The Bear Flag revolt put the territorial claims of Mexico in question and helped pave the way for the United States to seize control of the Pacific coastline (see Bauer 1974).

After the conclusion of the Mexican American War, the United States Land Commission was established under the Land Act of 1851 to assess the validity of land grants in California (Gates 1971:396). Vallejo filed his claim for Rancho Yulupa with the Commission on May 31, 1852. The Commission rejected this claim on the grounds that the land was not "segregated from the public domain" and lacked sufficient documentary evidence (63 US 416; Hoffman 1862:174-175). Witness testimonies by Juan Carrillo and surveyor Jasper O'Farrell helped to reverse the rejection, and the case was remanded for further evidence (Hoffman 1862:35). No further developments emerged in the case, and the land became public domain.

Bennett Valley and Landowners

The Study Area lies on the western margin of Bennett Valley, at the foot of Taylor Mountain. Bennett Valley is named for James N. Bennett, one of the many American men who came to Sonoma County at the conclusion of the Mexican-American War. By the time of the reversal in the Rancho Yulupa case, American squatters had begun to illegally settle on the land as they had done throughout the state. This squatting was undertaken in the hope that, under the Preemption Act of 1841, public land could be purchased before surveyors established its boundaries (Shelton 2013:8). Bennett squatted on the Rancho Yulupa claim, with the ambition to claim its lands if the Commission were to invalidate it. Bennett famously defeated future General Joseph Hooker for a state Assembly seat in 1853, running as a member of the "Settler's Convention" (Gregory 1911:140). In this capacity, Bennett was instrumental in establishing Santa Rosa as the seat of Sonoma County. Despite the success of his policy, he resigned his post soon after to work in local government, as a county road commissioner (LeBaron 2017; Munro-Fraser 1880:144).

Bennett Valley has long been an agricultural center of Sonoma County, particularly in the wine industry. The most notable of the growers in this period was Isaac DeTurk, proprietor of the DeTurk Winery in Santa Rosa and an officer of the State Board of Viticultural Commissioners. DeTurk operated a large vineyard in Bennett Valley, including the northeastern bank of Matanzas Creek in sections 4 and 33 (Thompson 1877:43; Lewis 1889:227). This supply fed a large brick winery on Donahue Street in Santa Rosa. In 1885, DeTurk sold his Bennett Valley land to G.W. and E.W. Davis, who continued to operate the property as a winery under the name Yulupa Ranch and Vineyard (Lewis 1889:707). D.M. Hedrick, a neighboring landowner, also grew grapes near the Study Area.

By 1889, Bennett Valley produced an estimated 500 tons of grapes per year, a figure that has only increased over time. In addition to wine, Bennett Valley produced apples, hay, wheat, oats, barley, and livestock. Santa Rosa has grown increasingly urban over time, but Bennett Valley retains a distinctly rural agricultural character. In addition, Bennett Valley holds the distinction of housing one of the first schoolhouses in the Santa Rosa Township, constructed in 1853 (Lewis 1889:227).

Between 1872 and 1903, most of the Study Area was under the ownership of Patrick Leddy (Guinn 1904:990-993; Thompson 1877:36; Reynolds and Proctor 1898:51). Leddy was an Irish immigrant from County Cavan who came west during the Gold Rush in the summer of 1849. Unsuccessfully as a miner in Downieville and on the Yuba River, Leddy soon sought other opportunities. He squatted on land in the Sebastopol area, and after paying $168 in squatter's rights, began growing potatoes. In 1872, Leddy leased his Sebastopol land and began consolidating property in Bennett Valley. Here, he ran sheep for approximately 8 years before leasing the land to A.S. Cardoza and moving into a house in Santa Rosa (Guinn 1904:993). Cardoza operated the Leddy Ranch for 17 years before buying his own land in the Wilson district of Petaluma Township in 1900 (Anonymous 1900:4).

Matanzas Creek Dam

The Matanzas Creek Dam was proposed as part of the 1958 Watershed Work Plan for the Central Sonoma Watershed, prepared in cooperation between the Santa Rosa Soil Conservation District and the Sonoma County Flood Control and Water Conservation District, with assistance from the USDA Soil Conservation Service (now NRCS). At the time, Matanzas Creek experienced heavy land loss and erosion during seasonal storms and tended to overflow at its confluence with Santa

Rosa Creek, causing urban flood damage. To prevent flooding and erosion, the City of Santa Rosa approved a proposal to dam Matanzas Creek (SRSCD and SCFCWCD 1958:9).

The Sonoma County Flood Control and Water Conservation District (now Sonoma Water) was created by state law in 1949 to implement USACE's recommendation for flood control and water conservation reservoirs on the Russian River and tributaries north of Ukiah in northern Sonoma County and southern Mendocino County (Sonoma Water 1999).

"This flood control system was completed in 1959; however, large areas of Sonoma County around Santa Rosa continued to be inundated with flood waters (Sonoma Water 1999). After a severe flood in 1955, local agencies requested assistance from the federal government through the United States Department of Agriculture (USDA) Soil Conservation Service (now the Natural Resources Conservation Service [NRCS]). This resulted in preparation of the Central Sonoma Watershed Work Plan. By 1958, when the Watershed Work Plan was prepared, flooding in the Santa Rosa Creek watershed was annual; on occasion, flooding events occurred three or four times in a single winter (City of Santa Rosa Public Works Department 2006; Santa Rosa Soil Conservation District et al. 1958)" (Beck, Miller and Meiser 2021:5-7).

Work proceeded on the Matanzas Creek Reservoir in 1963 and 1964. The project successfully resolved flooding problems within city limits, but not erosion problems along Matanzas Creek (PWD 2006:7).

VI. SOURCES CONSULTED

Records Search

A records search was prepared by Lisa Hagel, Researcher at the NWIC, (File Number 20-1242), on the campus of Sonoma State University. The NWIC, an affiliate of the State of California Office of Historic Preservation, is the official state repository of archaeological and historical records and reports for an 18-county area that includes Sonoma County. The records search request included a review of all study reports on file within a 0.5-mile radius of the Study Area. A search of cultural resources included a 0.5-mile radius. Sources consulted include archaeological site and survey base maps, survey reports, site records, and historic General Land Office (GLO) maps.

Included in the review were: *California Inventory of Historical Resources* (DPR 1976), *California Historical Landmarks* for Sonoma County (OHP 1990), *California Points of Historical Interest* (OHP 1992), *Built Environment Resource Directory* (OHP 2020), including the NRHP, California Historical Landmarks, and California Points of Historical Interest.

Review of historic registers and inventories indicate that no historical landmarks or points of interest are present in the Study Area. No NRHP-listed or eligible properties are within the 0.5-mile radius of the Study Area.

Review of archaeological site and survey maps revealed that twenty-nine cultural resource studies have been previously performed within a 0.5-mile radius of the current subject parcel (Table 1). Seven reports (S-1193, 1338, 1961, 2029, 17813, 19825, and 29802) included portions of the Study Area.

The records search revealed that 16 cultural resources are documented within the 0.5-mile search radius (Table 2). Two archaeological resources are known in the Study Area.

P-49-001109 (CA-SON-1182)

This prehistoric site consists of a lithic scatter with two discrete loci. Artifacts include obsidian and chert flakes and an obsidian projectile point. The site is situated on an alluvial terrace east of Matanzas Creek and spread over both sides of Bennet Valley Road. The site was originally recorded by Mick Hayes in 1979. Archeological test excavations at the site were conducted as part of the Grange Road-Matanzas Creek Bridge Replacement project (Wickstrom and Fredrickson 1979). Fieldwork included excavation of two control units and 15 auger borings. Excavations revealed historic-era materials consisting primarily of square nails, metal, glass, and porcelain fragments that were found in the upper 30 centimeters (cm) of the site. Prehistoric materials were found to a depth of 160 cm below surface. Chert was more prolific in the lower levels of the excavation, suggesting a possible shift in material use through time. Testing revealed no temporally diagnostic artifacts, no midden soils, and a small number of cultural materials, suggesting use of the site on a short-term, sporadic, or seasonal basis. The site was recommended as eligible for inclusion in the NRHP for its information potential (Wickstrom and Fredrickson 1979:29).

P-49-001864

This historic-era site consists of the Talbot Farmstead, a late 19th century farm complex that includes a one-story farmhouse and eight outbuildings on a property that occupies about 5 acres (Eastman 1996). The house and barn were probably erected during the late 1880s or early 1890s, when Joseph M. Talbot was the owner of the property. Outbuildings that were constructed in the early 20th century were erected by Joseph Talbot's son, Leonard, who ran a small dairying operation in addition to selling eggs and practicing small-scale faming. The Talbot House is among the oldest residences in Bennett Valley and one of the earliest farms (Eastman 1996).

Table 1. Summary of Previous Cultural Resources Studies within Search Radius

Report	Authors	Year	Title
S-000754	Robert J. Jackson	1977	An Archaeological Investigation of the Beverly Hills Ranch Proposed Subdivision, Bennett Valley Road, Sonoma County, California
S-000769	Robert I. Orlins	1977	An Archaeological Survey of a Proposed 18-Acre Subdivision, Bennett Valley, Sonoma County, California
S-001193	Jane C. Adams	1978	An Archaeological Investigation of the Alan Milner Property, Meadow View Commons, Bennett Valley, Sonoma County, California File 160.784
S-001338	Janis Offermann	1978	A Bennett Valley Road Archaeological Survey, Located Just Northwest of the Junction of Bennett Valley Road and Grange Road in Sonoma County, California, County File MS 6659
S-001727	Deborah A. Rippey	1979	An Archaeological Survey of the Barbara Kunz Property, MS 6346 A, Santa Rosa, California
S-001961	Brian Wickstrom	1979	Archaeological testing at CA-SON-1182, Grange Road (6702B) (letter report)
S-001961	Brian P. Wickstrom and David A Frederickson	1979	An Archaeological Investigation of CA-SON-1182, Bennett Valley, Sonoma County, California
S-002029	Thomas L. Jackson	1976	A preliminary archaeological reconnaissance of the Friedman Property (letter report)
S-002380	Christian Gerike	1980	An Archaeological Study for the Bennett Valley Road (6604) Matanzas Creek Bridge Replacement Project, Sonoma County, California

Report	Authors	Year	Title
S-005788	Deborah A. Rippey and David A. Fredrickson	1983	Archaeological Test Excavation of CA-SON-1250 and CA-SON-1251 near the Bennett Valley Road Bridge at Matanzas Creek, Sonoma County, California
S-005788	Christian Gerike		Appendix II: Bridge Remains and a Stone Fence at the Bennett Valley Road-Matanzas Creek Bridge, Sonoma County, California
S-006360	James P. Quinn and David G. Bieling	1984	An Archaeological Investigation of the Matanzas Creek Winery Property, Bennett Valley, Sonoma County, California
S-007880	Brian P. Wickstrom	1985	Bennett Valley Road Project over Matanzas Creek (letter report)
S-008777	Brian Paul Wickstrom	1986	An Archaeological Investigation of Prehistoric Sites CA-SON-1250 and CA-SON-1251, Southern Sonoma County, California
S-011582	Nancy French	1990	An Archaeological Study of 24.4 Acres on Bennett Valley Road, near Santa Rosa, Sonoma County, California
S-013726	William E. Soule	1992	Archaeological Survey Report, Application 29515, Friedman Property, Sonoma County
S-014268	Katherine Flynn and William Roop	1992	Archaeological Evaluation of the Bennett Valley Road Water Transmission Line, Santa Rosa (ARS 92-02)
S-014268	Stephen Bryne	1993	Results of Construction Monitoring for the Bennett Valley Road Water Transmission Line, Bennett Valley Road, Sonoma County, California
S-017813	Julia Huddleson	1996	Archaeological Survey Report for a Proposed Bridge Replacement on Grange Road, Sonoma County, California
S-017813	Tim Mayer	1997	Historic Property Survey Report and Finding of No Effect, Grange Road Bridge Replacement Project
S-017813	Bright Eastman	1997	Historic Architectural Survey Report (HASR) for the Grange Roade Bridge Replacement Project, Sonoma County, California
S-019825	Vicki R. Beard and Thomas M. Origer	1996	Archaeological Investigations at CA-SON-1182: The Grange Road Bridge Replacement Project, Sonoma County, California
S-028150	Elizabeth Bedolla	2004	A Cultural Resources Evaluation of the Lands of Veale Located at 4726 Bennett Valley Road, Santa Rosa, Sonoma County, California
S-029802	Vicki R. Beard	2004	A Cultural Resources Survey for the Matanzas Creek Reservoir Sediment Removal Project, Santa Rosa, Sonoma County, California
S-029822	Nelson B. Thompson and Vicki R. Beard	2004	A Cultural Resources Survey for the Wagner Minor Subdivision, 5757 Bennett Valley Road, Santa Rosa, Sonoma County, California
S-031219	Eileen Steen and Thomas M. Origer	2005	A Cultural Resources Survey of Jackson Park Ranch, Santa Rosa, Sonoma County, California
S-034109	Sally Evans	2007	A Cultural Resources Evaluation of Proposed Building Envelopes and Leach Field Areas for the Yahng Lot Line Adjustment, 2808 and 2308 Warrington Road (APNs 049-200-003 and 045-015-003), Sonoma County, California (ARS Project 07-024)
S-034937	Carolyn Losee	2008	Cultural Resources Investigation for Verizon Wireless #2006193820/Site No. 173544: 6161 Bennett Valley Road, Santa Rosa, Sonoma County, CA 95404; EBI Project No. 61071067
S-038223	Diana J. Painter	2011	4232 Grange Road, Benjamin Ranch, Santa Rosa, Sonoma County, California

Table 2. Summary of Previously Recorded Cultural Resources within Search Radius

Primary	Trinomial	Type	Age	Description
P-49-000373	CA-SON-000404	Site	Prehistoric	Midden, lithic scatter, cores, fire affected rock, marine shell
P-49-001109	CA-SON-001182	Site	Prehistoric	Sparse lithic scatter
P-49-001137	CA-SON-001213	Site	Prehistoric	Midden, lithic scatter, cores, fire affected rock, marine shell
P-49-001138	CA-SON-001214/H	Site	Historic	Sparse lithic scatter, ceramic and glass fragments
P-49-001139	CA-SON-001215/H	Site	Prehistoric, historic	Historic refuse dump
P-49-001174	CA-SON-001250	Site	Prehistoric	Moderate lithic scatter and possible midden
P-49-001175	CA-SON-001251	Site	Prehistoric	Midden, possible house pit, lithic scatter, fire affected rock, marine shell
P-49-001864		Building	Historic	Late 19th century farm complex
P-49-003236		Object, other	Historic	Late 19th century stone fence
P-49-003301		Structure	Historic	Late 19th century stone fence
P-49-003302		Site	Historic	Late 19th century stone fence
P-49-003303		Site	Historic	Possible adit and tailing pile
P-49-003304	CA-SON-002413H	Building, structure, object, site	Historic	Late 19th to early 20th century ranch complex
P-49-003306	CA-SON-002414H	Site	Historic	Early 20th century domestic refuse dump
P-49-004376		Building, structure	Historic	Late 19th to early 20th century ranch complex
P-49-004933		Structure	Historic	Road

Historic Map Review

Review of historic maps of the area was completed to better understand the timing of development in the subject parcel and to recognize historic features. The following historic maps were reviewed as part of this investigation.

Bowers, A.B.

1866 *Map of Sonoma County, California*. David Rumsey Historical Map Collection. 1:63,360 scale.

Bureau of Land Management (BLM)

1865a Survey plat for T6N R7W. General Land Office Records, Bureau of Land Management, Washington, D.C. 1:31,680 scale.

1865b Survey plat for T7N R7W. General Land Office Records, Bureau of Land Management, Washington, D.C. 1:31,680 scale.

Nelson, Thomas O.
1957 *Thomas Bros. Popular Atlas of Sonoma County*. 1:31,680 scale.

Reynolds, W.D., and T.A. Proctor
1898 T6N R7W. *Illustrated Atlas of Sonoma County*. 1:3,600 scale.

Ricksecker, Lucius Edgar
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Thompson, Thomas H.
1877 *New Historical Atlas of Sonoma County*. Thos. H. Thompson and Company, Oakland. 1:31,680 scale.

United States Geological Survey (USGS)
1916a Santa Rosa Topographic Map, 1:62,500 scale.

1916b Santa Rosa Topographic Map, 1:62,500 scale.

1927 Santa Rosa Topographic Map, 1:62,500 scale.

1944 Santa Rosa Topographic Map, 1:62,500 scale.

1951 Santa Rosa Topographic Map, 1:62,500 scale.

1955 Santa Rosa Topographic Map, 1:24,000 scale.

1965 Santa Rosa Topographic Map, 1:24,000 scale.

1969 Santa Rosa Topographic Map, 1:24,000 scale.

1975 Santa Rosa Topographic Map, 1:24,000 scale.

1980a Santa Rosa Topographic Map, 1:24,000 scale.

1980b Santa Rosa Topographic Map, 1:24,000 scale.

1999 Santa Rosa Topographic Map, 1:24,000 scale.

The earliest maps of the Study Area are two adjacent survey plats completed by the GLO during the first cadastral survey of the area (BLM 1865a, b). At this time, the land was officially made available for public sale. These maps depict only modest development within the boundaries of the Study Area, in the form of a fence following the western bank of Matanzas Creek between sections 5 and 32. A “Road from Petaluma to Santa Rosa” is depicted parallel to Matanzas Creek in section 32, though the adjacent map to the south does not show its continuity. Just east of the southeastern end of the Study Area, “B. Talbott’s Vineyard” is illustrated on the bank north of Matanzas Creek. No other improvements appear in the Study Area at this time.

By 1866, much of the public land offered by the GLO appears to have been purchased by private owners. In the Study Area, the names J. Badger, C. Talbot, and H. Talbot appear. Despite the number of landowners in the area, very few residences are depicted; only H. Talbot’s name is associated with a residence (Bowers 1866). The 1877 atlas of the area depicts a variety of new

names in the area. Badger does not appear, having been replaced by Patrick Leddy. Other names in the Study Area include John Driscoll, William Manion, and Isaac DeTurk. Bennett Valley Road appears in roughly its present configuration at this time (Thompson 1877:36).

By 1898, many identified property owners differ from prior maps. DeTurk's vineyard property is labeled G.W. Davis; Manion's as D.M. Hedrick; and John Driscoll's as Hannah Driscoll. The Talbot properties to the south of the Study Area appear to have been subdivided between new Talbot family members J.M. and Genevieve Holman Talbot (Reynolds and Proctor 1898:51, 58). Patrick Leddy's property, comprising most of the Study Area, remains labeled under his ownership. The landscape itself does not appear to be vastly different. This depiction remains consistent through 1900 (Ricksecker 1900).

The first USGS topographic map of the area, drawn in 1916, depicts modest residential development in the area, mostly concentrated along Bennett Valley Road. The Santa Rosa School appears approximately 1 mile north of the Study Area. The Bennett Valley Grange Hall appears southeast of the Study Area, along Grange Road. This depiction remains consistent through 1927 (USGS 1916a, 1916b, 1927). By 1944, Bennett Valley Road is depicted as paved, and the Santa Rosa School has been relabeled "Bennett Valley School." Aside from these changes, this map and subsequent maps up to 1969 appear the same as the 1916 map (USGS 1944, 1951, 1965). The 1969 7.5-minute quadrangle is the first to depict the Matanzas Creek Reservoir. Urban expansion from Santa Rosa has also been photorevised into the northern end of Bennett Valley, depicting an exponential rate of residential development. Nelson's 1957 atlas confirms this development, depicting a number of subdivision street names in the northern end of the valley. However, this development mostly slows at the Bennett Valley School. Lands south, including the Study Area, remain largely agricultural, though still show a notable expansion in residential development. This depiction remains consistent to the present (USGS 1969, 1975, 1980a, 1980b, 1999).

Ethnographic Literature Review

Available ethnographic literature was reviewed to identify cultural resources in the project vicinity. The following sources were consulted.

Barrett, Samuel A.
1908 The Ethnogeography of the Pomo and Neighboring Indians. *University of California Publications in American Archaeology and Ethnology* 6(1):1-332.

Kelly, Isabel
1978 Coast Miwok. In *Handbook of North American Indians Volume 8, California*. Smithsonian Institute, Washington, D.C.

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2009 Ethnohistory and Ethnogeography of the Coast Miwok and their Neighbors, 1783-1840. Technical paper presented to Golden Gate National Recreation Area, Cultural Resources and Museum Management Division, National Park Service, Department of the Interior, Washington, D.C.

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1943 Notes on Pomo Ethnogeography. *University of California Publications in American Archaeology and Ethnology* 40(2):29-62.

As previously described, the Study Area lies near the juncture of the traditional territory of three major groups: Southern Pomo, Wappo, and Coast Miwok. The nearest ethnographically known habitation site to the Study Area is the Coast Miwok village of *lumen laká·lu* (Barrett 1908:314; Kelly 1978:415). This place is located indefinitely, at a point just within the bounds of Coast Miwok territory, and is plotted near the southern slopes of Sonoma Mountain. No ethnographically known sites are described in the Study Area.

Native American Notification

On December 27, 2021, ALTA sent a brief letter introducing the proposed project to Native American tribes who may have ancestral ties to the Study Area asking if they had concerns about the proposed project or information about resources that could be impacted. No responses have been received to date. Recipients consisted of the following:

- Patricia Hermosillo, Chairperson, Cloverdale Rancheria of Pomo Indians
- Dino Franklin Jr., Chairperson, Kashia Band of Indians of the Stewarts Point Rancheria
- Anthony Macias, Tribal Heritage Preservation Officer (THPO), Kashia Band of Indians of the Stewarts Point Rancheria
- Chris Wright, Chairperson, Dry Creek Rancheria Band of Pomo Indians
- Marjorie Mejia, Chairperson, Lytton Rancheria
- Gene Buvelot, Federated Indians of Graton Rancheria
- Buffy McQuillen, THPO, Federated Indians of Graton Rancheria
- Greg Sarris, Chairperson, Federated Indians of Graton Rancheria
- Jose Simon III, Chairperson, Middletown Rancheria
- Scott Gabaldon, Chairperson, Mishewal-Wappo Tribe of Alexander Valley
- Merlene Sanchez, Chairperson, Guidiville Band of Pomo Indians
- Leona Williams, Chairperson, Pinoleville Pomo Nation
- Ya-Ka-Ama Tribe

VII. FIELD METHODS

ALTA archaeologists Alex DeGeorgey and Jamie Frattarelli of ALTA and Karin Beck of AECOM conducted a field survey of the Study Area on February 22, February 25, and April 8, 2021. Project design drawings, project maps, and aerial imagery were used to correctly identify the Study Area. In general, ground surface visibility was poor, about 10 percent, throughout the Study Area, due to dense grasses, underbrush, or duff. A trowel was used to periodically scrape the ground surface to expose mineral soils and inspect sediments for evidence of cultural materials. The Study Area was surveyed using intensive survey coverage with transects no greater than 20-meter intervals. No access was granted to private parcels at the eastern end of the Study Area, north of Matanzas Creek. No survey coverage was completed in these areas. A total of 110.1 acres were surveyed as part of this investigation (Figure 4). Archaeological resource locations were recorded using a Trimble Geo7x datalogger capable of submeter accuracy. Digital photographs were taken of the Study Area, cultural resources, and surroundings (Attachment C). Cultural resources were recorded using the standard DPR 523 forms (Attachment D).

VIII. STUDY FINDINGS AND MANAGEMENT RECOMMENDATIONS

No cultural resources were identified in the Study Area as a result of the literature review. Two cultural resources were identified in the Study Area as a result of the records search performed. Four cultural resources, eight isolated finds, and four noted finds were identified in the Study Area as a result of archaeological field survey.

Previously Identified Cultural Resources

As discussed in Section VI, two previously recorded cultural resources are present in the Study Area (P-49-001109 and P-49-001864). Both resources are situated on private lands. Access to these areas for the cultural resources survey was not granted by the landowner. As a result, these cultural resources were not revisited as part of the current survey effort.

Newly Identified Cultural Resources

Four cultural resources were newly identified as a result of archaeological field survey (Figure 4).

ALTA2020-107-01

This historic-era resource consists of a road grade and parallel tree alignment, approximately 240 meters northwest of the Matanzas Creek Reservoir dam. The road segment begins above the eastern bank of Matanzas Creek and proceeds in an east-northeastern direction. The road segment is about 320 feet long, measures approximately 10 feet wide, and cuts into the bank at a maximum depth of 2 feet. An alignment of mature oak trees follows the road grade along its southern edge. This site is in fair condition. Upon further evaluation, this resource was determined to be associated with the Matanzas Creek Dam Facility and an evaluation of this resource is provided in the Matanzas Creek Dam Watershed Rehabilitation Project, Historical Resources Inventory and Evaluation Report (HIER) prepared under separate cover by AECOM.

ALTA2020-107-02

This historic-era resource consists of a wooden platform and a wooden well shed. These features are approximately 500 feet north of the eastern edge of the Matanzas Creek Reservoir dam, under

a stand of oak trees. The site is in fair condition. Neglect of the well house and vegetation (blackberry) overgrowth have affected the integrity of the building.

Feature 1 is a dilapidated redwood platform, constructed over a shallow drainage. It is likely a foundation for a water tank. The platform measures 10 feet by 8 feet, and consists of four parallel 5-inch by 5-inch circular-cut redwood joists spanning the drainage. These joists were once topped by 1-inch by 4-inch planks, most of which are now rotted or absent. 16-penny wire nails fasten the planks to the joists. A 1½-inch steel water pipe leads to the platform from the well house. The pile features a universal coupler. Poison oak brush covers most of the platform.

Feature 2 is a wooden well shed. This building has a square footprint, measuring 12 feet 6 inches on each side, and stands 6 feet tall. Its exterior siding consists of vertical 1-inch by 12-inch circular-cut redwood. It is topped by a medium-pitch hipped roof, clad in redwood shakes. The roof is trimmed with simple 1-inch by 6-inch fascia. The access door is constructed of siding materials and affixed to the siding with strap hinges and wire nails. The building houses an open well, which exhibits standing water. The building is mostly blanketed in poison oak brush and berry vines.

Following initial recordation by ALTA, it was subsequently decided that because this resource is an intact building/structure, it would most appropriately be addressed in the HIER prepared under separate cover by AECOM for the Matanzas Creek Dam Watershed Rehabilitation Project. Evaluation of this resource is provided in that report.

ALTA2020-107-03

This resource is a historic-era habitation site dating to the late 1950s and 60s. This scatter is on the southern bank of Matanzas Creek, approximately 90 meters northwest of the garage at 4030 Grange Road (APN 049-150-006). It consists of four features: 1) a possible privy pit, 2) a wooden platform, 3) a residential debris scatter, and 4) an earthen pad. This site is in fair condition, having only suffered obvious impacts from vegetation overgrowth and neglect.

Feature 1, a possible privy pit, is east of center in the site boundary. It is a 4-foot-diameter circular hole, measuring approximately 12 feet deep. A galvanized steel pipe and an enameled steel milk bucket overlay the feature, suggesting its reuse as a refuse deposit.

Feature 2, a milled wood platform, lies north of center of the site, near the boundary. It measures 4 feet wide by 6 feet long. Construction materials include 2-inch by 8-inch redwood joists and wire nails. These joists are spaced 24 inches apart. It is mostly occluded by coyote brush.

Feature 3, a residential debris scatter, is in the northernmost portion of the site. Its contents include a galvanized steel bucket, steel machine parts, terra cotta pipes, and porcelain toilet fragments.

Feature 4, an earthen pad, lies at the center of the site. It is a rectangular form, likely used for parking a trailer or the former location of a house. It is aligned north/south; measures 25 feet north to south by 12 feet east to west; and cuts 2 feet deep at its deepest point in the hillslope. Within the footprint of the pad, brick, glass fragments, and white improved earthenware were observed. One item, a green glass bottle base from the Owens-Illinois company, bears a maker's mark post-dating 1954.

ALTA2020-107-04

This prehistoric resource is a sparse lithic scatter situated in a sloping dirt roadway above the western bank of the Matanzas Creek Reservoir. Represented materials include obsidian and Franciscan chert. The site consists of two formal artifacts and nine flakes (two chert and seven obsidian).

Artifact 1 is an obsidian biface midsection in the center of the roadway. It measures 39 millimeters (mm) long by 20 mm wide by 13 mm thick. It exhibits relatively recent fractures on both proximal and distal ends, contrasting with weathering and patination on its surface. Its form suggests it may have been a projectile point, but a lack of diagnostic features precludes specific identification. Artifact 2 is a chert core, made of local brown Franciscan chert. The context of the site in a roadway characterized by imported gravels suggests that the site constituents may have been imported to this locale.

Isolated Finds

Eight isolated artifacts and features were discovered (Table 4, Figure 4). Isolated finds were numbered sequentially in the field. Fence segments were the most common isolates.

Table 3. Isolated Finds

Isolate	Description	Easting	Northing	Length (feet)
ISO-1	Barbed wire fence segment	530170	4251194	100
ISO-2	Picket fence segment	530312	4251190	50
ISO-3	Obsidian nodules (n=2)	530296	4250608	NA
ISO-4	Obsidian flakes (n=2)	530550	4250376	NA
ISO-5	Picket fence segment	530622	4250352	15
ISO-6	Barbed wire fence segment	530579	4250482	350
ISO-7	Hog wire fence segment	531054	4250331	200
ISO-8	Rock alignment, earthen pad, and road	530982	4250501	60

Noted Finds

Five finds were identified by archaeologists as modern features. These features are reported to prevent potential future confusion with cultural resources (Table 4, Figure 4).

Table 4. Noted Finds

Noted find	Description	Easting	Northing	Length (feet)
NF-1	Rock-lined path	531113	4250251	70
NF-2	Six-inch-diameter concrete monuments	531137	4250244	NA
NF-3	Rock ring, pet cemetery, multiple graves	531088	4250226	NA

NF-4	Rock ring, pet grave	531098	4250230	NA
NF-5	Rock ring, pet grave	531098	4250230	NA

Management Recommendations

We make the following recommendations to ensure that cultural resources are not adversely affected by the proposed project. The project should be allowed to proceed, given the following recommendations.

Avoidance of Cultural Resources

Cultural resources present in the project area and described in this report, aside from ALTA2020-107-01 and ALTA2020-107-02, which are evaluated in the HIER prepared by AECOM under separate cover, have not been formally evaluated to determine their eligibility for listing in the California Register of Historical Resources or NRHP. For the purposes of this project, these cultural resources will be assumed potentially eligible for state and federal registers and will be avoided. Project proponents will ensure that cultural resources are not adversely affected by ground-disturbing activities. If cultural resources cannot be avoided and ground disturbance will occur within the recorded site limits, then the site(s) will be formally evaluated to determine whether they meet the regulatory criteria for eligibility for the state and federal registries.

Unanticipated Discovery of Cultural Resources

If previously unidentified cultural resources are encountered during project implementation, avoid altering the materials and their stratigraphic context. A qualified professional archaeologist should be contacted to evaluate the situation. Project personnel should not collect cultural resources. Prehistoric resources include, but are not limited to, chert or obsidian flakes, projectile points, mortars, pestles, dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often in old wells or privies.

Encountering Native American Remains

Although unlikely, if human remains are encountered, all work must stop in the immediate vicinity of the discovered remains and the County Coroner and a qualified archaeologist must be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American and prehistoric, the Native American Heritage Commission must be contacted by the Coroner so that a “Most Likely Descendant” can be designated and further recommendations regarding treatment of the remains can be provided.

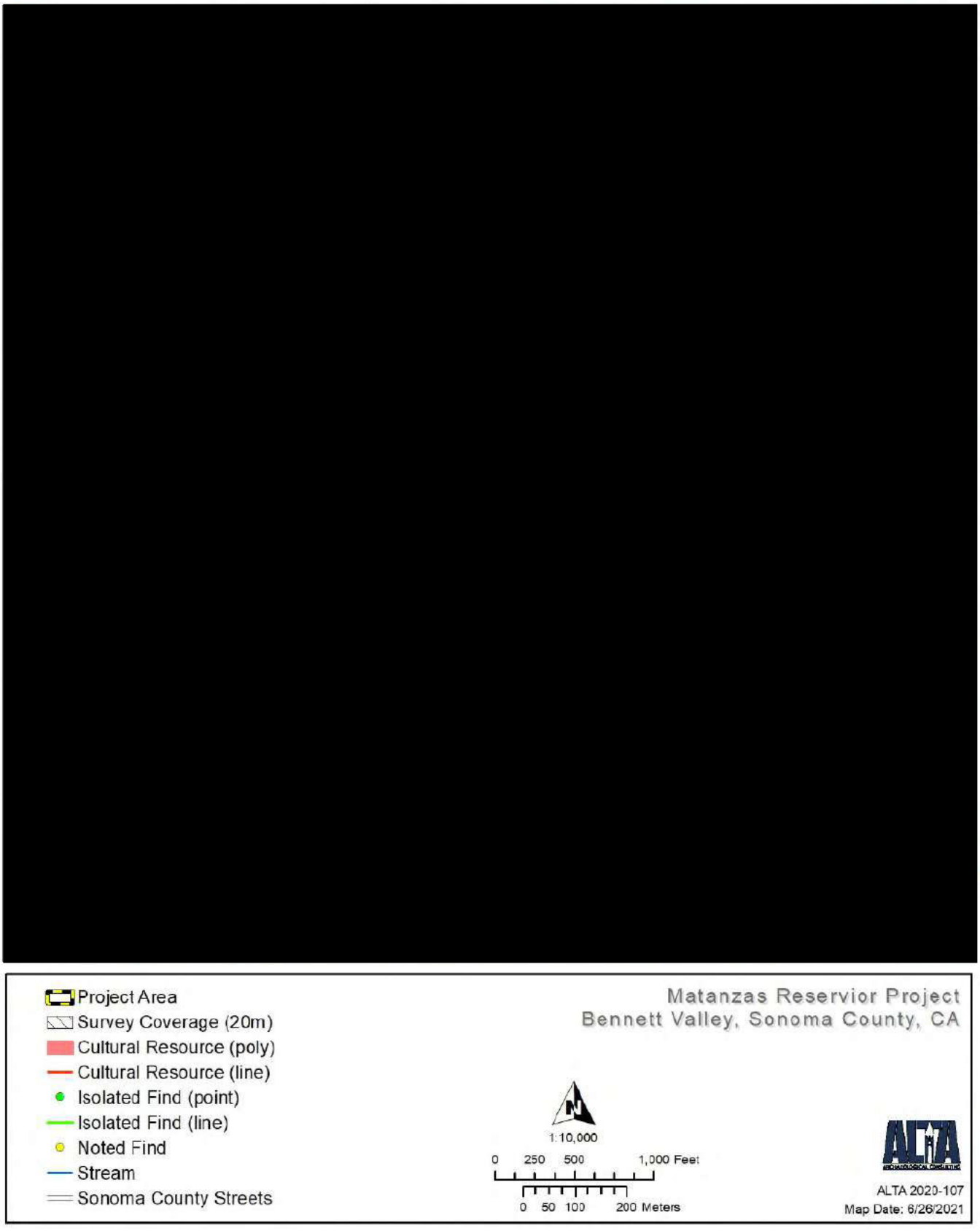

Figure 4. Survey Coverage and Findings

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1979 An Archaeological Investigation of CA-SON-1182, Bennett Valley, Sonoma County, California. Document S-001961 on file at the Northwest Information Center, Sonoma State University, Rohnert Park.

MATANZAS CREEK DAM WATERSHED REHABILITATION PROJECT
HISTORICAL RESOURCES INVENTORY AND EVALUATION REPORT

Prepared for

Natural Resources Conservation Service,
as a subconsultant to Jones & DeMille Engineering,
in coordination with Sonoma Water

March 2022

AECOM

SUMMARY OF FINDINGS

AECOM prepared this Historic Resources Inventory and Evaluation Report to evaluate Sonoma County Water Agency's Matanzas Creek Dam and its associated components, collectively referred to herein as the Matanzas Creek Dam Facility, as well as any other built environment resources identified during the survey of the Study Area in support of the Natural Resources Conservation Service's Watershed Rehabilitation Program, specifically the Supplemental Watershed Plan and Environmental Document for Matanzas Creek Dam in Sonoma County, California. The Matanzas Creek Dam was constructed in 1963 as part of the Central Sonoma Watershed Project (CSWP).

AECOM conducted a field review on February 22 and 25, and April 8, 2021. The study identified the Matanzas Creek Dam Facility and an abandoned construction road, the Talbot farmstead, and a historic-age spring house and platform as historic-era resources in the project Study Area. AECOM documented the Matanzas Creek Dam Facility the abandoned construction road, the spring house and platform, on separate Department of Parks and Recreation 523 forms; the Talbot farmstead was inspected at a distance from the public right-of-way (i.e., from Bennett Valley Road, Grange Road Bridge, and across Matanzas Creek) in the absence of permission to access the property. The Talbot farmstead was previously determined to be ineligible for listing in the National Register of Historic Places (NRHP) but was not evaluated for the California Register of Historical Resources (CRHR). For this project, the Talbot farmstead is assumed to be eligible for the CRHR, but it is also assumed that it will not be significantly impacted by this project. The spring house and platform do not meet eligibility criteria for listing in the NRHP or CRHR.

The evaluation presented in this report concludes that the Matanzas Creek Dam Facility is not individually eligible for listing in the NRHP or CRHR. The abandoned construction road, although associated with the development of the Matanzas Creek Dam Facility, is not a functioning element of the dam facility; it was therefore individually evaluated and is not eligible for listing in the NRHP or CRHR. A full inventory and evaluation of the CSWP facilities is currently underway as part of a separate study being conducted in support of Sonoma Water's Central Sonoma Watershed Plan, a broader National Environmental Policy Act planning study currently being conducted by Sonoma Water in cooperation with the Natural Resources Conservation Service. An evaluation of the entire CSWP is outside of the scope of this current Matanzas Creek Dam Rehabilitation Project study; however, based on research and evaluation conducted for this report, Matanzas Creek Dam may be eligible for listing in the NRHP as a contributing element of a potential CSWP historic district consisting of earthfill dams, four reservoir facilities, and several improved conveyance channels that were designed and constructed between 1958 and 1964. Although the Matanzas Creek Dam Facility is not individually eligible, the integrated flood control system may be significant as a discontiguous historic district because it prevented the constant flooding of the City of Santa Rosa and other areas of Sonoma County, facilitating additional growth and economic development into the latter half of the 20th century and today. The potential period of significance is 1958 to 1964. See **Plate 12** for the location of the contributing elements of this potential historic district (the Spring Creek Bypass Culvert was constructed in 1988, after the period of significance, and is not a contributing element of the potential historic district):

- Brush Creek Reservoir (1961)
- Piner Creek Reservoir (1964)
- Spring Lake (1963)
- Matanzas Creek Reservoir (1963)
- Diversion structure on Santa Rosa Creek (Vortex Tube) (1962)

- Diversion structure on Spring Creek (1962)
- Myriad channel conveyance facilities (including ~33.6 miles of stream channels and bridges/ culverts constructed during the period of significance)

Evaluation of the entire CSWP for eligibility as a historic district, currently underway for the Central Sonoma Watershed Plan, will be reported on separately and will be available to inform an effects analysis for the Matanzas Creek Dam Rehabilitation Project. Although ineligible as an individual facility, for now the Matanzas Creek Dam Facility should be assumed eligible as part of the larger district. The significance of the potential Central Sonoma Watershed historic district lies within its function as a larger flood water control system, which would allow for minor changes on individual dams/facilities without significantly affecting the overall historic status of the larger system. This assumption will be confirmed upon completion of the analysis underway for the CSWP, or if the district is found to be ineligible, the approach for the Matanzas Creek Dam Rehabilitation Project will be revised accordingly.

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List of Acronyms and Abbreviations

APN	Assessor's Parcel Number
BERD	Built Environment Resources Directory
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CRHR	California Register of Historical Resources
CSWP	Central Sonoma Watershed Project
Dam	Matanzas Creek Dam
DPR	Department of Parks and Recreation
NPS	National Park Service
OHP	California Office of Historic Preservation
Lewis	Lewis Publishing Company
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966, as amended
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
Sonoma Water	Sonoma County Water Agency
Sponsor	Sonoma County Water Agency
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey

1 INTRODUCTION

The Matanzas Creek Dam (Dam) was constructed in 1963 as part of the Central Sonoma Watershed project. Under the authority of the Watershed Protection and Flood Prevention Act ("PL-566"), the Natural Resources Conservation Service (NRCS) provided technical and financial assistance to the Sonoma County Flood Control and Water Conservation District and the Santa Rosa Soil Conservation District to plan, design, and construct four floodwater detention structures, diversion structures, and approximately 28 miles of channel improvements, for the purpose of alleviating flooding along Santa Rosa Creek in Sonoma County, California. The project was designed to protect the city of Santa Rosa and other communities along Santa Rosa Creek against floods up to the 1 percent exceedance flow, over a 50-year planned design life. Constructed in 1963, the Dam has exceeded its 50-year project life.

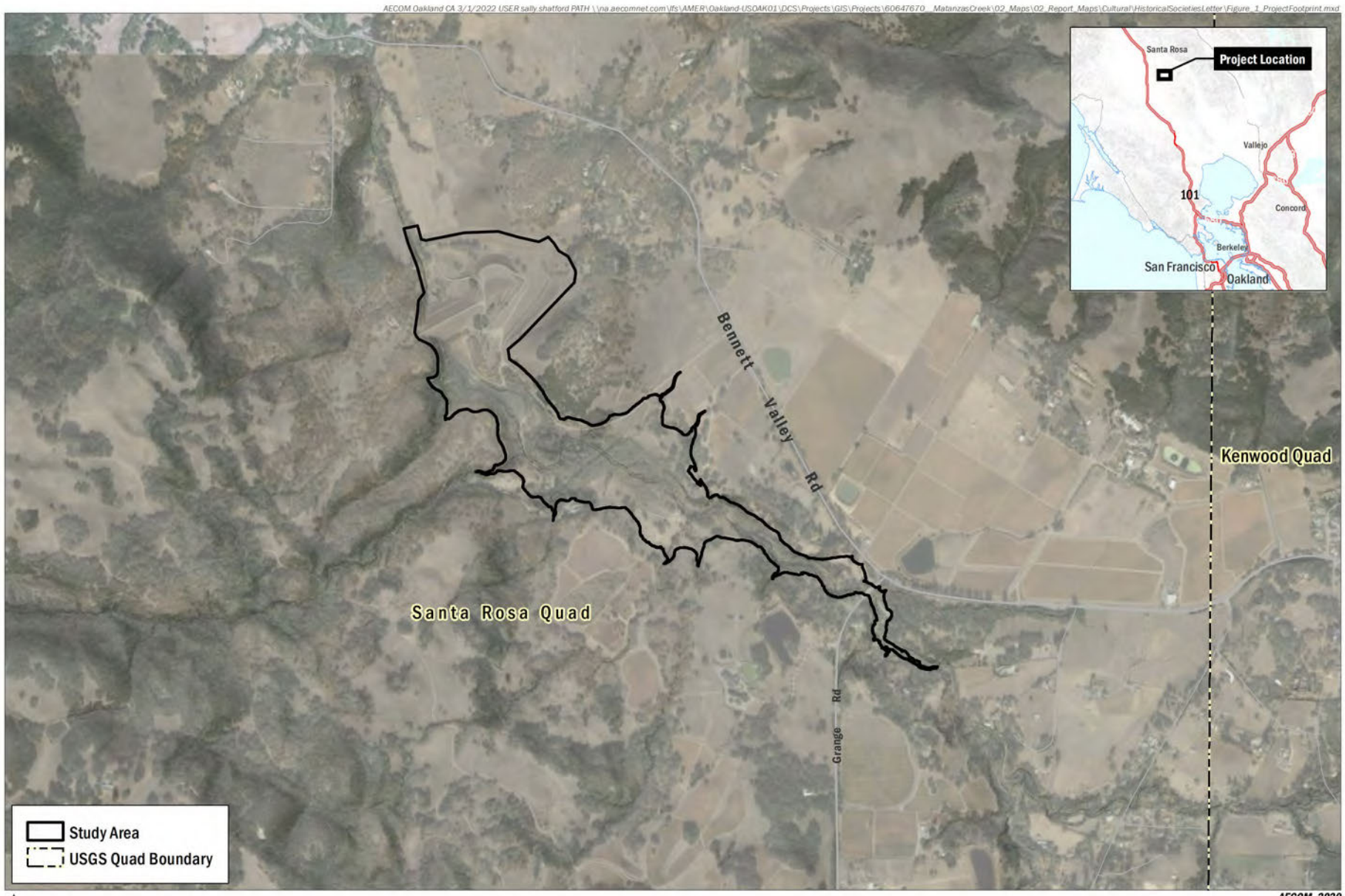
The Dam impounds Matanzas Creek about five river miles upstream from its confluence with Santa Rosa Creek in Santa Rosa. Its sole purpose is flood control, and it is operated as a dry dam. The auxiliary spillway has never flowed (NRCS 2020:2).

The Dam is operated and maintained by the Sonoma County Water Agency, which serves as the local sponsor (Sonoma Water, or Sponsor). The Dam is currently classified as a "High Hazard" dam; hydraulics analyses and dam breach inundation mapping by engineering firm HDR/Kleinfelder and the Sponsor indicate that life and property would likely be impacted by a dam failure.

The Matanzas Creek Dam Watershed Rehabilitation Project ("project") is an early but critical step in a larger effort to ensure continued flood protection by bringing the Dam into compliance with current NRCS and state dam safety criteria and performance standards. To support the objective of ensuring adequate flood protection in a manner that is both cost-effective and environmentally acceptable, the Sponsor seeks to align the project with a broader effort to conduct a more comprehensive, watershed-wide evaluation of the entire Central Sonoma Watershed Project (CSWP).

1.1 STUDY AREA

Because the project is still in the early planning stages, and various alternatives are under development, the exact footprint of the project is unknown; therefore, a Study Area has been delineated of the largest area where project effects may occur. The Study Area encompasses the Dam Facility and the County's flood control parcels (049 130 006, 049 150 009, 149 150 010, 149 060 009, and 049 060 054) and extends upstream from Matanzas Dam to the southeast beyond Grange Road Bridge, approximately 0.2 mile into the Matanzas Creek watershed. The Study Area is shown on Figure 1 and conservatively includes the entire reservoir footprint, although the Area of Potential Effect of any single project alternative would likely be much smaller. Although unlikely, the Study Area extends upstream to include areas with a low potential to be affected by project alternatives that would increase the reservoir water surface elevation. Three historic-age resources that were identified in the Study Area are mapped on Figure 2.



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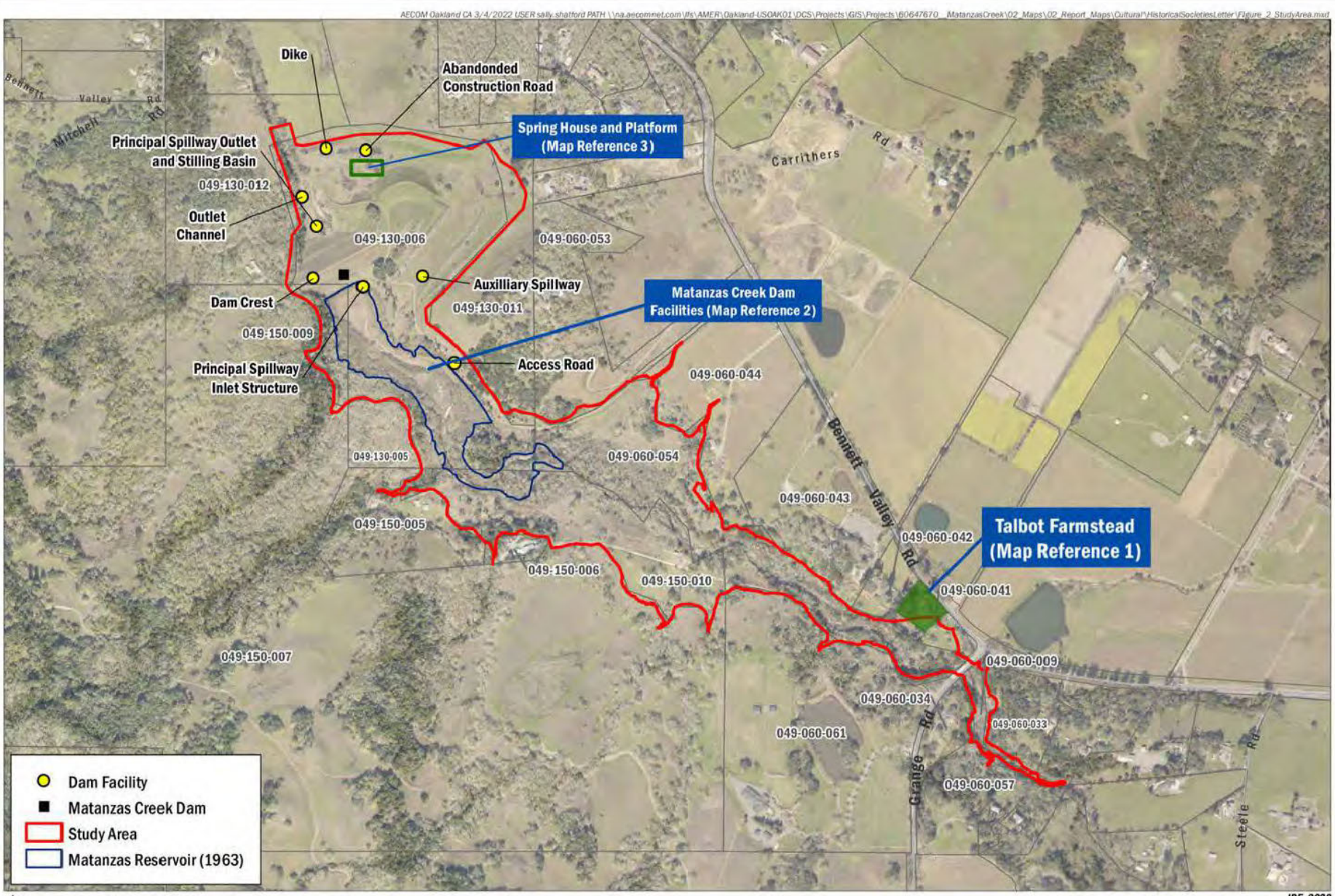
Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 1

Study Area



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Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 2

Study Area with Mapped Resources

2 REGULATORY CONTEXT

The following discussion briefly describes the federal and state environmental laws and regulations that govern the historic preservation review process for this Project.

2.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Under the National Environmental Policy Act (NEPA; Public Law 91-190; 42 United States Code 4371 et seq.), as amended, federal agencies are required to consider the environmental effects of their proposed programs, projects, and actions on historic and cultural resources prior to initiation. Pursuant to NEPA and the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508), the proponents of federal undertakings will ensure that historic properties are fully considered when preparing NEPA documents. NEPA documents will include, or make reference to, an assessment of the impacts of proposed federally permitted actions on historic properties. Compliance with NEPA for a specific action does not relieve the agency of the independent compliance procedures associated with applicable historic or cultural resources requirements, such as consultation under Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) consultation.

Impact assessments under NEPA must consider whether an action may significantly affect the quality of the human environment, including unique characteristics of the geographic area such as proximity to historic or cultural resources. The information needed to make such impact assessments may be acquired from information developed as a result of compliance with cultural resources statutes, regulations, and Executive Orders. The impact evaluation procedures specified in Section 106 of NHPA are currently the most acceptable process for dealing with cultural resources in a NEPA study.

2.2 SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Therefore, prior to the issuance or authorization of any permit under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act, the NRCS must consider the effect that the issuance of the permit might have on historic properties. Historic properties may include prehistoric or historic districts, sites, buildings, structures, objects, sacred sites, and traditional cultural places that are included in or eligible for inclusion in the National Register of Historic Places (NRHP).

To be eligible for the NRHP, properties must be 50 years old (unless they have special significance) and have national, state, or local significance in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of four criteria for evaluation listed in 36 CFR § 60.4, which require that a resource:

- **Criterion A:** be associated with events that have made a significant contribution to the broad patterns of our history;
- **Criterion B:** be associated with the lives of persons significant in our past;

- **Criterion C:** embody characteristics of type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or

- **Criterion D:** have yielded, or be likely to yield, information important in prehistory or history.

2.3 STATE LAWS AND REGULATIONS

Regulatory compliance in relation to cultural resources is governed by the California Environmental Quality Act (CEQA). CEQA guidelines define a significant cultural resource as a resource listed in or eligible for listing on the California Register of Historical Resources (CRHR) (Public Resources Code section 5024.1). Measures must be considered to reduce or control impacts to identified historic properties affected by a Proposed Project. Sonoma Water is the California Lead Agency under CEQA.

The lead agency can determine that a resource is potentially eligible for listing in the CRHR for the purposes of determining whether a significant impact will occur. Even if the resource is not listed in or has not been determined eligible for listing in the CRHR and is not included in a local register of historical resources, an agency is not precluded from determining whether a resource may be a historical resource for the purposes of CEQA. A historical resource may be eligible for inclusion in the CRHR if it:

- **Criterion 1:** is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

- **Criterion 2:** is associated with the lives of persons important in our past;

- **Criterion 3:** embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values; or

- **Criterion 4:** has yielded, or may be likely to yield, information important to prehistory or history.

3 BACKGROUND RESEARCH

3.1 NORTHWEST INFORMATION CENTER

Once the Study Area was established (Figure 1), AECOM cultural resources staff examined standard sources of information that list and identify known and potential resources to determine whether any buildings, structures, objects, districts, or sites besides the Dam Facility had been previously recorded or evaluated in or near the Study Area. AECOM reviewed the NRHP, CRHR, California Historical Landmarks, and California Points of Historical Interest databases (NPS 2021). AECOM also consulted California's Office of Historic Preservation Built Environment Resources Directory (BERD) (OHP 2020).

On January 29, 2021, a records search of the Study Area was conducted at the Northwest Information Center at Sonoma State University (File No. 20-1242). Three built environment resources were in or near the Study Area (see Appendix A, Previous Recordation):

- Talbot farmstead (5732 Bennett Valley Road)
- Bennett Valley Road (OHP 2020)
- Matanzas Creek Bridge over Grange Road (Bridge # 20C0533) (Caltrans 2021)

Portions of the Talbot farmstead are in the Study Area, north of Matanzas Creek, 0.10 mile northwest of Grange Road. The farmstead was recorded by the Anthropological Studies Center in 1996 (Eastman 1996) and was determined to be ineligible for the NRHP by consensus through the Section 106 process the following year (OHP 2020). The resource was not evaluated for its eligibility for the CRHR or local listing.

Bennett Valley Road is listed in the BERD as individually eligible for local listing or designation but is outside of the Study Area 60 feet to the north.

Matanzas Creek Bridge over Grange Road is also listed in the BERD and was determined to be ineligible for the NRHP by consensus through the Section 106 process in 1997. This bridge was removed and replaced by a new bridge in 2005 (Caltrans 2021).

Research regarding historical context development was conducted via online resources because the majority of local history rooms and libraries were closed or open with modified services due to the COVID-19 pandemic. Research was conducted at the Sonoma County History and Genealogy Library and the North Bay Digital Collections at Sonoma State University. Historic newspapers were accessed through newspapers.com and the California Digital Newspaper Collection. Historic aerials research was also facilitated by documents provided by Sonoma Water, which also included particularly useful as-built drawings of the dam facility.

The following historic maps were also reviewed:

Bowers, A.B.
1866 *Map of Sonoma County, California*. David Rumsey Historical Map Collection. 1:63,360 scale.

Bureau of Land Management (BLM)
1865 Survey plat for T6N/R7W and T7N/R7W. General Land Office Records, Bureau of Land Management, Washington, D.C. 1:31,680 scale.

Reynolds and Proctor
1898 T6N R7W. *Illustrated Atlas of Sonoma County*. 1:3,600 scale.

Ricksecker, Lucius Edgar
1900 *Official Map of Sonoma County, California.* Library of Congress, Washington, D.C.

Thompson, Thomas H.
1877 *New Historical Atlas of Sonoma County*. Thos. H. Thompson and Company, Oakland. 1:31,680 scale.

United States Geological Survey (USGS)
1916 *Santa Rosa, California*. Topographic Map, 1:62,500 scale.
1944 *Santa Rosa, California.* Topographic Map, 1:62,500 scale.
1955 *Santa Rosa, California.* Topographic Map, 1:24,000 scale.
1980 *Santa Rosa, California.* Topographic Map, 1:24,000 scale.

In addition, on April 29, 2021, AECOM sent letters to potential interested parties, including the Sonoma Valley Historical Society, The Historical Society of Santa Rosa, and the Sonoma County Historical Society. No responses were received. See Appendix B for Historical Societies Outreach.

4 SETTING

4.1 HISTORICAL CONTEXT

4.1.1 EARLY SETTLEMENT IN BENNETT VALLEY

Southeast of the present-day boundaries of the City of Santa Rosa, Bennett Valley was settled in the 1850s by farmers and ranchers, most of whom came to California to mine gold. By 1877, Isaac DeTurk was one of the larger landowners in the valley, with 360 acres of land on the northeastern bank of Matanzas Creek, spanning both sides of Bennett Valley Road (**Plate 1**). DeTurk operated a large vineyard, the DeTurk Winery, and was an officer of the State Board of Viticultural Commissioners. In the mid-1880s, grapes, apples, hay, wheat, and other grains were being cultivated in Bennett Valley. Vineyards dominated the landscape of this 15,000-acre community until the 1890s, when the grapes were destroyed by phylloxera. At that time, raising cattle for meat and dairy products became the focus of the region's farming activities (City of Santa Rosa Public Works Department 2006; Painter 2003).

DeTurk sold his Bennett Valley property in 1885 to G.W. and E.W. Davis, who continued to operate the winery as the Yulupa Ranch and Vineyard (Lewis 1889). Other neighboring landowners in and near the Study Area were also grape growers. D.M. Hedrick and Patrick Leddy were two of the larger landowners who contributed to the estimated 500 tons of grapes grown in 1889 in Bennett Valley (**Plate 2**). Coleman Talbot, a native of Kentucky, settled on 600 acres in Bennett Valley in 1853, where he engaged in stock raising and grain farming in and near the Study Area (Tuomey 1926). Talbot and his wife Drucilla raised their family of nine children on their Bennett Valley property, which was subdivided and sold off over the years to several of the Talbot children (Kennedy, Holman, and Joseph) and grandchildren (Allena [Holman's eldest child] and her husband, George F. Clark) (**Plate 3**) (Bowers 1866; Lewis 1889; Tuomey 1926).

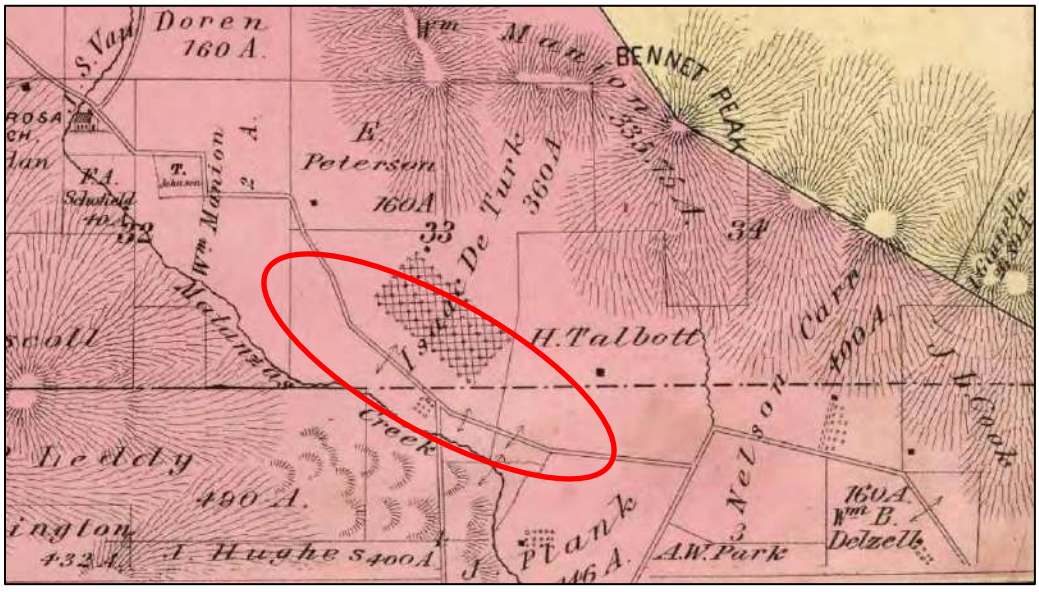

Plate 1 1877 Map Depicting Property Owners in Bennett Valley; Red Oval Showing General Study Area

Source: Thompson 1877

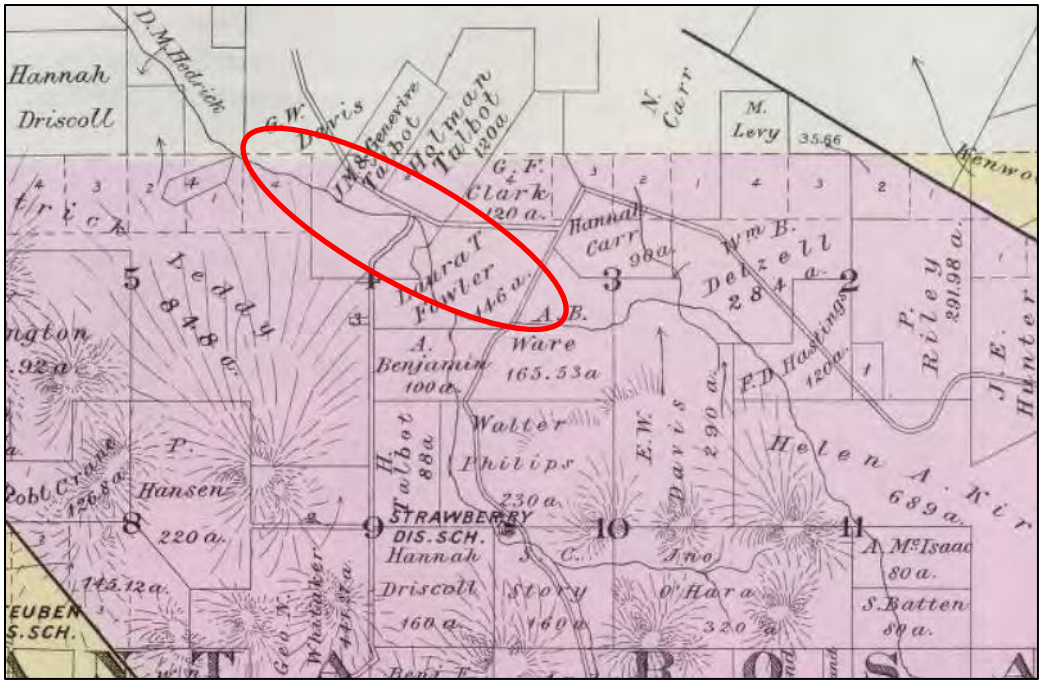

Plate 2 1898 Map Depicting Property Owners in Bennett Valley; Red Oval Showing General Study Area

Source: Reynolds and Proctor 1898

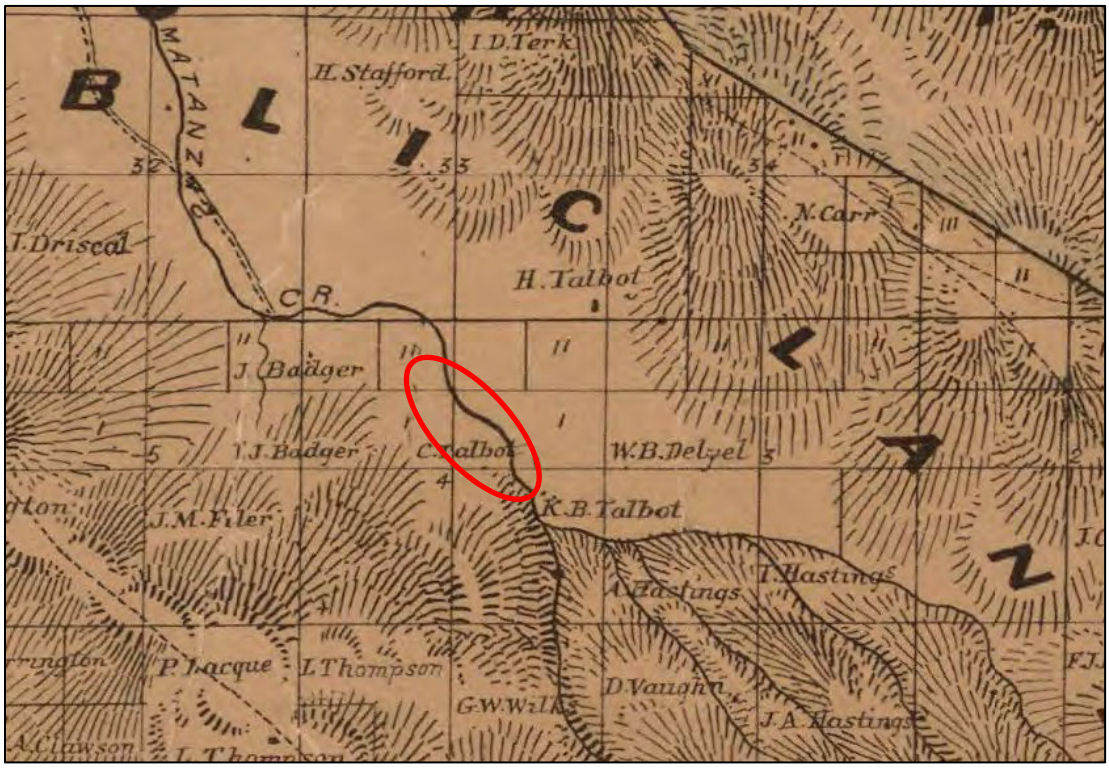

Plate 3 1866 Map Depicting Property Owners in Bennett Valley; Red Oval Showing General Study Area

Source: Bowers 1866

Holman Talbot worked alongside his father Coleman for many decades, eventually purchasing his own land off Grange Road, outside the Study Area in the Strawberry School District, with his wife Frances (see **Plate 2**) (Lewis 1889).

Holman's youngest sibling, Joseph "Joe" Martin Talbot, was raised on his parents' Bennett Valley property, and helped with the family farm until his father's death in 1896 (Tuomey 1926). Eight years later, Joe purchased more than 20 acres of land in Santa Rosa, but still maintained his parents' property in Bennett Valley.

Joe Talbot was a long-time member of the Bennett Valley Grange, which was established in 1873, as well as the California Grape Exchange. He was known as the "Sage of Bennett Valley" and was a weekly contributor to the county newspaper, providing updates on the "goings-on" in his community (Eastman 1996; *Healdsburg Tribune* 1935). Talbot was a widower who remarried in 1885 to Genevieve Ayer, a native of Marysville (Tuomey 1926). They raised their six children on the Talbot property in the Study Area until 1909, when they moved onto their property in Santa Rosa. The "farmhouse and several outbuildings constructed on the [Bennett Valley] property, which spanned Bennett Valley Road, in the 1880s and early [1890s]" were inherited by Joe's youngest son Leonard, "who continued to cultivate vineyards and operate the small dairy, in addition to working as a broker in Santa Rosa" (Eastman 1996; *Sonoma Democrat* 1881). Joseph Talbot's family moved from Sonoma County to Sutter County in February 1917, selling all their property in the county to purchase more than 500 acres near Live Oak (*Press Democrat* 1917).

4.1.2 HISTORY OF IRRIGATION IN SONOMA COUNTY AND BENNET VALLEY

Irrigation in Sonoma County and in the Sonoma and Petaluma valleys was developed after 1900 and limited to gravity-flood irrigation using surface water from creeks. By 1910, there were only 631 acres under irrigation on 38 farms throughout Sonoma County, and 157 of those acres were irrigated by wells. Three years later, only 60 of the 90,000 acres of agricultural land in the Sonoma and Petaluma valleys were reported under irrigation. By 1939, 4,195 acres were under irrigation by surface water and groundwater in Sonoma County (Cardwell 1958: 19; Sonoma County Department of Agriculture 2022). In the 1940s, a major development of irrigation wells occurred in the region. Prior to 1940, the United States Geological Survey identified only one irrigation well in operation in the Bennet Valley. (The one pre-1940 well may have been the well on the Mitchell property, but historical research did not identify any documentation confirming this.)

Between 1941 and 1950, there were 14 new wells in use, which included the 403-foot-deep artesian well sunk on the Mitchell property in 1948 (Cardwell 1958:20, 236). By 1949, there were 9,285 acres were under irrigation in the county and most of the increased acreage was in the Santa Rosa and Petaluma valleys. By 1951, wells in the Santa Rosa and Petaluma valleys irrigated 5,200 acres, which were largely dedicated to permanent pasture and hay at 3,800 acres. Permanent pasture and hay also have the highest water requirements because the fields are irrigated for 5 or 6 months between the last spring rains and early autumn rainfall (Cardwell 1958:20). Review of yearly county agricultural reports indicated the number of acres of irrigated pasture increased from 3,000 in 1948, the first year this crop was recorded as its own commodity; to 15,000 acres by 1958, which corresponded with the increase of the wells sunk in the region for irrigation. Over the decades, irrigated pasture has decreased, and as of 2020 only 6,871 acres of pastureland were under irrigation compared to 328,000 acres of field crops in the county, accounting for only 2.09 percent of the total agricultural acreage in the county (Sonoma County Department of Agriculture 2022).

Mitchell Property in Bennett Valley

The Mitchell family moved to Bennett Valley from Petaluma circa 1926. John Mitchell, as head of household, was conducting general farming (*Santa Rosa Republican* 1939; United States Department of Commerce 1930). After John Mitchell's death in 1939 at the age of 80, John's wife, Edith, was listed as head of the household; but her sons, Samuel and John, were the only members of the household listed as farmers on the Bennett Valley Road property (*Santa Rosa Republican* 1939; United States Department of Commerce 1940). In 1948, the Mitchells were operating a dairy farm with 60 cows on irrigated pastureland (*Press Democrat* 1951). At the time of Edith Mitchell's death in 1962, she was living at 4968 Bennett Valley Road with Samuel and John, and her estate consisted of 245 acres of property in Sonoma County (*Press Democrat* 1964). John Mitchell, Jr., continued to operate the farm property on Bennett Valley Road until his death in 1983 (*Press Democrat* 1983).

A 403-foot deep well was sunk on Mrs. Edith Mitchell's property in Township 7 North, Range 7 West, Section 32 in 1948. In 1950, the Precision Drilling Company drilled the well to a depth of 325 feet on an alluvial plain, with a recorded flow of 150 gallons per minute and a temperature between 72 and 74 degrees Fahrenheit, which was 6 to 8 degrees warmer that wells of similar depth elsewhere in the Sonoma Valley (Cardwell 1958: 96, 236). Based on the well location data provided in *Geology and Ground Water in the Santa Rosa and Petaluma Valley Areas Sonoma County California* (Cardwell 1958: 7, 236), this well is northwest of a spring house and platform.

The spring house and platform (additional detail provided in Section 8.1) may have been part of a previous well on the Mitchell property that was sunk before the 403-foot-deep artesian well was dug in 1948. This earlier well may have continued to be used as a supplemental water source after the 1948 well was excavated, but the Mitchells likely abandoned it in the 1960s when it became obsolete with the construction of the Matanzas Creek Dam dike to the north and the sale of the southern end of the irrigated pasture to the CSWP for the construction of the dam facilities (**Plate 4**).

4.1.3 DEVELOPMENT OF CENTRAL SONOMA WATERSHED FLOOD PROTECTION

Matanzas Creek, in addition to several other creeks, flows into Santa Rosa Creek (**Plate 5**). Santa Rosa Creek then flows west through the City. The first wave of settlers built beyond the Santa Rosa Creek floodplain, outside of what is now the City of Santa Rosa, but further growth resulted in buildings along the borders of Santa Rosa Creek. It became a steep-sided creek channel, missing much vegetation and prone to erosion. The first recorded flood occurred in 1861, and floods became annual events into the twentieth century (*Press Democrat* 1904, 1909). A series of winter floods between 1935 and 1945 caused more than $6 million dollars in damage. As early as 1937, the Sonoma County Board of Supervisors requested a study by the United States Army Corps of Engineers (USACE) of the Russian River Basin to develop a comprehensive flood control plan for northern Sonoma County. The study was delayed by World War II (Sonoma Water 1999).

After World War II, a USACE study published in 1949 identified areas of repeat flooding events and declining groundwater quality as significant threats to continued economic growth of the region. The Sonoma County Flood Control and Water Conservation District (now Sonoma Water) was created by state law in 1949 to implement USACE's recommendation for flood control and water conservation reservoirs on the Russian River and tributaries north of Ukiah in northern Sonoma County and southern Mendocino County (Sonoma Water 1999).

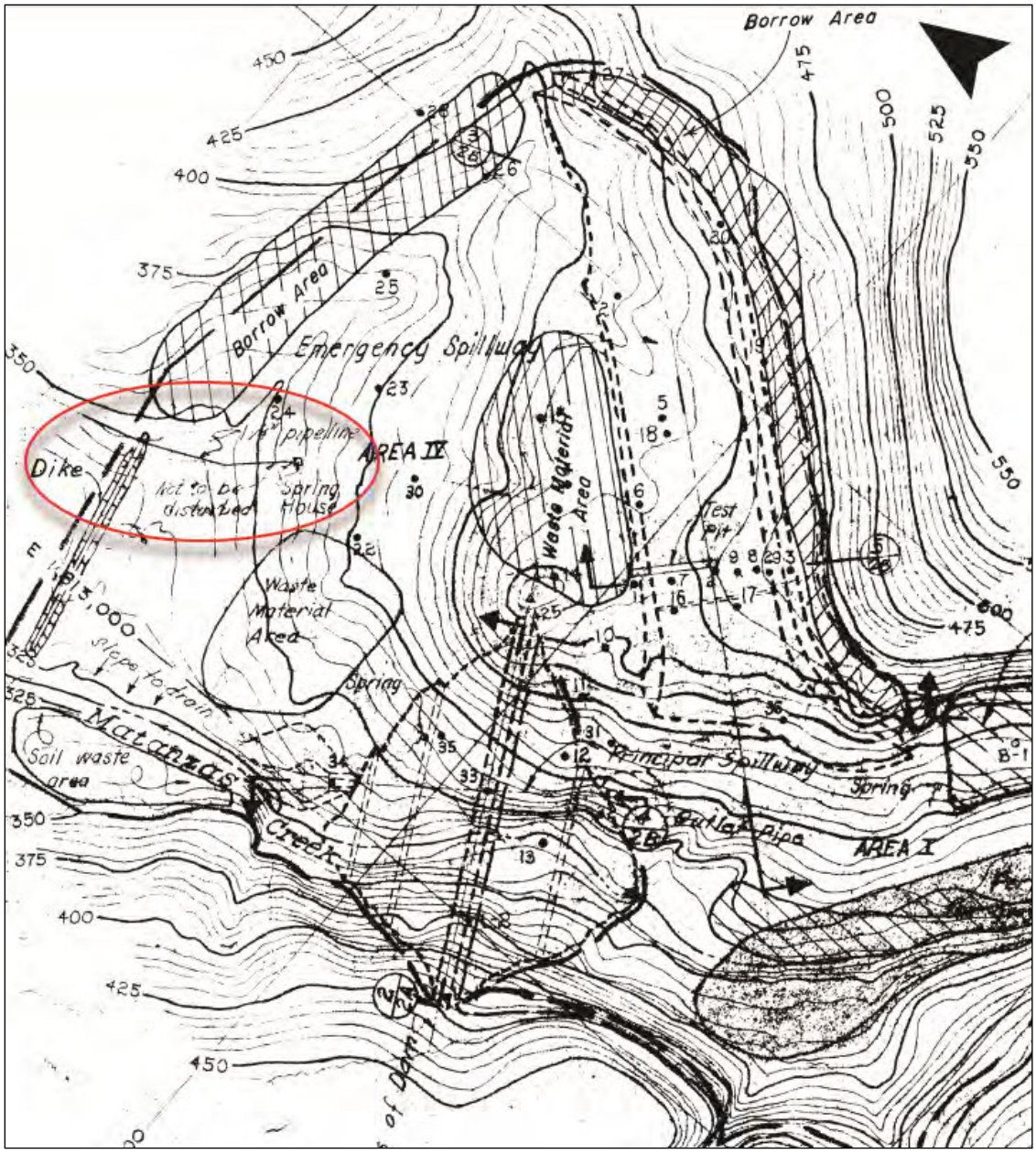

Plate 4 Spring House and Pipeline Illustrated as "Not to Be Disturbed" on As-Built Drawings for Matanzas Creek Dam

Source: Sonoma County Flood Control District and Water Conservation District 1962: Drawing D57-2.

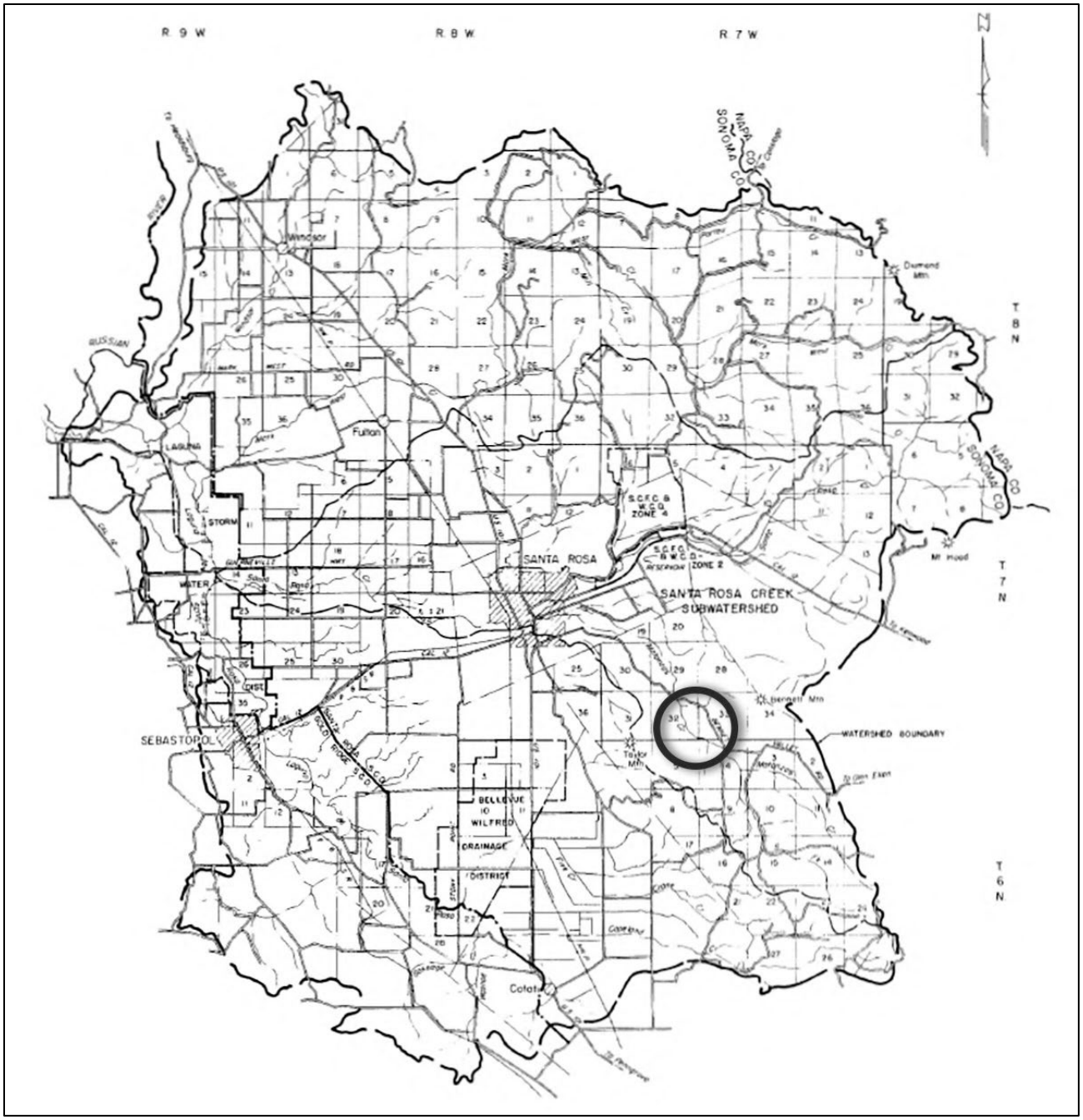

Plate 5 1958 Map of the 50,000-Acre Santa Rosa Creek Subwatershed Area for the Central Sonoma Watershed Project; Future Location of Matanzas Creek Dam Circled in Black, Added by AECOM

Sources: City of Santa Rosa Public Works Department 2006; Santa Rosa Soil Conservation District et al. 1958

This flood control system was completed in 1959; however, large areas of Sonoma County around Santa Rosa continued to be inundated with flood waters (Sonoma Water 1999). After a severe flood in 1955, local agencies requested assistance from the federal government through the United States Department of Agriculture (USDA) Soil Conservation Service (now NRCS). This resulted in preparation of the Central Sonoma Watershed Work Plan. By 1958, when the Watershed Work Plan was prepared, flooding in the Santa Rosa Creek watershed occurred annually and occasionally up to three times in a single winter (City of Santa Rosa Public Works Department 2006; Santa Rosa Soil Conservation District et al. 1958).

The 1958 Watershed Work Plan for the Central Sonoma Watershed was prepared with cooperation between the Santa Rosa Soil Conservation District and the Sonoma County Flood Control and Water Conservation District, with assistance from the USDA Soil Conservation Service (now NRCS). As designed, the system of dams and channel improvements would virtually eliminate flooding in the 50,000-acre Santa Rosa Creek subwatershed and provide protection against a 100-year flood event (see **Plate 5**). The proposal included six earthen dams in the Santa Rosa Creek watershed, and more than 30 miles of channel improvements (**Plate 6**). The project was submitted to Congress with a request for $13 million, which was the largest project presented under the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Statute 666), as amended by the Act of August 7, 1956 (Public Law 1018, 84th Congress, 70 Statute 1088), also called the Small Watershed Act (*Press Democrat* 1958a; *Cloverdale Reveille* 1958).

Although 87 percent of the watershed area was pasture/rangelands, crops, orchards/vineyards, or woodland and brush, after World War II the local economy was shifting away from agriculture. Both the City of Santa Rosa and Sonoma County experienced higher rates of population growth than other parts of the state between 1940 and 1957; Santa Rosa's population grew 130 percent and Sonoma County's grew 103 percent. The relatively close proximity to San Francisco and the mild climate attracted people, including retirees to the area; that and industrial development resulted in the corresponding growth of the service, retail, and business industries. A subsequent building boom occurred in Santa Rosa, with more than 2,400 building permits issued between 1952 and 1956 alone. As a result of this urban and suburban expansion, agriculture production was anticipated to diminish through encroachment by residential, commercial, and industrial developments. In relation to the watershed project, city and county planning agencies predicted the intensification of land use patterns with the increasing population and shift of the economy. Therefore, proponents of the Santa Rosa Creek phase of the CSWP strongly believed in joint action to create a flood protection system as soon as possible before further encroachment and development into the floodplain occurred during this period of rapid expansion (City of Santa Rosa Public Works Department 2006; Santa Rosa Soil Conservation District et al. 1958).

Only four of the six floodwater protection facilities were constructed; the West Fork Brush Creek Reservoir and the Spring Creek Reservoir were not constructed. What was constructed was "of a conventional design" made with local fill material (Santa Rosa Soil Conservation District et al. 1958). Construction was proposed to span 5 to 6 years, with the majority of the project funded with federal monies. After completion, the Sonoma County Flood Control and Water Conservation District would be responsible for ongoing maintenance of the system. When the federal funds were awarded in the summer of 1958, Gordon W. Miller, chief engineer of the Sonoma County Flood Control and Water Conservation District, sought additional engineers to work on the project, either by hiring directly through the district or hiring a private engineering firm to produce the plans under his direction (*Press Democrat* 1958b).

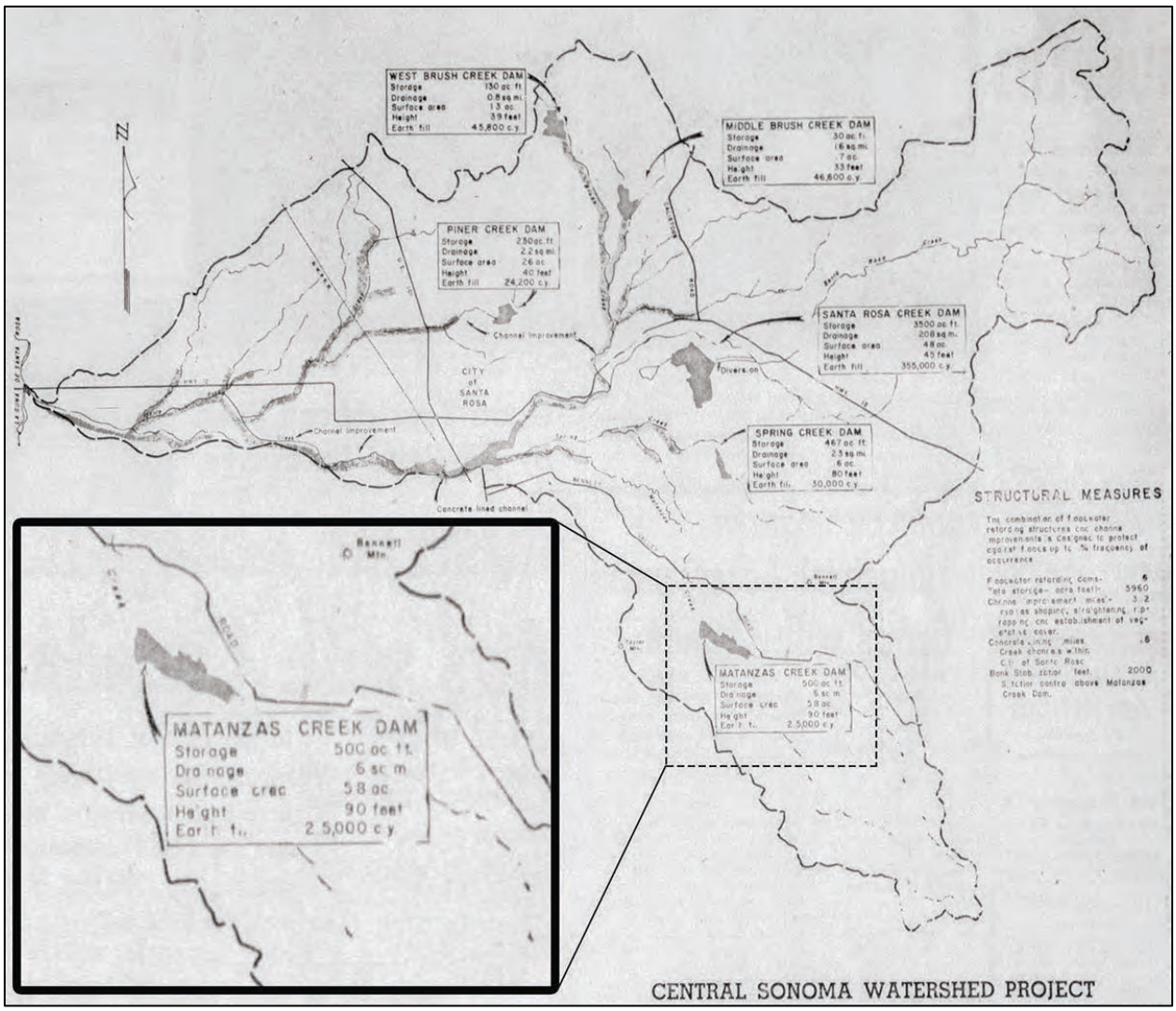

Plate 6 Proposed Central Sonoma Watershed Project with Six Flood Detention Structures, Matanzas Creek Dam at Bottom within Dashed Line

Source: Press Democrat 1959

4.1.4 MATANZAS CREEK DAM

In the late 1950s, the Matanzas Creek channel in Bennett Valley was large and increasing in size with bank erosion, which was a major problem in the area. Nearly a third of an acre was lost each year to creek bed erosion. Toward the City of Santa Rosa, the channel was partially planted with vegetative protection to slow the erosion, but erosion still occurred. During flood events at the confluence of Santa Rosa Creek and Matanzas Creek near the central core of the City of Santa Rosa, Santa Rosa Creek would overtop and Matanzas Creek would overflow, causing more flood damage in downtown Santa Rosa (City of Santa Rosa Public Works Department 2006; Santa Rosa Soil Conservation District et al. 1958).

Woodward, Clyde, Sherard & Associates, the soil engineering and geology consulting firm that conducted the initial soil and geotechnical studies and designed the Dam, was established in Oakland

in 1950 (Rogers and Kropp 2021). By 1960, the firm had established offices in Oakland, Denver, Omaha, Kansas City, Philadelphia, Montclair, New Jersey, St. Louis, San Diego, and New York City. In 1962 and 1963, four of the firm's senior partners co-authored the book *Earth & Earth-Rock Dams,* which helped establish the firm's technical expertise in embankment dams. In 1978, the firm took the name Woodward Clyde Consultants, which it kept until its acquisition by URS-Greiner in 1997. By that time, they had 162 offices with 7,000 employees in 17 countries. In October 2014, URS was acquired by AECOM (Rogers and Kropp 2021).

Plumas Development Company, an Oroville-based construction company, was awarded the contract for excavation and construction of the Dam. During excavation activities, a "freakish pocket of quicksand-like material" was discovered while excavating the streambed for the construction of the dam embankment. Although Woodward, Clyde, Sherard & Associates had conducted core drillings of the proposed site for the dam as part of the pre-design studies, all of the cores missed the 60-foot-deep slanted shaft of material at the bottom of the stream bed (*Press Democrat* 1963).

Engineers from the various entities involved in the project designed a solution to place a gravel blanket on top of the quicksand-like material and allow the water to drain downstream at a controlled rate through relief wells and standpipes (see **Plate 7** and **Plate 8**). A similar situation and solution were used at the Coyote Dam for the Russian River flood control project in northern Sonoma and southern Mendocino Counties. Gordon W. Miller, chief of engineering for the project, described the modification as a "supercaution" and was confident of the solution (*Press Democrat* 1963).

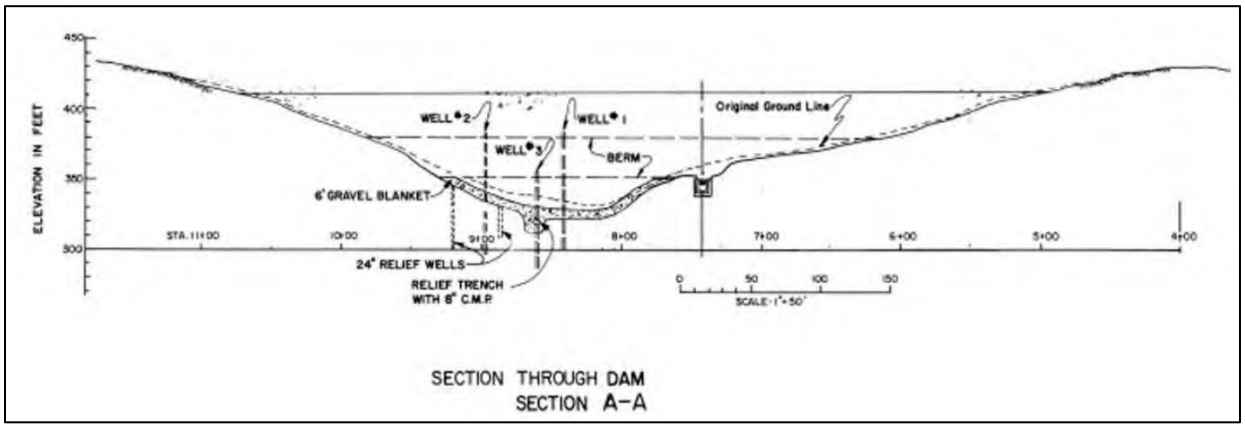

Plate 7 Cross Section of Gravel Blanket Solution for Quicksand-Like Material Encountered during Construction

Source: Sonoma County Flood Control District and Water Conservation District 1962

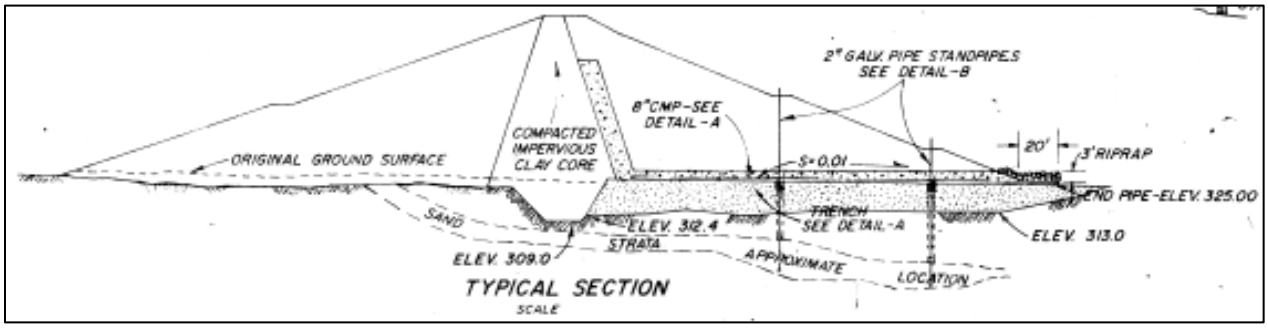

Plate 8 As-Built Cross-Section of Earth-Fill Matanzas Creek Dam

Source: Sonoma County Flood Control District and Water Conservation District 1962

While excavation of the dam was on hold in early August 1963, the Plumas Development Company constructed the spillway and the 26- by-26-foot concrete spillway intake structure (**Plate 9**). The intake structure was designed to be submerged during normal dam operations and completely underwater during flood season. The spillway conveys flood waters from behind Matanzas dam at a controlled rate until the reservoir fills and activates the emergency spillway (*Press Democrat* 1963).

Once completed, the Dam Facility consisted of an earthen dike, an outlet channel, the earth-filled dam, the reservoir, the primary spillway with intake structure, the emergency spillway (auxiliary), and an access road.

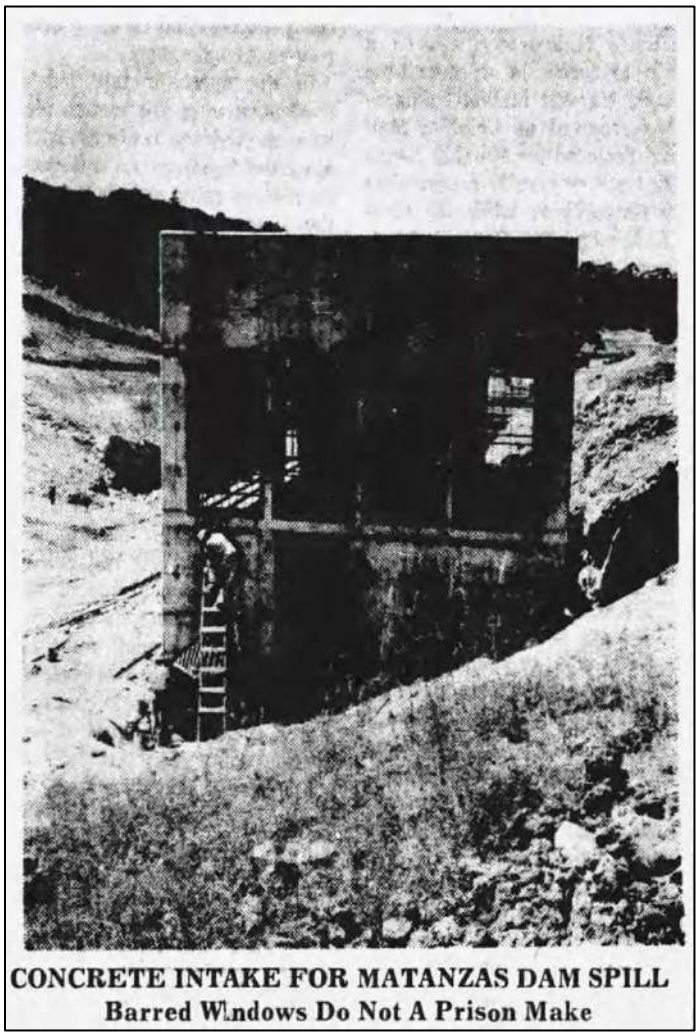
CONCRETE INTAKE FOR MATANZAS DAM SPILL
Barred Windows Do Not A Prison Make

Plate 9 Concrete Intake under Construction in August 1963
Source: *Press Democrat* 1963

5 FIELD INSPECTION

AECOM Senior Archaeologist Karin G. Beck, MA, RPA, who meets the Secretary of the Interior's Professional Qualifications for work in Archaeology, History, and Architectural History (see Appendix D), conducted fieldwork for the project on February 22, February 25, and April 8, 2021. Ms. Beck conducted the field investigation with Alta Archaeological Consulting's Archaeologist Alex DeGeorgey, MA, RPA who meets the Secretary of the Interior's Professional Qualifications for work in Archaeology.

Mr. DeGeorgey initially recorded a spring house and platform as an archaeological resource on a Primary and Archaeological Record Department of Parks and Recreation (DPR) 523 series form for the Archaeological Survey Report for the Matanzas Creek Dam Rehabilitation Project, Bennett Valley, Sonoma County, California (Alta Archaeological Consulting). However, because the spring house and platform is an intact building/structure, AECOM prepared a Continuation Sheet DPR 523 series form to provide historical context and evaluation of the spring house and platform as a single historic-age resource. The spring house and platform (ALTA2020-107-02) DPR 523 forms are included in Appendix B.

AECOM recorded and evaluated the Matanzas Creek Dam Facility on DPR 523 forms, which are included in Appendix B. Like the spring house and platform, Mr. DeGeorgey initially recorded an old roadbed (ALTA2020-107-01) as an archaeological resource on a Primary and Archaeological Record DPR 523 series form for the Archaeological Survey Report for the Matanzas Creek Dam Rehabilitation Project, Bennett Valley, Sonoma County, California (Alta Archaeological Consulting). Upon further evaluation, that roadbed was determined to be associated with the construction of the Matanzas Creek Dam facility. Therefore, the roadbed initially identified in Alta's report is included in this report as the "abandoned construction road" in **Plate 10** and appended to the DPR 523 series forms for the Matanzas Creek Dam Facility (Appendix B).

The Talbot farmstead was inspected from a distance (i.e., from Bennett Valley Road, Grange Road Bridge, and across Matanzas Creek) in the absence of permission to access the property. The previous recordation of this resource is included in Appendix A. No other historic-age (45 years and older) built environment resources were identified in the Study Area.

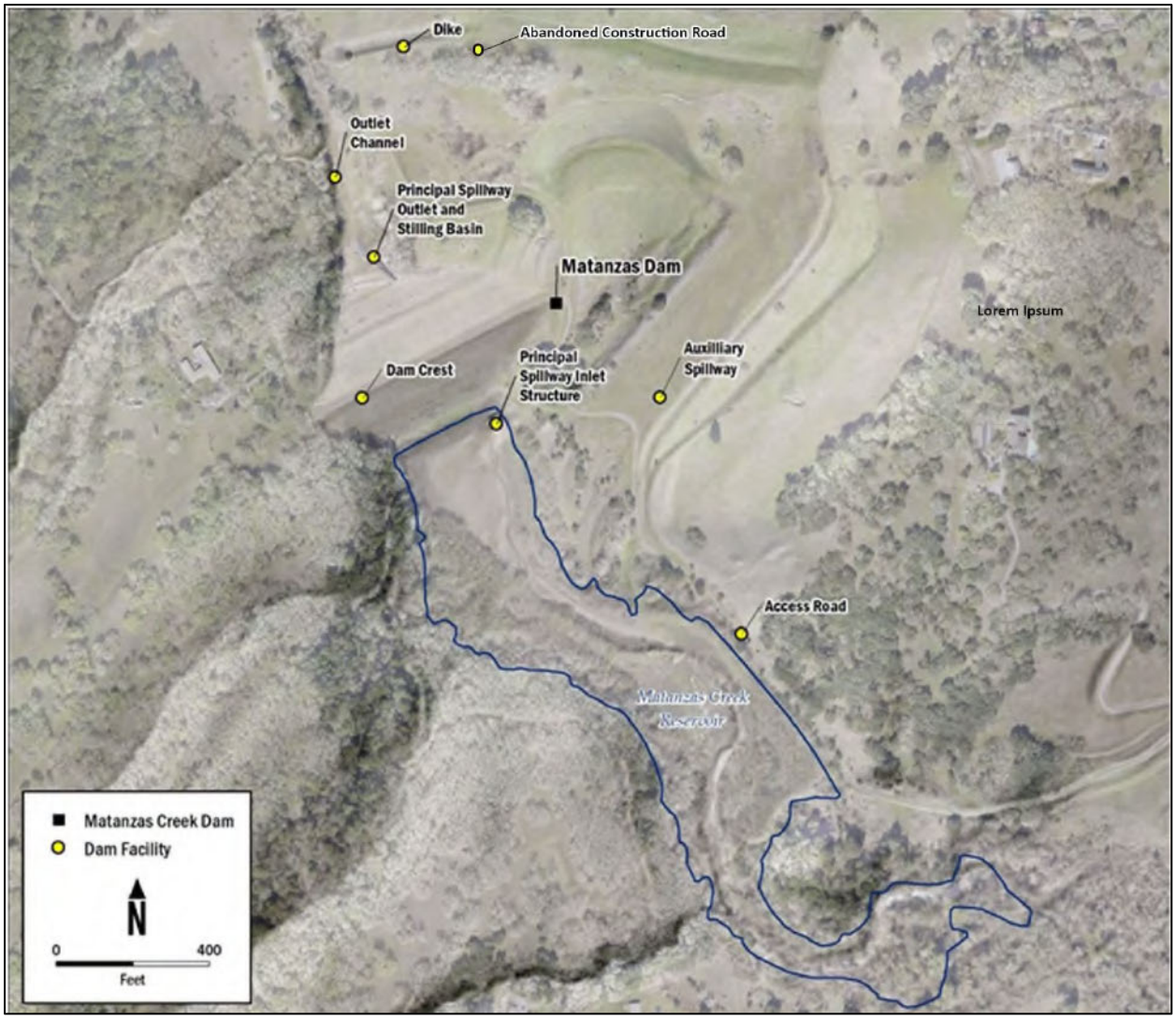

Plate 10 Matanzas Creek Dam Facility

Note: Reservoir boundary is defined by the July 1965 water impoundment (UCSB 1965)

6 RESOURCES IDENTIFIED IN THE STUDY AREA

The Study Area encompasses the presumed limits of work (pending development and selection of a preferred alternative) in Bennett Valley and includes five parcels, from roughly 0.25 mile upstream of Grange Road to approximately 1.25 mile downstream of Grange Road, in the Matanzas Creek watershed (see **Table 1**). This area is rural, with residential farmland and vineyards adjacent to the Study Area; this has been the characterization of this community historically.

Table 1 Identified Resources in Study Area

Identifier (Map Reference #)	Address	APN(s)	Resource Type	Year Built
Talbot Farmstead (1)	5732 Bennett Valley Road	049-060-041	Residential/ Farm	circa 1880 – 1890s
Matanzas Creek Dam Facility (2)	Bennett Valley Road	049-060-053 049-060-054 049-130-006 049-150-009 049-150-010	Flood Control	1963
Spring House and Platform (3)	N/A	049-130-006	Irrigation	Pre-1948

Notes:

APN = Assessor's Parcel Number

Talbot Farmstead, 5732 Bennett Valley Road (Map Reference 1)

This property is a multi-generational farmstead owned and operated over the years by Coleman, Holman, Joseph, and Leonard Talbot. It includes an 1880s residence and eight outbuildings (constructed circa the 1880s and 1890s). This property is on the northwestern corner of Bennett Valley Road and Grange Road but historically straddled both sides of Bennett Valley Road. The residence was recorded as a one-story, hip-roofed farmhouse constructed in 1880 (Eastman 1996; Sonoma County Assessors Records 2021).

The previous evaluation found the Talbot farmstead significant under Criteria A, B, and C of the NRHP. It appeared eligible under Criterion A because it was one of the first farms to be established in Bennett Valley, and is associated with the early settlement of the region. It appeared eligible under Criterion B because of its association with persons of local historical significance: the Talbots. Coleman and Drucilla Talbot were among the earliest residents of Bennett Valley in the 1850s, and their son Joseph Martin Talbot achieved importance by being the "first local farmer to cultivate vineyards on the hillsides of Bennett Peak, [as well as] being an important community leader and reporter for many years." Joseph's son Leonard Talbot carried on the family farming into the 20th century, as well as contributing to the development of the community (Eastman 1996). The property also appeared to be eligible under Criterion C as a "good example of a one-story farmhouse built in the Folk Victorian style in Bennett Valley during the 19th century." However, although the property possessed good historical associations and sufficient integrity to convey its significance with respect to its associations with an important person and architecture, the integrity of its setting was found to be compromised due to post-historical property divisions and land use, and the historic integrity of the complex as a whole was found to possess only fair integrity, owing to the loss of many

of the significant buildings that contributed to the farm's operations in the past. Therefore, this property was found to be ineligible for listing in the NRHP by consensus through the Section 106 process (FHWA9711248); however, the property was not evaluated for the CRHR (OHP 2020).

Matanzas Creek Dam Facility, Bennett Valley Road (Map Reference 2)

The flood control system consisting of the Dam (**Photograph 1**) and its associated components is collectively referred to as the Dam Facility in this report. The property consists of the dam, the primary spillway, an auxiliary spillway, an intake structure, an outlet channel, an earthen dike, an access road, and a reservoir (**Plate 10**). The Dam is a 685-foot-long, 95-foot-tall earth and rock fill dam with an impervious clay core (see **Plate 11**), with a crest elevation at 425 feet above sea level.

The Matanzas Creek Reservoir is designed to remain dry until heavy rains are dammed and stored, allowing the flow of water to be released downstream at a more constant rate to avoid flooding. Matanzas Creek Reservoir has a total storage capacity of approximately 1,500 acre feet. Water from Matanzas Creek flows west through a 26- by 26- by 41-foot-tall Intake Structure (**Photograph 2**) at the southeastern base of the Dam, which opens up to the Primary Spillway beneath the Dam. On the downstream side, the water spills through an Outlet Structure (**Photograph 3**) into a Stilling Basin and is released through the Outlet Channel.

The Auxiliary Spillway is southeast of the Dam and wraps around a natural rise in the landscape immediately east of the Dam. The spillway is designed to come into use when the 1 percent frequency flood is exceeded (Santa Rosa Soil Conservation District et al. 1958). Excavated brown rocky clay from the spillway was reused elsewhere in the construction of the Dam Facility. The spillway is designed with a 10-foot-deep concrete cut-off wall to prevent undercutting, and riprap lines the structure to protect the channel (**Photograph 4**). An earthen dike stretches 375 feet before the spillway reaches the Outlet Channel.

Photograph 1 Matanzas Creek Dam, View to Southwest

Photograph 2 View of Intake Structure and Dam in the Background, View to Northeast

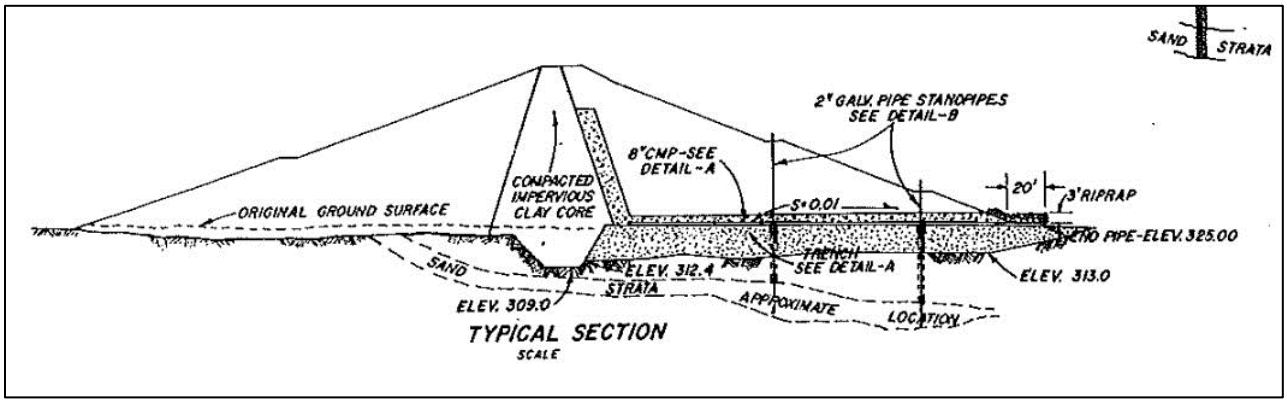

Plate 11 Cross Section of Matanzas Creek Dam

Source: Sonoma County Flood Control District and Water Conservation District 1962

Photograph 3 View of Outlet Structure and Stilling Basin at Base of Dam; View to Southeast

Photograph 4 Northern Bank in Auxiliary Spillway Showing the Riprap and Concrete Sill; View to the Northwest

An abandoned construction road and parallel tree alignment, approximately 240 meters northwest of the Matanzas Creek Reservoir dam, begins above the eastern bank of Matanzas Creek and proceeds at an east-northeastern bearing for approximately 300 feet. The road grade measures approximately 10 feet wide, and cuts into the bank at a maximum depth of 2 feet. An alignment of oak trees follows the road grade along its southern edge (see **Photograph 5**). The alignment of the roadbed is south of the previously existing fence line that followed parcel lines of the larger farm property owned by the Mitchell family. The construction of the Matanzas Creek Dam and associated structures resulted in the removal of this fence line and the disturbance of much of the area for earthmoving activities associated with the construction of a larger borrow area and the dam overall. Much of the area around the extant roadbed was heavily disturbed after construction of the dam facilities, and it appears the roadbed was abandoned after construction of the dam was complete.

Photograph 5 Eastern Terminus of Abandoned Construction Road, View Facing West

Spring House and Platform, Bennett Valley Road (Map Reference 3)

Two historic-age resources were recorded approximately 500 feet north of the eastern edge of the Matanzas Creek Dam under a small stand of oak trees: a wood spring house (**Photograph 6**) and a wooden platform (**Photograph 7**).

This spring house has a square footprint, measuring 12 feet 6 inches on each side, and stands 6 feet tall. Its exterior siding consists of vertical 1-inch by 12-inch circular-cut redwood. It is topped by a medium-pitch hipped roof, clad in hand-split redwood shakes. The roof is trimmed with simple 1-inch by 6-inch fascia. The access door is constructed of siding materials and affixed to the siding with strap hinges and wire nails. The building houses an open well, which exhibits standing water. It is mostly blanketed in poison oak brush and berry vines. The dilapidated wooden platform is constructed over a shallow drainage. It is likely a foundation for a water tank no longer extant. The platform measures 10 feet by 8 feet and consists of four parallel 5-inch by 5-inch circular-cut redwood joists spanning the drainage. These joists were once topped by 1-inch by 4-inch planks, most of which are now rotted or absent. The planks are fasted to the joists with 16-penny wire nails. A 1.25-inch steel water pipe leads to the platform from the spring house (Feature 2) and features a universal coupler. Poison oak brush covers most of the platform.

Photograph 6 View of Spring House South of Matanzas Dike; View to the East

Photograph 7 View of Platform South of Matanzas Dike; View to the East

Based on review of as-built and project plans for the Matanzas Creek Dam, the spring house and a 1.25-inch pipeline pre-date the 1962 construction of the dam and its associated structures and were not to be disturbed during construction. It appears that the well in the spring house was still active at that time, and water was piped to a 10-acre irrigated pasture area to the north on the larger parcel owned by Edith Mitchell (Sonoma County Flood Control District and Water Conservation District 1962).

7 FINDINGS AND CONCLUSIONS

AECOM evaluated three properties under the NRHP and the CRHR criteria. The NRHP/CRHR state that, in addition to national, state, or local significance under one of the four criteria, a property must possess integrity of location, design, setting, materials, workmanship, feeling, and association.

7.1 EVALUATION

Talbot Farmstead – Map Reference 1

The Talbot farmstead was previously determined to be ineligible for the NRHP through the Section 106 of the NHPA process, but it was not evaluated for the CRHR or local listing. Based on the current investigation, AECOM agrees with this determination for the NRHP. However, the resource was inaccessible for further evaluation under the CRHR and local criteria. Therefore, for the purposes of this project, this resource is assumed to be eligible for the CRHR, but it is currently assumed that it will not be significantly impacted as a result of this project.

Matanzas Creek Dam Facility – Map Reference 2

Evaluation presented in this section of this report (below) concludes that the Matanzas Creek Dam Facility is not individually eligible for listing in the NRHP or CRHR. A full inventory and evaluation of the CSWP facilities is currently underway as part of a separate study being conducted in support of Sonoma Water's Central Sonoma Watershed Plan, a broader NEPA planning study currently being conducted by Sonoma Water in cooperation with NRCS. An evaluation of the entire CSWP is outside of the scope of this current Matanzas Creek Dam Rehabilitation Project study; however, based on research and evaluation conducted for this report, Matanzas Creek Dam may be eligible for listing in the NRHP as a contributing element of a potential Central Sonoma Watershed historic district consisting of earthfill dams, four reservoir facilities, and several improved conveyance channels that were designed and constructed between 1958 and 1964. Although the Matanzas Creek Dam Facility is not individually eligible, the integrated flood control system may be significant as a discontiguous historic district because it prevented the constant flooding of the City of Santa Rosa and other areas of Sonoma County, facilitating additional growth and economic development into the latter half of the 20th century and today. The potential period of significance is 1958 to 1964. See **Plate 12** for the location of the contributing elements of this potential historic district (the Spring Creek Bypass Culvert was constructed in 1988 after the period of significance and is not a contributing element of the potential historic district):

- Brush Creek Reservoir (1961)
- Piner Creek Reservoir (1964)
- Spring Lake (1963)
- Matanzas Creek Reservoir (1963)
- Diversion structure on Santa Rosa Creek (Vortex Tube) (1962)
- Diversion structure on Spring Creek (1962)
- Myriad channel conveyance facilities (including ~33.6 miles of stream channels and bridges/ culverts constructed during the period of significance)

The evaluation below addresses the eligibility of the Matanzas Creek Dam Facility as an individual facility. Evaluation of the entire CSWP for eligibility as a historic district, currently underway for the Central Sonoma Watershed Plan, will be reported on separately.

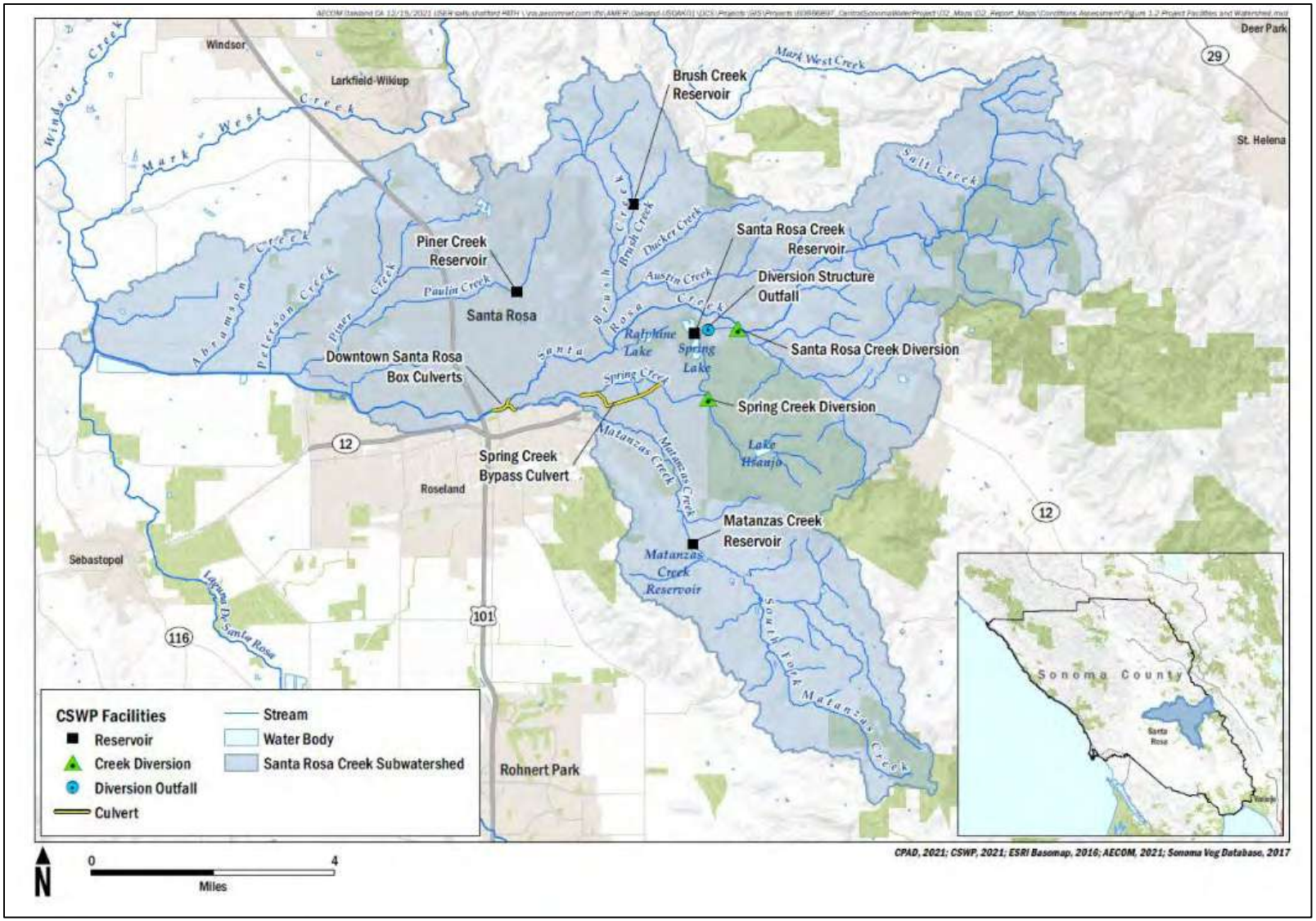

Plate 12 Location of Contributing Elements of the Potential Central Sonoma Watershed Project Historic District

Note: The Spring Creek Bypass Culvert was constructed in 1988 after the period of significance as is not a contributing element of the potential historic district.

NRHP/CRHR Criterion A/1: The Dam Facility is an integral part of the CSWP's flood control system, which played an important role in curtailing the nearly annual flooding in and around the City of Santa Rosa prior to the 1960s. The Santa Rosa/Sonoma County area was growing at a rate of 100 to 160 percent between 1940 and 1957, much higher than the rate of population increase experienced in other areas of the state. The CSWP was initiated because, based on population, economic, and building trends, development was going to expand into the floodplains, which would impede future economic growth of the region.

The Dam is the southernmost structure in the flood control system. It occupies an area that was almost 90 percent rural/agricultural lands and not heavily populated before the construction of the Dam Facility and does not appear to have changed much since. However, the construction of the Dam Facility, in addition to the other CSWP's flood control system, has significantly reduced the constant flooding at the confluence of Matanzas and Santa Rosa creeks in the City of Santa Rosa. Over the subsequent decades, this may have facilitated additional growth of the region southeast of Santa Rosa in the area south of Hoen Avenue and east of Bennett Valley Road, where the CSWP provides considerable flood protection.

Based on these considerations, the Dam Facility is not individually eligible for listing in the NRHP. However, it may be eligible as a contributor to the potentially eligible Central Sonoma Watershed historic district, which meets NRHP/CRHR Criterion A/1 as the larger flood control system that prevented the constant flooding of the City of Santa Rosa, facilitating additional growth and economic development into the latter half of the 20th century and today. The evaluation of the eligibility of the Central Sonoma Watershed as a historic district is underway and will be reported on separately.

NRHP/CRHR Criterion B/2: The Dam Facility does not have associations with persons who gained prominence in their professions or made significant contributions in local, state, or national history; therefore, it does not appear to be eligible under these criteria.

NRHP/CRHR Criterion C/3: The Dam Facility design was called "conventional," although the design later needed to be adapted to account for the quicksand-like material discovered during excavation. However, the same situation and solution were encountered at another flood control facility under construction by Sonoma Water, so the Dam Facility does not appear to exhibit particularly significant design or engineering characteristics. Additionally, although the engineering and design firm, Woodward, Clyde, Sherard & Associates, specialized in soils and geotechnical civil engineering designs and may be considered master engineers, the conventional nature of the design does not rise to the level of significance to be considered an exemplary example of their engineering abilities. In consideration of these factors, the Dam Facility does not appear to meet the NRHP/CRHR Criterion C/3.

NRHP/CRHR Criterion D/4: This criterion is usually reserved for archaeological sites if they have yielded, or may likely yield, information important in prehistory or history. The property must have or have had information to contribute to our understanding in history, and the information must be considered important. In rare instances, structures such as dams can serve as sources of important information about historic construction materials or technologies; however, this property is otherwise documented and does not appear to be a principal source of important information in this regard.

Integrity: As noted above, integrity of an historic resource is measured by application of seven aspects: location, design, setting, workmanship, materials, feeling, and association. The Dam Facility has retained integrity of all seven aspects. It remains in its original location, with the setting unchanged from its original construction. It has not been substantially altered (the only changes being the removal of sediment from the reservoir), so it retains integrity of design, workmanship, and materials. Its physical elements, function, and setting maintain its integrity of feeling and association.

Spring House and Platform – Map Reference 3

NRHP/CRHR Criterion A/1: The spring house and platform do not meet NRHP Criterion A/CRHR Criterion 1 for association with events that have made a significant contribution to the broad patterns of history. While associated with the early irrigation efforts in the Bennett Valley sometime within the first half of the twentieth century, the utilitarian platform and spring house and platform are similar to many other ancillary irrigation structures constructed and used throughout California and the United States and do not convey any specific significance to the history of agriculture within the region, state, or nation. The spring house housed a well that conveyed water via a metal pipe to irrigate a 10-acre pasture used to feed dairy cows on the larger agricultural property owned by the Mitchell family. The first county agricultural crop report that listed "irrigated pasture" as its own commodity in 1948 indicated 3,000 acres under cultivation when there was over 70,000 acres of field crops in the county and an additional 50,000 acres of permanent crops. Therefore, irrigated pasture only accounted for 2.5 percent of the total agricultural endeavors in Sonoma County. Irrigated pasture also had no "farm value" as it was used to self-sustain farms and was not sold (Sonoma County Department of Agriculture 2022). While in subsequent years, the number of irrigated pasture acres increased to 15,000-acres, which corresponds with an increase in the number of additional wells sunk in the region, as of 2020 there are only 6,871-acres of irrigated pastureland compared to 328,000-acres of field crops in the county, only 2.09 percent of the total acreage. Therefore, neither the wooden platform nor wood spring house shed are eligible under NRHP Criterion A/CRHR Criterion 1.

NRHP/CRHR Criterion B/2: The spring house and platform do not meet NRHP Criterion B/CRHR Criterion 2 for any direct associations with the productive lives of persons important in local, state, or national history. Although the spring house and platform appear to have been developed during the ownership of the property by the Mitchell family, there is no evidence to suggest that any members of the Mitchell Family made demonstrably important contributions to history at the local, state, or national level. John Mitchell and his sons John and Samuel were engaged in general farming and dairying on the property from 1925 to 1983, but they do not appear to have made any significant contributions to the agricultural or economic development of Bennett Valley. Therefore, neither the wooden platform nor wood spring house are eligible under NRHP Criterion B/CRHR Criterion 2.

NRHP/CRHR Criterion C/3: The spring house and platform do not meet NRHP Criterion C/CRHR Criterion 3 for embodying distinctive characteristics of a type, period, and method of construction, or as the work of an important creative individual, or as having high artistic value. The wood spring house is a vernacular utilitarian building using standard materials and designs of the time and is an unexceptional and common building type found throughout California and nationwide on farms. The wood platform structure is an unremarkable remnant to support an assumed water tank that is no longer extant.

NRHP/CRHR Criterion D/4: The spring house and platform do not meet NRHP Criterion D/CRHR Criterion 4 because they are is unlikely to yield information important to history. It is unlikely that these structures have the potential to broaden our understanding of agricultural practices, or the history of the property, region, state, or nation. Irrigation buildings and structures are well documented in other sources and they do not appear to have any likelihood of yielding important information about historic-period construction materials or technologies. Therefore, neither the wooden platform nor wood spring house are eligible under NRHP Criterion D/CRHR Criterion 4.

Integrity: The spring house and platform retain integrity of location, but have compromised integrity of design, setting, materials, workmanship, feeling, and association to any potential period of significance. The agricultural setting was diminished with the construction of the Matanzas Creek Dam dike, and because the wooden platform and wood spring house are physically separated from the larger agricultural property there were once associated with, they also lack integrity of setting,

feeling, and association. Deferred maintenance and the abandonment of the platform and springhouse, as well as the removal of the water tank from the platform, have also compromised their integrity of design, materials, workmanship.

7.2 CONCLUSIONS

The study identified the Matanzas Creek Dam Facility, the Talbot farmstead, and a historic-age spring house and platform as historic-era resources within the project Study Area. The Talbot farmstead was previously determined to be ineligible for listing in the NRHP but is assumed to be eligible for the CRHR; however, it is currently assumed that the Talbot farmstead will not be significantly impacted by this project. The spring house and platform do not meet eligibility criteria for listing in the NRHP or CRHR.

The Matanzas Creek Dam Facility, which includes the dam, the primary spillway, an auxiliary spillway, an intake structure, an outlet structure, a dike, an access road, and the reservoir, is not individually eligible for listing in the NRHP or CRHR; however, it is currently assumed to be eligible for listing in the NRHP/CRHR as a contributing element of a potential Central Sonoma Watershed historic district that meets NRHP/CRHR Criterion A/1 as the larger flood control system that prevented the constant flooding of the City of Santa Rosa, facilitating additional growth and economic development into the latter half of the 20th century and today. The abandoned construction road associated with the development of the dam does not meet eligibility criteria for listing in the NRHP or CRHR.

Evaluation of the entire CSWP for eligibility as a historic district, currently underway for the Central Sonoma Watershed Plan, will be reported on separately and will be available to inform an effects analysis for the Matanzas Creek Dam Rehabilitation Project. Potentially contributing features of the Matanzas Creek Dam Facility that allow it to retard floodwaters, currently under evaluation as part of a larger flood control system, include the Dam, the Reservoir, the Primary and Auxiliary spillways, the Intake and Outlet structures, Outlet pipe, Outlet structure, Stilling Basin, and Earthen dike. The access road would likely be a noncontributing feature because it is not a significant element of the flood control system. Under a separate scope of work associated with the Central Sonoma Watershed Plan, AECOM is currently evaluating whether the contributing features retain sufficient historic integrity to its potential period of significance (1964). Although ineligible as an individual facility, the Matanzas Creek Dam Facility should be assumed, for now, to be eligible as part of the larger district. This assumption will be confirmed upon completion of the analysis underway for the CSWP; if the district is found to be ineligible, the approach for the Matanzas Creek Dam Rehabilitation Project will be revised accordingly.

When considering potentially significant impacts to a historic district, the reason for its eligibility must be considered. Changes that affect a system's overall function and design could significantly impact the eligibility of a historic district. The significance of the potential Central Sonoma Watershed historic district lies in its function as a larger flood water control system, which would allow for minor changes on individual dams/facilities without significantly affecting the overall historic status of the larger system. The eligibility of the potential Central Sonoma Watershed historic district would be significantly impacted if individual dams/facilities were demolished in whole or in part. Maintenance and improvement activities, which could cause minor changes to structures and the appearance of individual dams/facilities, would not impact the significance of the historic district because they would not alter their function as a dam/facility or the operation of the overall flood control system. If the analysis underway for the CSWP finds that that the Central Sonoma Watershed is eligible for listing as a historic district, potential effects of viable project alternatives on the historic district should be evaluated during the environmental review.

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APPENDIX A. PREVIOUS RECORDATION

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary # P-49-001864
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

*Resource Name or #: Talbot Farmstead

P1. Other Identifier: Talbot Homestead

*P2. Location: ☒ Not for Publication ☐ Unrestricted *a. County: Sonoma and

*b. USGS 7.5' Quad: Santa Rosa (5012) Date: 1951 T 7S ; R 7W ; NE ¼ of NW ¼ of Sec 4 ; B.M.

c. Address: 5732 Bennett Valley Road City: Santa Rosa Zip: 95404

d. UTM: Zone: ; mE/ 5317000 mN 4250100 (531680E/4249980N)

e. Other Locational Data:

APN # 049-060-041

*P3a. Description:

This late 19th-century farm complex consists of a one-story farmhouse and eight outbuildings that are situated on a gently sloping grassy terrace that borders Bennett Valley Road. The property occupies approximately 5 acres; most of which is covered with range grasses, oak woodland; dense riparian vegetation grows along the creek that forms the southern boundary of the parcel. The complex is dominated by the hip-roofed farmhouse that faces the road. It rests on a raised rough-cut stone foundation that is covered with lapped wood skirting. The steeply pitched roof is covered with asphalt shingles. The rear portion of the roof is extended by a steeply sloping shed section. A red brick chimney protrudes from the eastern slope. The wide, overhanging eaves are closed with a plain soffitt and decorated with tandem pairs of scrolled brackets on three sides. Cladding consists of wooden shiplap, with cornerboards, and a plain frieze under the eaves. Typical windows are single-pane, double-hung sash. Wood casements on the windows of the east side and rear end have been replaced with aluminum. The facade of the house is marked by an open half-width porch that is covered with a slightly sloping shed roof. It is supported by three turned posts with carved wooden braces near the tops. A 3-1/2 ft. tall wooden railing attached to the posts at the end of the porch is a recent addition. See Continuation Sheet.

P3b. Resource Attributes: HP33 farm/ranch

P4. Resources Present: ☒Building ☐Structure ☐Object ☐Site ☐District ☐Element of District ☐Other:

P5a. Photo or Drawing

P5b. Description of Photo:
See attached Photo Log

*P6. Date Constructed/Age and Sources: ☒Historic ☐Prehistoric ☐Both
Est. date of construction: 1890

*P7. Owner and Address:
Blaine and Sidne Goodwin
5732 Bennett Valley Road
Santa Rosa, CA 95404

*P8. Recorded by:
Bright Eastman
Anthropological Studies Center
Sonoma State University
Rohnert Park, CA 94928

*P9. Date Recorded:
26 June 1996

*P10. Survey Type: intensive

P11. Report Citation: none

*Attachments: ☐NONE
☒Location Map ☐Sketch Map ☒Continuation Sheet ☒Building, Structure, and Object Record
☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record
☐Artifact Record ☒Photograph Record ☐ Other:

*Required information

JUN 0 9 1997

The porch ceiling is tongue-in-groove, and the porch floor consists of painted wood boards that have replaced the original flooring. The other half of the facade features a rectangular bay with four single-pane, double-hung sash windows and a shed roof. Eaves overhand slightly, with scrolled brackets attached to a plain frieze. Plain rectangular wooden panels decorate the lower half of the bay. The front doorway is located at the center of the facade, and features a single-pane rectangular transom. The house appears to be in good condition. It appears to possess good historic integrity; recent maintenance and replacements do not detract from its historical appearance.

A large one-and-a-half, story three-bay barn is situated on the other side of Bennett Valley Road, facing the house. It is clad with redwood board-and-batten and has an upper-gable loading door with a hay trolley. The smaller outbuildings are situated near the house. They all have gable roofs and are clad with either board-and-batten or vertical boards with wire nails. Functional types include a pumphouse situated near the northwest corner of the parcel; two portable buildings on sledges; a small egg-candling house; a small chicken house; a creamery; and a storage shed. The outbuildings appear to have been constructed ca. 1890-1925. They appear to be in fair condition to have good historic integrity. The complex as a whole does not appear to have good historic integrity as a farmstead, owing to the loss of many outbuildings that contributed to its operation in the past as a dairy, a stock and grain farm, and as a wine grape farm.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

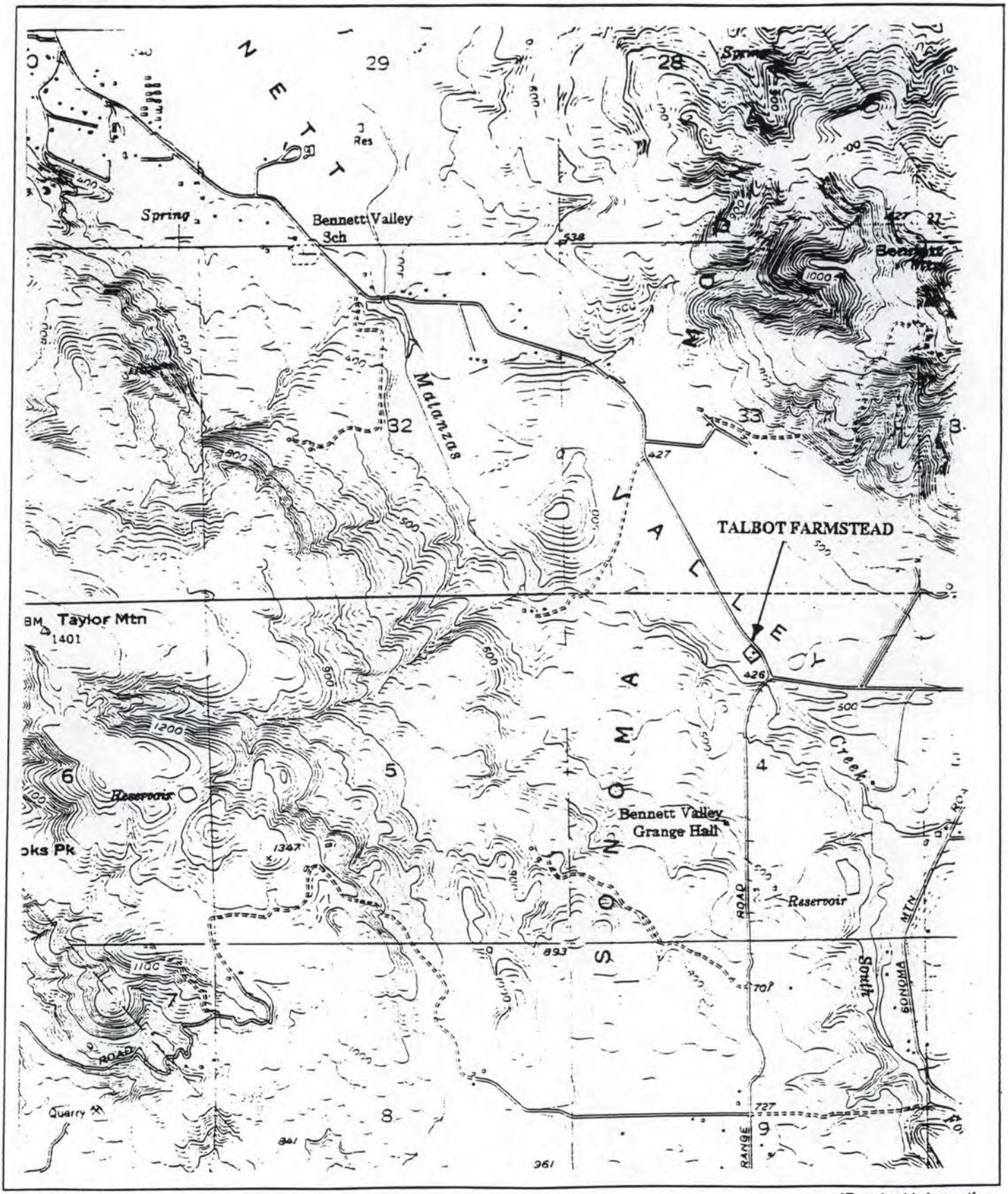
Primary # P-49-001864
HRI#
Trinomial

Page 3 of 6

*Resource Name or #: Talbot Farmstead

*Map Name: USGS Santa Rosa Quad

*Scale: 1:24000 *Date of Map: 1954



DPR 523J (1/95)

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Primary # P-49-001864
HRI#

BUILDING, STRUCTURE, AND OBJECT RECORD

*NRHP Status Code 3S

*Resource Name or # Talbot Farmstead

B1. Historic Name: Talbot Farm
B2. Common Name: Talbot Homestead
B3. Original Use: Farm
B4. Present Use: Single-family Residence
*B5. Architectural Style: Folk Victorian

*B6. Construction History: The house and the barn were probably erected during the late 1880s or early 1890s when Joseph M. Talbot was the owner of the property. Outbuildings that were constructed in the early 20th century were erected by Joseph Talbot's son, Leonard, who ran a small dairying operation in addition to selling eggs and small-scale farming.

*B7. Moved? ☒No ☐Yes ☐Unknown Date: Original Location:
*B8. Related Features: The complex also contains a large barn, pumphouse, portable outbuildings, egg-candling house, chicken coop, creamery, and storage house. All outbuildings are wood-frame and appear to have been constructed ca 1890-1925
B9a. Architect: unknown
b. Builder: unknown

B10. Significance: Theme: Settlement and Agricultural Development
Area: Bennett Valley
Period of Significance: 1890-1925
Property Type: farmstead
Applicable Criteria: B, C

The Talbot House is reputed to be the oldest house in Bennett Valley, and was the site of one of Bennett Valley's earliest farms. It is a significant example of a 19th-century farmstead in this area, and is associated with one of the community's oldest pioneer families: the Talbot family. The Talbots resided on the property from the middle of the 19th century and well into the 20th. They were among Bennett Valley's earliest settlers and made significant contributions to the agricultural development and economic growth of the region. The farmhouse is an excellent example of late 19th-century Folk Victorian style and appears to be a unique example of this type in Bennett Valley. The presence of the farmstead contributes to the historic rural landscape of this region and helps to illustrate its early architectural history. See Continuation Sheet

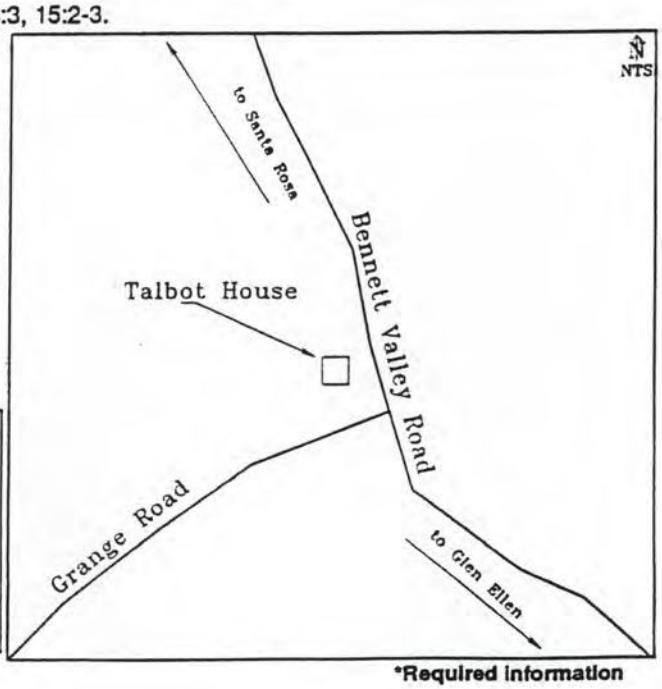
11. Additional Resource Attributes:

*B12. References:

Bowers, A.B. *Map of Sonoma County, California.* Second edition, 1877
Reynolds and Proctor, *Illustrated Atlas of Sonoma County, California*, 1897, Santa Rosa, Calif. p. 5
Sonoma County Official Records, Bk. 66:235, 1879.
The Press Democrat, Santa Rosa 5/29/1949: 10:1, 11:1, 12:3, 13:5, 14:3, 15:2-3.
Tourney, H. *The History of Sonoma County*, Chicago 1926:220-221

B13. Remarks:
The property appears to be potentially eligible for individual listing on the National Register of Historic Places (NRHP) under Criteria B and C.

*B14. Evaluator: Bright Eastman,
Anthropological Studies Center, Sonoma State University, Rohnert Park, Ca
*Date of Evaluation: 7/19/96



(This space reserved for official comments.)

*Required information

The project location is situated in what is known as Bennett Valley, a vernacular region of Sonoma County just southeast of the city of Santa Rosa. Sonoma County was one of California's original 27 counties when the United States took possession of California from the Mexican government through the Treaty of Guadalupe Hidalgo in 1848 Prior to California's statehood in 1850, the Mexican government granted tracts of unsurveyed land to individuals. General Mariano Vallejo was one of these grantees, who owned several large tracts in Sonoma County that incorporated the Bennett Valley region. Vallejo sold many sections of his vast holdings to newly-arrived American settlers . Among Vallejo's land buyers in the early 1850s was James N. Bennett, who acquired the small valley and the majestic peak that overlooks it, both of which bear his name.

The agricultural potential of this fertile valley was quickly recognized by other newly arrived settlers who sought to establish profitable farms in California. Coleman and Drusilla Talbot, natives of Kentucky, traveled overland by wagon train to make their permanent home in California, settling in Bennett Valley. In 1853, Talbot bought 640 acres of land in Bennett Valley from James Bennett. Like other unfortunate land buyers of during this period, Talbot became mired in contentious litigation that surrounded his land title, ultimately having to repurchase it from the United States Government after his original purchase was declared illegal. Coleman Talbot established a farmstead on the parcel of land that includes the project area, engaging in stock and grain farming. Portions of Talbot's larger holdings were sold to vineyardist Isaac DeTurk, who was one of the first settlers of Bennett Valley to plant vineyards and orchards, crops that were to become hallmarks of the valley's agricultural productivity). Drusilla Talbot was among the founder's of one of Santa Rosa's first church congregations, the Disciples of Christ, established in 1854).

Coleman and Drusilla Talbot's son, Joseph Martin, was born in Bennett Valley in 1854. "Joe" Talbot was raised on the family farm, attending the public school in Bennett Valley, which was one of the first public schools to be established in Sonoma County. . In 1879, he married Louise Bannister, native of Shasta County. They had a son, Aquilla Parker, who was born in 1882. Louise died in 1883. Joseph was remarried in 1885 to Genevieve Ayer of Marysville, California. To Joseph and Genevieve were born three children: Joseph Regan, Elizabeth, and Leonard Ayer. He remained on the farm, devoting himself to its operation until his father's death in 1904, and expanding its productivity to include vineyards. Joseph M.Talbot was the first vineyardist in the valley to cultivate grapes on the hilly slopes of Bennett Peak. He also operated a small dairy on the farmstead. Joseph M. Talbot (locally known as "Joe") was a member of the Bennett Valley Grange, which was established in 1873, and was active in the California Grape Exchange. He was a member of the school board of trustees, taking a very active role in educational matters of the community. Known as "the Sage of Bennett Valley," Joe Talbot was a correspondent for the county newspapers, providing regular updates on the "goings-on" in his community.

A farmhouse and several outbuildings were constructed on the property, which spanned Bennett Valley Road, in the late 1880s and early . His son, Leonard A. Talbot, inherited the farmstead and continued to cultivate vineyards and operate the small dairy, in addition to working as a broker in Santa Rosa.

The Talbot farmstead appears to be significant under Criterion A, because it is one of the first farms to be established in Bennett Valley, and is associated with the early settlement of the region. The presence of the house and its outbuildings conveys this association. This property, together with the other local extant historical properties that were established during this era, illustrate the early history of the built environment and local agricultural economic history during the 19th century in Bennett Valley.

Under Criterion B, the Talbot farmstead appears to be significant for its long-time association with persons of local historical significance: the Talbot family. Coleman and Drusilla Talbot were among the earliest residents of Bennett Valley, establishing their home and farm in the 1850s. Their son, Joseph M. Talbot achieved importance by being the first local farmer to cultivate vineyards on the hillsides of Bennett Peak, in addition to being an important community leader and reporter for many years. Joseph's son, Leonard A. Talbot, also bears a significant association with the property, carrying on the family farming tradition and contributing to the development of the community during the early 20th century.

The property iappears to be significant under Criterion C as a good example of a one-story farmhouse built in the Folk Victorian style in Bennett Valley during the late 19th century. The house possesses good historic integrity of design, location, materials, and workmanship. Minimal repair and maintenance have been carried out on the house, none of which detract from its historical appearance. The few alterations, to the facade could easily be removed, leaving the historical structure intact. The house today has basically the same appearance as it did in the late 1890s.

The Talbot house appears to be potentially eligible for listing on the NRHP under Criteria B and C. While the property possesses good historical associations and sufficient historic integrity to convey its significance with respect to important persons and architecture, the integrity of its setting has been compromised due to post-historical property divisions and land use. The historic integrity of the complex as a whole possesses only fair integrity owing to the loss of many of its significant outbuildings that contributed to its operation as a farm in the past.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PHOTOGRAPH RECORD

Primary # P-49-001864
HRI#
Trinomial

Page 6 of 6 **Resource Name or #:** Talbot Farmstead **Year**

Camera Format: Olympus Automatic Zoom **Lens Size:** 35-7-mm
Film Type and Speed: 125 b&w **Negatives Kept at:** Sonoma County Planning Division

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward	Accession #
6	26		15	house; facade 5732 Bennett Valley Road	sw	
			10	house; rear	n	
			17	barn	nw	
			18	creamery	se	
			13	pumphouse	w	
			12	portable buildings	w	
			11	chicken coop	s	
6	28		1	stable 4057 Grange Road	n	
			3	office building	w	
			4	horse barn	w	
			5	house 3790 Grange Road	n	
			7	house 5940 Bennett Valley Road	se	

P-49-001864

a.

Talbot Farmstead
Sonoma County CA
House- facade
VT S
7-96

P-49-001864

a.

Talbot House -rear
Sonoma County CA
VT N
7-96

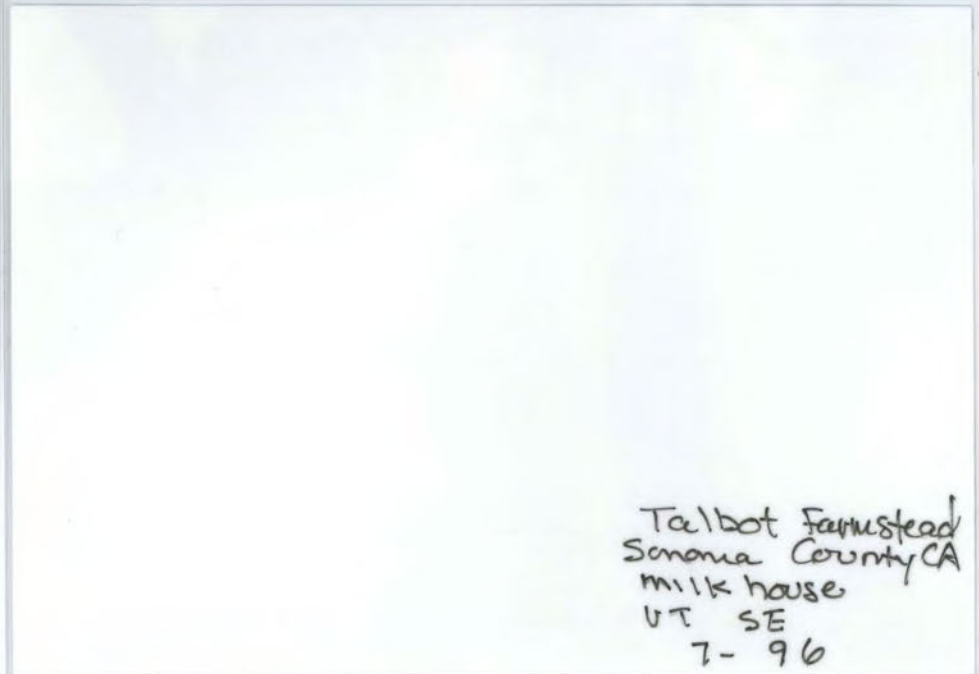
P-49-001864

a.

Talbot Farmstead
Sonoma County CA
portable sheds
VT NW
7-96

P-49-001864

a.



Talbot Farmstead
Sonoma County CA
milk house
VT SE
7-96

OHP Built Environment Resources Directory

Primary Number	Name	Street Number	Street Name	City	County	Zip	Evaluation Info	Parcel Number	Ownership	Construction Year	Export Date
	BENNETT VALLEY ROAD		BENNETT VALLEY RD	SANTA ROSA	SONOMA		5S2, , 5402-0240-0000		C		3/3/2020
	TALBOT FARMSTEAD	5732	BENNETT VALLEY RD	SANTA ROSA	SONOMA	95404	6Y, 12/22/1997, FHWA971124B	049-060-041	P	1890	3/3/2020
	MATANZAS CREEK BRIDGE		GRANGE RD	SANTA ROSA	SONOMA		6Y, 12/22/1997, FHWA971124B		U		3/3/2020

5S2 - Individually eligible for local listing or designation.

6Y - Determined ineligible for NR by concensus through Section 106 process - Not evaluated for CR or local listing.

APPENDIX B. HISTORICAL SOCIETIES OUTREACH

AECOM
300 Lakeside Drive,
Suite 400
Oakland, CA 94612
aecom.com

April 29, 2021

Sonoma Valley Historical Society
270 First Street West
Sonoma, CA 95476

To Whom It May Concern:

The Sonoma County Water Agency (SCWA) operates and maintains the Matanzas Creek Dam facilities, which impounds Matanzas Creek about 5 miles upstream from its confluence with Santa Rosa Creek in Santa Rosa, as a method of flood control. The Matanzas Creek Dam facilities were constructed in 1964 as part of the Central Sonoma Watershed project. The facilities have exceeded its 50-year project life. SCWA is reviewing alternatives to address the Soil Conservation Service (NRCS) and Division of Dam Safety (DSOD) design requirements for flood and seismic safety. The SCWA is the lead agency for California Environmental Quality Act (CEQA) compliance on this project, and the NRCS is the lead federal agency responsible for Section 106 of the National Historic Preservation Act (NHPA) compliance.

AECOM has been retained to conduct cultural resources inventory surveys and evaluate the dam facilities. This letter is being sent to your organization because you may have pertinent information on historical resources within or near the project area.

If you or your organization has any information, questions, or concerns regarding historical resources within or near the project area that could be affected by this project, please contact me at (510) 874-1787 or via e-mail at karin.beck@aecom.com. Please note this is not a request for research, just for information. Your comments and concerns are important to us. We look forward to hearing from you soon. We would appreciate your response within 30 days of your receipt of this letter. Thank you.

Sincerely,

Karin G. Beck

Karin G. Beck, M.A., RPA, RPH
Senior Archaeologist

Enclosure: Project Map

AECOM
300 Lakeside Drive,
Suite 400
Oakland, CA 94612
aecom.com

April 29, 2021

Historical Society of Santa Rosa
P.O. Box 164
Santa Rosa, CA 95402

To Whom It May Concern:

The Sonoma County Water Agency (SCWA) operates and maintains the Matanzas Creek Dam facilities, which impounds Matanzas Creek about 5 miles upstream from its confluence with Santa Rosa Creek in Santa Rosa, as a method of flood control. The Matanzas Creek Dam facilities were constructed in 1964 as part of the Central Sonoma Watershed project. The facilities have exceeded its 50-year project life. SCWA is reviewing alternatives to address the Soil Conservation Service (NRCS) and Division of Dam Safety (DSOD) design requirements for flood and seismic safety. The SCWA is the lead agency for California Environmental Quality Act (CEQA) compliance on this project, and the NRCS is the lead federal agency responsible for Section 106 of the National Historic Preservation Act (NHPA) compliance.

AECOM has been retained to conduct cultural resources inventory surveys and evaluate the dam facilities. This letter is being sent to your organization because you may have pertinent information on historical resources within or near the project area.

If you or your organization has any information, questions, or concerns regarding historical resources within or near the project area that could be affected by this project, please contact me at (510) 874-1787 or via e-mail at karin.beck@aecom.com. Please note this is not a request for research, just for information. Your comments and concerns are important to us. We look forward to hearing from you soon. We would appreciate your response within 30 days of your receipt of this letter. Thank you.

Sincerely,

Karin G. Beck

Karin G. Beck, M.A., RPA, RPH
Senior Archaeologist

Enclosure: Project Map

AECOM
300 Lakeside Drive,
Suite 400
Oakland, CA 94612
aecom.com

April 29, 2021

Sonoma County Historical Society
P.O. Box 1373
Santa Rosa, CA 95402

To Whom It May Concern:

The Sonoma County Water Agency (SCWA) operates and maintains the Matanzas Creek Dam facilities, which impounds Matanzas Creek about 5 miles upstream from its confluence with Santa Rosa Creek in Santa Rosa, as a method of flood control. The Matanzas Creek Dam facilities were constructed in 1964 as part of the Central Sonoma Watershed project. The facilities have exceeded its 50-year project life. SCWA is reviewing alternatives to address the Soil Conservation Service (NRCS) and Division of Dam Safety (DSOD) design requirements for flood and seismic safety. The SCWA is the lead agency for California Environmental Quality Act (CEQA) compliance on this project, and the NRCS is the lead federal agency responsible for Section 106 of the National Historic Preservation Act (NHPA) compliance.

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Senior Archaeologist

Enclosure: Project Map

APPENDIX C. DPR 523 RECORDATION FORMS

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code _____
Other Listings _____
Review Code _____ **Reviewer** _____ **Date** _____

***Resource Name or #:** Matanzas Creek Dam Facility

P1. Other Identifier: Matanzas Reservoir & Dam

***P2. Location:** ☐ **Not for Publication** ☒ **Unrestricted** ***a. County** Sonoma **and**

***b. USGS 7.5′ Quad** Santa Rosa, Calif. **Date** 2018 **T** 7N; **R** 7W; SE ¼ **of Sec** 32; M.D. **B.M.**

c. Address _____ City Santa Rosa Zip 95404

d. UTM: Zone 10S; 530287.4mE / 4250909.7mN

e. Other Locational Data: (APN# 049-130-006) Matanzas Creek Dam Facility can be accessed via a gate-protected road off Bennett Valley Road, approximately 115 feet southeast of the 5556 Bennett Valley Road gate. Elevation is 425 feet.

***P3a. Description:**

For the purposes of this form, the Matanzas Creek Reservoir, the Matanzas Creek Dam (Dam), and the associated components are collectively referred to herein as the Dam Facility. The Dam Facility, which is southeast of the City of Santa Rosa and has access via Bennett Valley Road, was constructed in 1963 and 1964 as part of the Central Sonoma Watershed project as a flood protection measure to prevent flooding of existing and future development in and around Santa Rosa. The dry reservoir[1] is fed from Matanzas Creek; the Dam Facility consists of the dam, the primary spillway, an auxiliary spillway, an intake structure, an outlet channel, a dike, an access road, and the reservoir (see **Site Map** and Continuation Sheet).

***P3b. Resource Attributes:** HP21 - Dam

***P4. Resources Present:** ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other

P5a. Photo or Drawing: **Photograph 1**

P5b. Description of Photo:

Photograph 2: Matanzas Creek Dam; upstream on left, with access road in foreground, view to southwest, February 24, 2021.

***P6. Date Constructed/Age and Sources:**
☒ Historic 1963-1964 (DWR 2019)

***P7. Owner and Address:**
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

***P8. Recorded by:**
Karin G. Beck
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612

***P9. Date Recorded:** February 24, 2021

***P10. Survey Type:** Intensive

[1] A dry dam is constructed for the purpose of flood control. During intense rainfall, when the excess water would otherwise cause flooding, the dam releases the excess water downstream at a controlled rate. The remainder of the year, the reservoir is dry.

***P11. Report Citation:** AECOM, *Matanzas Creek Dam Historical Resources Inventory and Evaluation Report, NRCS Supplemental Watershed Plan, Sonoma County, California* (2021).

***Attachments:** ☒ Location Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record ☒ Site Map

*NRHP Status Code 3D
*Resource Name or #: Matanzas Creek Dam Facility

B1. Historic Name: Matanzas Creek Dam
B2. Common Name: Matanzas Creek Reservoir & Matanzas Creek Dam
B3. Original Use: Flood detention dam B4. Present Use: Flood detention dam
*B5. Architectural Style: Earth and rock fill dam with a clay core; utilitarian
*B6. Construction History: See Continuation Sheet

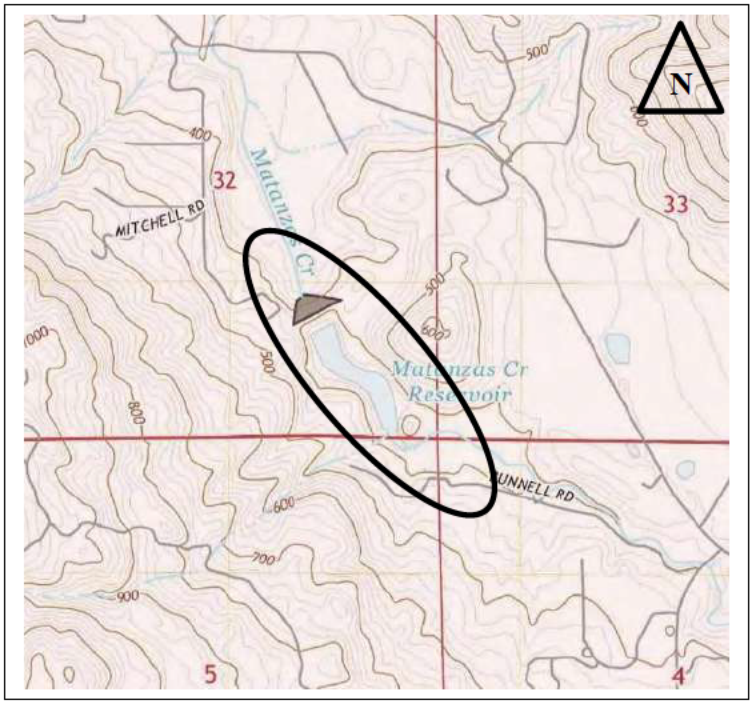
*B7. Moved? ☒ No ☐ Yes ☐ Unknown Date: Original Location:
*B8. Related Features:

B9. Architect: Woodward, Clyde, Sherard & Associates b. Builder: Plumas Development Company
*B10. Significance: Theme: Post-war flood protection Area: Sonoma County
Period of Significance: 1958-1964 Property Type: Flood control Applicable Criteria: NRHP/CRHR Criterion A/1 as a contributing element of a potential CSWP Historic District

The Dam Facility does not appear to be individually eligible for listing in the National Register of Historic Places (NRHP) nor in the California Register of Historical Resources (CRHR). However, it may be eligible as a contributing element to a potential Central Sonoma Watershed Project (CSWP) historic district consisting of earthfill dams, four reservoir facilities, and several improved conveyance channels that were designed and constructed between 1958 and 1964. Although the Matanzas Creek Dam Facility is not individually eligible, the integrated flood control system may be significant as a discontiguous historic district because it prevented the constant flooding of the City of Santa Rosa and other areas of Sonoma County, facilitating additional growth and economic development into the latter half of the 20th century and today (NRHP/CRHR Criteria A/2). The potential period of significance is 1958 to 1964.
(See Continuation Sheet)

B11. Additional Resource Attributes:

*B12. References: *Dams Within Jurisdiction of the State of California* (Department of Water Resources, Division of Safety of Dams, 2019); *Watershed Work Plan* (Santa Rosa Soil Conservation District, Sonoma County Flood Control and Water Conservation District, 1958); *Central Sonoma Watershed Protection and Flood Prevention Project, Plans for Construction, D57-2* (Sonoma County Flood Control & Water Conservation District, 1964) see Continuation Sheet.



B13. Remarks:

*B14. Evaluator: Karin G. Beck

*Date of Evaluation: February 2021

(This space reserved for official comments.)

P3a. Description (continued):

Matanzas Creek flows north from the northern slope of Sonoma Mountain into Bennett Valley, formed between Taylor Mountain and Bennett Mountain. The creek flows under Grange Road through the Matanzas Creek Reservoir, meandering toward the Dam before reaching the Intake (Inlet) Structure at the base of the Dam. The Primary Spillway leads from the Intake Structure to an Outlet Structure, Stilling Basin, and Outlet Channel on the downstream side via a concrete conduit below the Dam (see Site Map).

The Dam is a 685-foot-long, 95-foot-tall earth and rock fill dam with an impervious clay core (see **Plate 1**). It has a cambered crest, with a crest elevation (without camber) at 425 feet above sea level. The Dam's walls are tapered on both the upstream and downstream sides. There is a 10-foot-wide graded, riprapped berm on both faces of the Dam, at 375 feet above sea level on the upstream face and 380 feet above sea level on the downstream side. A second, similar 10-foot-wide berm is on the downstream face at 350 feet elevation. Both faces of the Dam are covered with a thin layer of grasses.

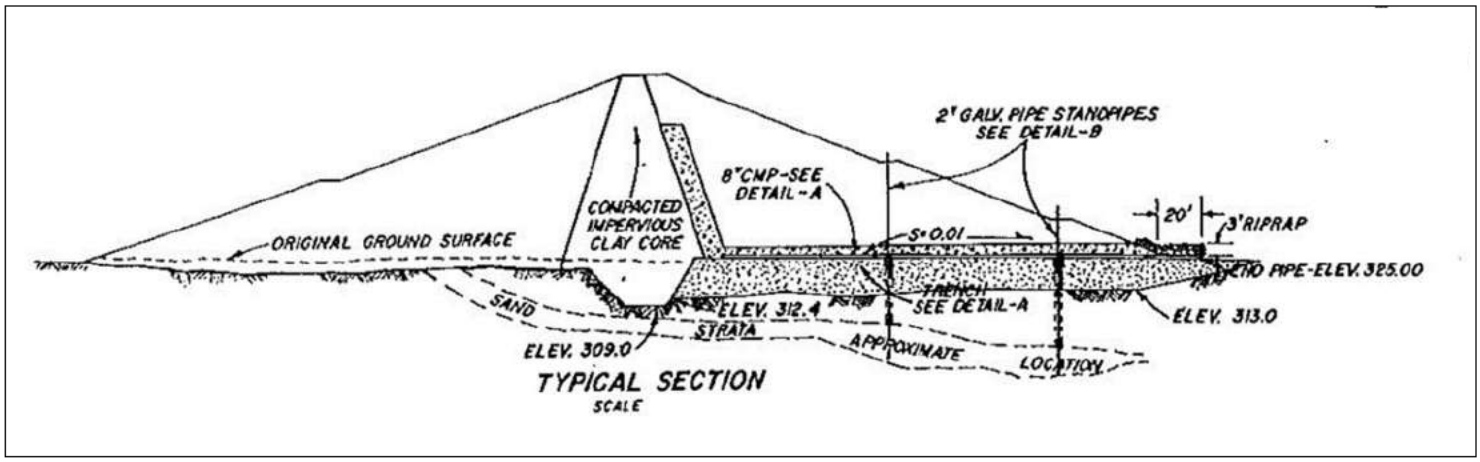


Plate 1: Cross section of Matanzas Creek Dam.[2]

The Intake Structure is a 26- by 26- by 41-foot-tall concrete structure at the southeastern base of the Dam (Error! Reference source not found.). It has four large, steel bar "trash racks" over the upper openings (see **Plate 2**) on each elevation. The upper openings are 7 feet from the top of the structure and measure nearly 9.4 feet tall by 4.7 feet wide. On the western elevation, there are two openings below the upper openings on the south half that appear to be of similar size, but no trash racks are present. The southern elevation has one lower opening of smaller size, with a bush currently growing from its base.

There is an 18-inch-diameter steel outlet pipe on the southwestern corner of the southern elevation of the Intake Structure (see **Photograph 4**, **Plate 3**). A two-sided, tented trash rack (currently half buried by vegetation) measuring 6.5 feet tall by roughly 6 feet wide, protects the pipe from flood debris. The pipe has a slide gate connected to a rod that runs the full height of the Intake Structure to the roof, where a turn wheel was located to open the gate to allow water to flow through the Primary Spillway (see **Plate 2**). The turn wheel is no longer present, and a railing on the southwestern corner of the roof has been added as a safety measure (see **Photograph 4**). Additionally, metal conduit has been added to the western and southern elevations in this location, likely to assist with an added control measure near the gate. On the northeastern corner of the northern elevation, sixteen individual metal rungs are bolted to the Intake Structure, forming a ladder, with two "D"-shaped galvanized handles attached to the highest rung to provide access to the roof, which is flat.

[2] Sonoma County Flood Control District and Water Conservation District. 1962. *Central Sonoma Watershed Protection and Flood Prevention Project, Plans for the Construction of Matanzas Creek Reservoir.* Prepared by Woodward, Clyde, Sherard & Associates, Consulting Civil Engineers – Oakland, California.

Photograph 2: View of intake structure showing western/southern elevations (upstream), with the trash rack partially buried on the western side of the southern elevation; dam is in the background, February 24, 2021 (AECOM)

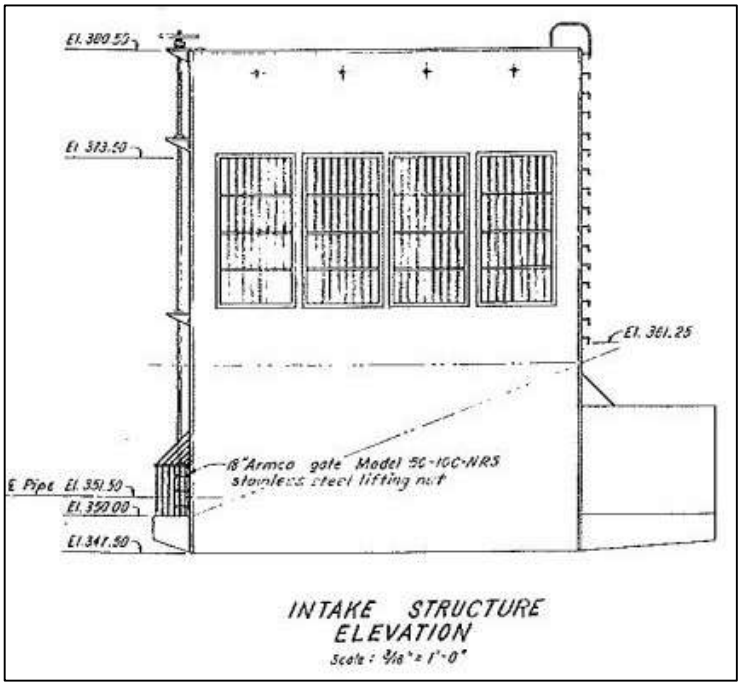


Plate 2: Intake Structure, eastern elevation.[3]

[3] *Ibid.*

The Primary Spillway leads from the Intake Structure to an Outlet Structure, Stilling Basin, and Outlet Channel on the downstream side via a concrete conduit at an elevation of 350 feet above sea level (Error! Reference source not found.) (see Site Map). The Outlet Structure is a portal at the toe of the Dam that opens to an 88-foot-long concrete spillway, with 14-foot-long wingwalls opening to a Stilling Basin and Outlet Channel (see **Plate 3**). The wingwalls are riprapped at the edges as are the surroundings of the Stilling Basin (**Photograph 4**); the size of the Stilling Basin is difficult to determine due to the surrounding vegetation. Approximately 500 feet downstream of the wingwalls, there is a 375-foot-long dike running roughly east to west where the Auxiliary (Emergency) Spillway and Outlet Channel intersect (**Photograph 5**) (see Site Map). The earthen dike measures 25 feet wide at the base, 10 feet wide at the crest, and is 13 feet tall. The Outlet Channel has been shaped and riprapped from the Stilling Basin to well north of the dike; the farther downstream reaches of Matanzas Creek, closer to the downtown Santa Rosa area, have been improved to include lined concrete channels.

Photograph 3: View of outlet structure and stilling basin at base of dam; view to southeast, February 24, 2021 (AECOM)

The Auxiliary Spillway is southeast of the Dam and wraps around a natural rise in the landscape—immediately east of the dam—that has been fortified with waste material from the construction of the Dam Facility (**Photograph 6**). At its opening, the Auxiliary Spillway is approximately 350 feet wide and then narrows to 200 feet wide for approximately 750 feet (**Photograph 7**). The spillway narrows further as it turns to the north, then to the west, around the aforementioned rise. It narrows down to a small creek as it skirts the southern side of the dike, until it reaches the riprapped intersection with Matanzas Creek. The upper portion of the Auxiliary Spillway is lined on the northern side with riprap, and there is a concrete sill 10 feet deep by 3 feet wide is approximately 250 feet east into the spillway to prevent undercutting during wave action while in use (**Photograph 8, Plate 4**).

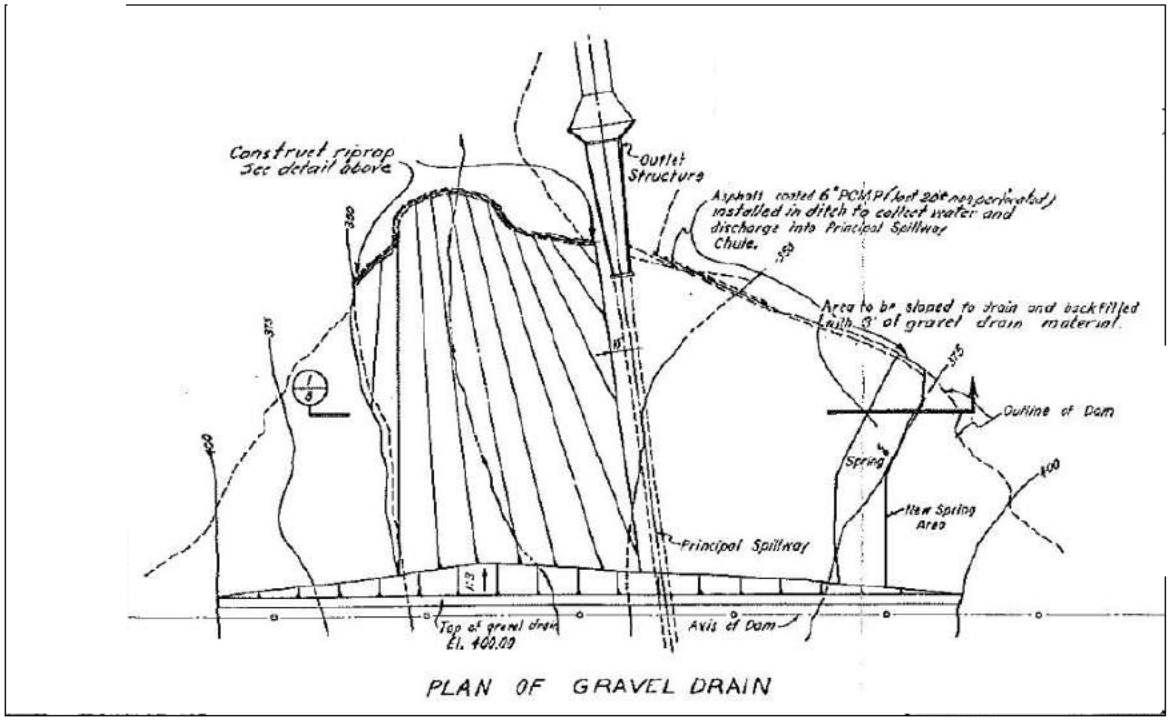
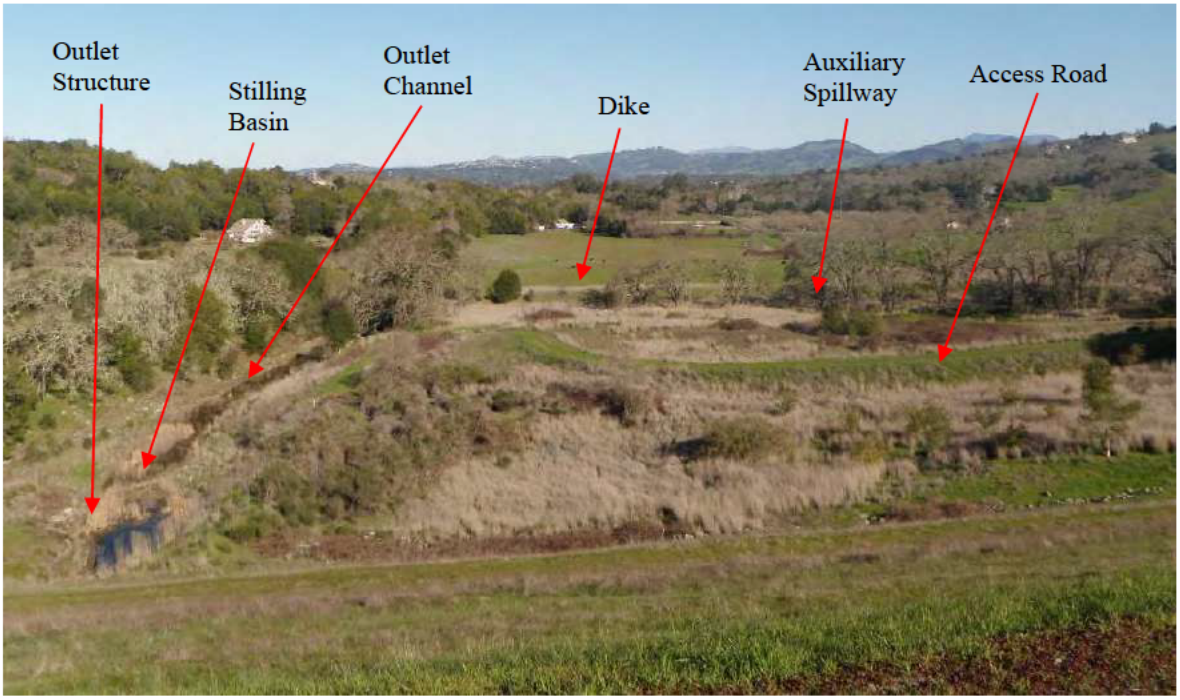


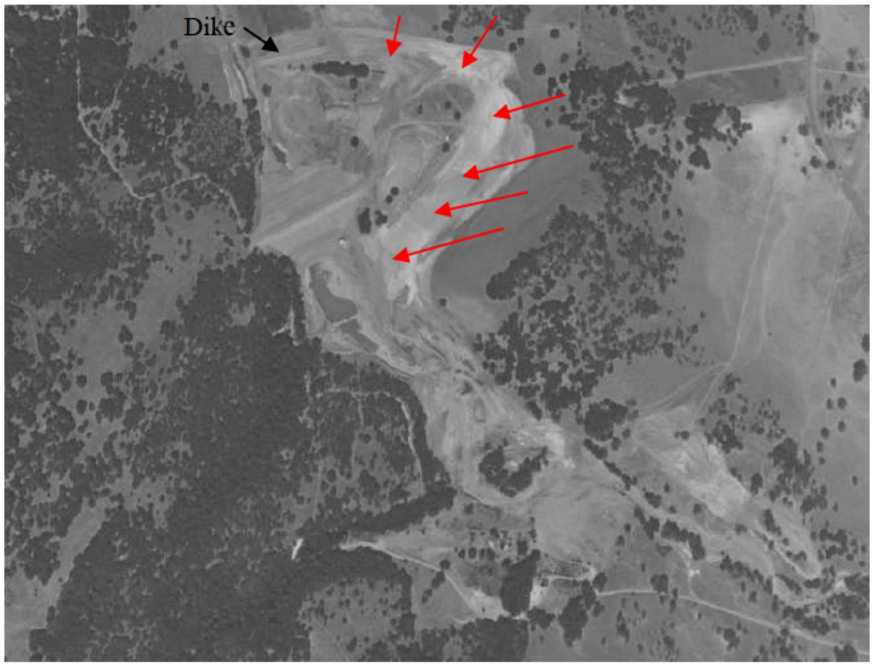
Plate 3: Outlet Structure[4]

Photograph 4: Stilling Basin (foreground-right) and Outlet Channel (background); view to the north, February 24, 2021 (AECOM)

[4] *Ibid.*



Photograph 5: View from the Dam of the Outlet Structure, Stilling Basin, Outlet Channel, Dike, and Access Road; view to the north, February 24, 2021 (AECOM)



Photograph 6: Aerial view of the Dam Facility after construction in August 1964, with the scar of the Auxiliary Spillway highlighted with red arrows; view to the north, August 1964[5]

[5] UCSB FrameFinder. 1964. August. Available online at: https://mil.library.ucsb.edu/ap_indexes/FrameFinder/.

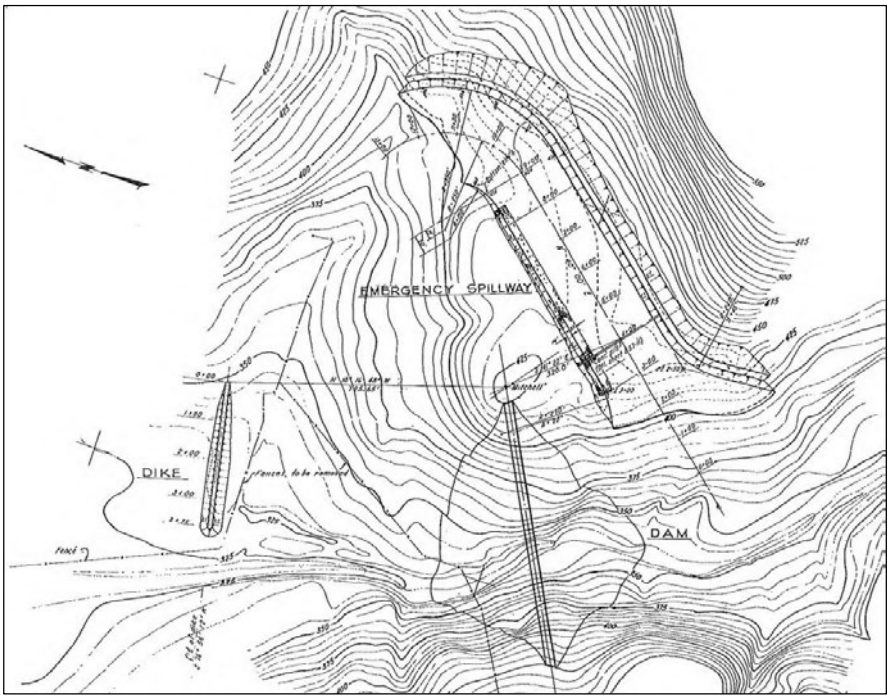


Plate 4: Design drawing showing Auxiliary (Emergency) Spillway[6]

Photograph 7: Auxiliary Spillway; view toward the southwest, February 24, 2021 (AECOM)

[6] Sonoma County Flood Control District and Water Conservation District. 1962. *Central Sonoma Watershed Protection and Flood Prevention Project, Plans for the Construction of Matanzas Creek Reservoir.* Prepared by Woodward, Clyde, Sherard & Associates, Consulting Civil Engineers – Oakland, California.

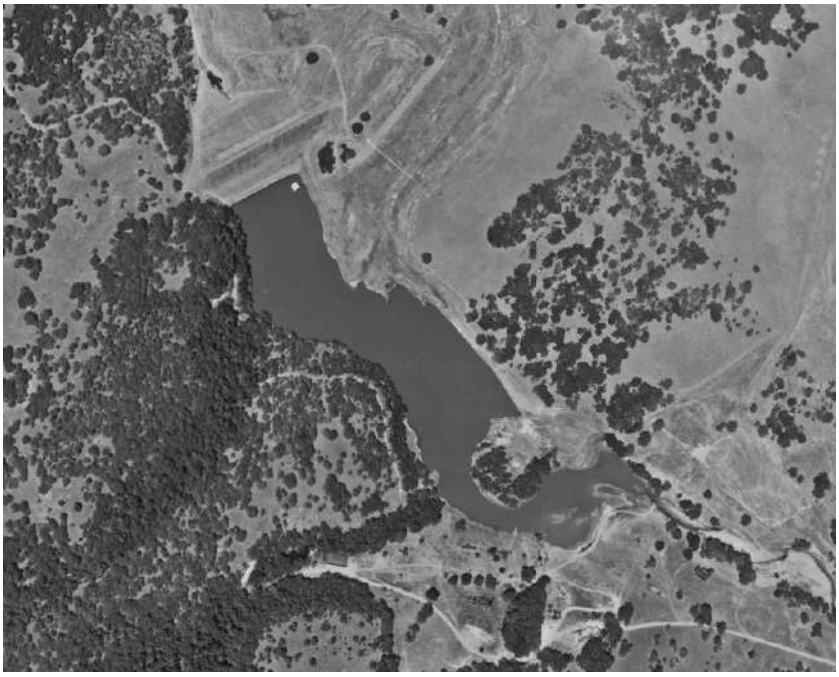
Photograph 8: Northern bank within Auxiliary Spillway showing the riprap and concrete sill; view to the northwest, February 24, 2021 (AECOM)

A gravel access road leads from a locked gate on Bennett Valley Road and west onto the Dam Facility property. After about 0.25 mile, it branches to the south, following the eastern edge of the reservoir and ending near the creek after about 0.5 mile. The main Access Road continues approximately 0.15 mile from where it branches to the south, then turns north to follow the eastern edge of the reservoir. The road passes the entrance to the Auxiliary Spillway and reaches the eastern crest of the Dam, where it splits again (**Photograph 9**). A more overgrown road continues downstream, curving west then north to a flat. There, it finally turns to the south and ends on a terrace above the Stilling Basin. The road on the Dam crosses the crest to the west; the road splits to the north through a locked property gate and continues north, then west, and then north again, joining Mitchell Road. This road appears unused on the Dam Facility property. The Access Road to the south from the Dam crest follows the western edge of the Reservoir at approximately the same elevation as the eastern road (425 feet above sea level), but ends at a turnaround approximately 0.3 mile from the Dam (as the crow flies).

The Matanzas Creek Reservoir is designed to remain dry until heavy rains are dammed and stored, and the flow of water can be released downstream at a more constant rate to avoid flooding. Matanzas Creek Reservoir has a total storage capacity of approximately 1,500 acre feet[7] and reaches to about 2,300 feet west of Grange Road Bridge. In late January 1964, the Dam Facility experienced its first winter storm that brought enough rain to impound water in the Reservoir (see Photograph 6). It was reported that the Central Sonoma Watershed's flood control system resulted in a reduction of about a third of the water that would have been in the stream flow.[8] The following year, extreme winter storms occurred in many areas of the northern California and other western states, resulting in extensive flooding, including the nearby Russian River watershed.[9] The Dam Facility functioned as designed and still stored water by May 1965 (**Photograph 10**).

[7] *Ibid*.
[8] *Press Democrat*, "Watershed's Flood Dams Get First Test." January 22, 1962. 37. Santa Rosa, California.
[9] Waananen, A.O., D.D. Harris, and R.C. Williams, 1971. Floods of December 1964 and January 1965 in the Far Western States. United States Department of Interior, Geological Survey Water-Supply Paper. Available online at: https://pubs.usgs.gov/wsp/1866a/report.pdf.

Photograph 9: Access Road approach to the eastern side of the Dam; view to the southwest, February 24, 2021 (AECOM)



Photograph 10: Aerial view of the Dam in May 1965, with the Reservoir full; view to the north, May 1965[10]

[10] UCSB FrameFinder. 1965. May. Available online at: https://mil.library.ucsb.edu/ap_indexes/FrameFinder/.

B6. Construction History (continued):

Matanzas Creek Dam was the final dam to be completed of the Central Sonoma Watershed project. The primary function of the dam is to provide a detention structure for floodwaters during periods of intense rainfall and runoff.[11] In July 1962, the construction contract was awarded to the Plumas Development Company of Oroville, for $469,126.[12] Construction of the primary spillway, auxiliary spillway, intake structure, outlet channel, dike, access road, and reservoir were underway when in summer 1963, additional money (approximately $30,000) was requested because the contractor "ran into quick-sand-like foundation material" at the base of the dam and near the east abutment.[13] Despite cores being drilled prior to engineering, the 60-foot-deep tilted shaft of material was not identified prior to construction. If the problem did not get resolved by winter, the contractor would have had to breach the dam embankment to allow for drainage of the increased storm waters, and reconstruct it the following summer.[14] The problem was not considered unique; similar circumstances were encountered at the big Coyote Dam north of Ukiah. In both cases, a gravel blanket atop the material was engineered to allow for drainage to the downstream side. The delay to the construction was not substantial, and the system was in place for the first winter storm in January 1964.[15]

Modification to the Dam Facility

The Dam Facility remains today as it was built in 1963, except for the Reservoir, which has undergone sediment removal on multiple occasions. In 1988, approximately 100,000 cubic yards of material and vegetation were dredged from the reservoir bottom.[16] In 2006 and 2007, approximately 120,000 cubic yards of material and vegetation were removed from the reservoir,[17,18] with inlet maintenance removal of sediment materials occurring annually from 2010 through 2019.[19]

B10. Significance (continued):

Historic Context

Matanzas Creek, in addition to several other creeks, flows into Santa Rosa Creek (**Plate 5**). Santa Rosa Creek then flows west through the City. The first wave of settlers built beyond the Santa Rosa Creek floodplain, outside of what is now the City of Santa Rosa, but further growth resulted in buildings along the borders of Santa Rosa Creek. It became a steep-sided creek channel, missing much vegetation and prone to erosion. The first recorded flood occurred in 1861, and floods became annual events into the twentieth century.[20, 21] A series of winter floods between 1935 and 1945 caused more than $6 million dollars in damage. As early as 1937, the Sonoma County Board of Supervisors requested a study by the USACE of the Russian River Basin to develop a comprehensive flood control plan for northern Sonoma County. The study was delayed by World War II.[22]

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[11] Woodward, Clyde, Sherard & Associates. 1964, "Final Analysis of Design, Design Calculations and Estimates, Matanzas Creek Dam, Central Sonoma Watershed Project, Sonoma County, California." Oakland, California.
[12] *Press Democrat*, "Action by Board of Supervisors." July 17, 1962. 4. Santa Rosa, California.
[13] *Ibid.*, "Pocket of Quicksand Hikes Cost of Matanzas Project." August 2, 1963. 3. Santa Rosa, California.
[14] *Ibid*
[15] *Ibid,* "Watershed's Flood Dams Get First Test." January 22, 1964. 37. Santa Rosa, California.
[16] Sonoma County Water Agency. 2005. *Matanzas Creek Detention Reservoir Sediment Removal Project, SCH No. 2001062092*.
[17] *Ibid*.
[18] Google Earth. Various dates. Aerial Photographs of APE. Santa Rosa, California.
[19] *Ibid*.
[20] *Press Democrat, The.* 1904. February 12. "Flood Is Caused by Heavy Rains." Available online at: https://cdnc.ucr.edu. Accessed June 2021.
[21] *Press Democrat, The.* 1909. January 16. "Rising Floods Threaten Much Damage In County." Available online at: https://cdnc.ucr.edu. Accessed June 2021.
[22] Sonoma County Water Agency. 1999. *Fifty Years of Caring for Sonoma County Water Resources.* Available online at: http://www.drivecms.com/uploads/scwa.ca.gov/biennial_report.pdf. Accessed February 2021.

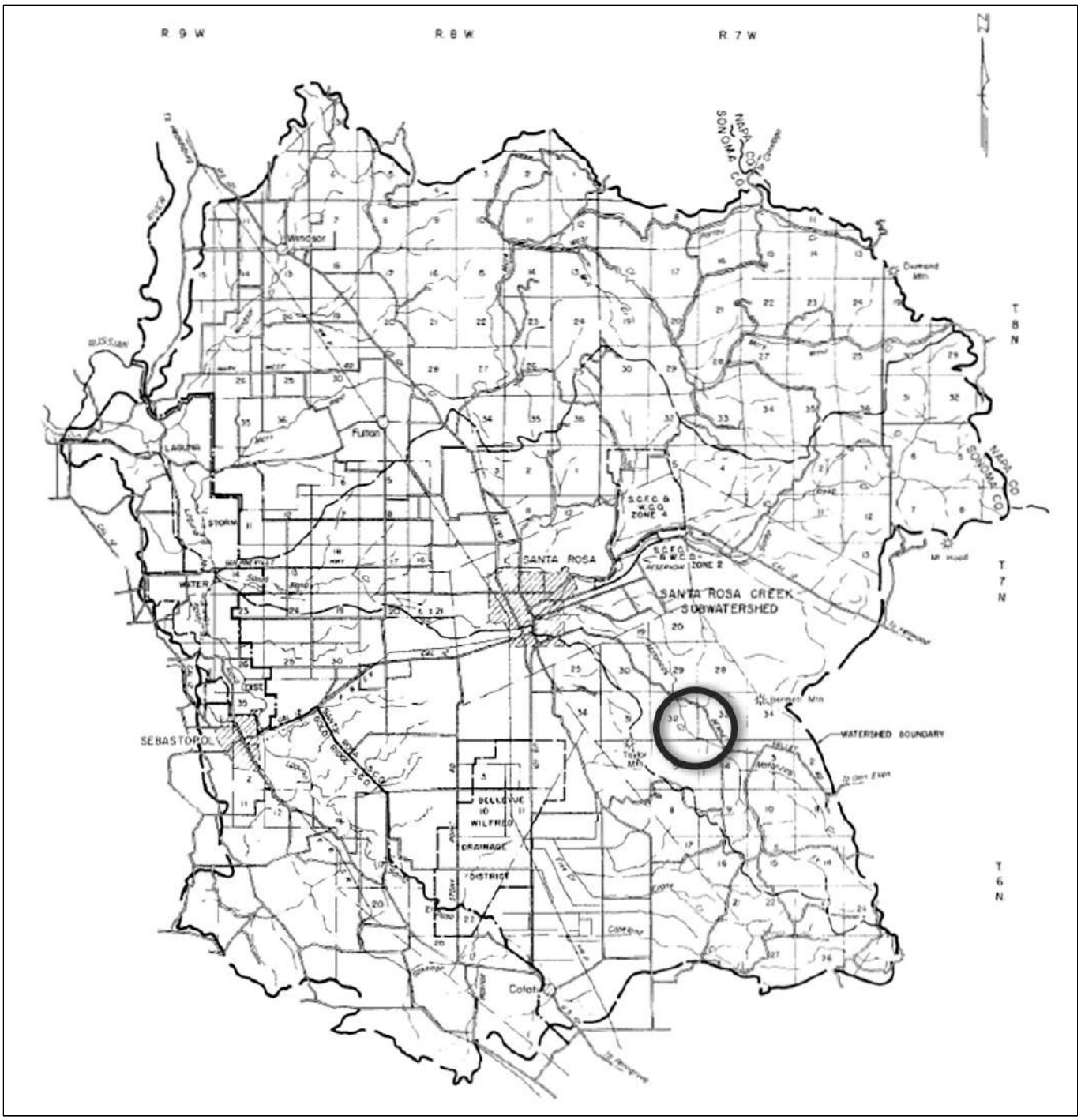

Plate 5. 1958 map of the 50,000-acre Santa Rosa Creek subwatershed area for the Central Sonoma Watershed Project; future location of the Dam Facility circled in black; notes added by AECOM[23,24]

[23] City of Santa Rosa Public Works Department. 2006.
[24] Santa Rosa Soil Conservation District and Sonoma County Flood Control and Water Conservation District with assistance by U.S. Department of Agriculture Soil Conservation Service. 1958.

After World War II, a USACE study published in 1949 identified areas of repeat flooding events and declining groundwater quality as significant threats to continued economic growth of the region. The Sonoma County Flood Control and Water Conservation District (now called the Sonoma County Water Agency [Sonoma Water]) was created by state law in 1949 to implement USACE's recommendation for flood control and water conservation reservoirs on the Russian River and tributaries north of Ukiah in northern Sonoma County and southern Mendocino County.[25]

This flood control system was completed in 1959; however, large areas of Sonoma County around Santa Rosa continued to be inundated with flood waters.[26] After a severe flood in 1955, local agencies requested assistance from the federal government through the United States Department of Agriculture (USDA) Soil Conservation Service (now the Natural Resources Conservation Service). This resulted in preparation of the Central Sonoma Watershed Work Plan. By 1958, when the Watershed Work Plan was prepared, flooding in the Santa Rosa Creek watershed occurred annually and occasionally up to three times in a single winter.[27,28]

The 1958 *Watershed Work Plan for the Central Sonoma Watershed* was prepared with cooperation between the Santa Rosa Soil Conservation District and the Sonoma County Flood Control and Water Conservation District, with assistance from the USDA Soil Conservation Service (now NRCS). As designed, the system of dams and channel improvements would virtually eliminate flooding in the 50,000-acre Santa Rosa Creek subwatershed and provide protection against a 100-year flood event (see **Plate 4**). The proposal included six earthen dams in the Santa Rosa Watershed, and more than 30 miles of channel improvements (**Plate 6**). The project was submitted to Congress with a request for $13 million, which was the largest project presented under the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Statute 666), as amended by the Act of August 7, 1956 (Public Law 1018, 84th Congress, 70 Statute 1088), also called the Small Watershed Act.[29,30]

Although 87 percent of the watershed area was pasture/rangelands, crops, orchards/vineyards, or woodland and brush, after World War II the local economy was shifting away from agriculture. Both the City of Santa Rosa and Sonoma County experienced higher rates of population growth than other parts of the state between 1940 and 1957; Santa Rosa's population grew 130 percent and Sonoma County's grew 103 percent. The relatively close proximity to San Francisco and the mild climate attracted people, including retirees, to the area; that and industrial development resulted in the corresponding growth of the service, retail, and business industries. A subsequent building boom occurred in Santa Rosa, with more than 2,400 building permits issued between 1952 and 1956 alone. As a result of this urban and suburban expansion, agriculture production was anticipated to diminish through encroachment by residential, commercial, and industrial developments. In relation to the watershed project, city and county planning agencies predicted the intensification of land use patterns with the increasing population and shift of the economy. Therefore, proponents of the Santa Rosa Creek phase of the CSWP strongly believed in joint action to create a flood protection system as soon as possible before further encroachment and development into the floodplain occurred during this period of rapid expansion.[31,32]

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[25] *Ibid.*
[26] *Ibid.*
[27] *Ibid.* Santa Rosa Public Works Department. 2006.
[28] Santa Rosa Soil Conservation District and Sonoma County Flood Control and Water Conservation District with assistance by U.S. Department of Agriculture Soil Conservation Service. 1958. *Watershed Work Plan, Central Sonoma Watershed, Sonoma County, California.* April.
[29] *Press Democrat.* 1958. March 7. "Santa Rosa Watershed Outlined to Board." Available online at: https://cdnc.ucr.edu. Accessed February 2021.
[30] *Cloverdale Reveille.* 1958. January 2. "List 1957 Acts Made in County."
[31] *Ibid.* City of Santa Rosa Public Works Department. 2006.
[32] Santa Rosa Soil Conservation District and Sonoma County Flood Control and Water Conservation District with assistance by U.S. Department of Agriculture Soil Conservation Service. 1958.

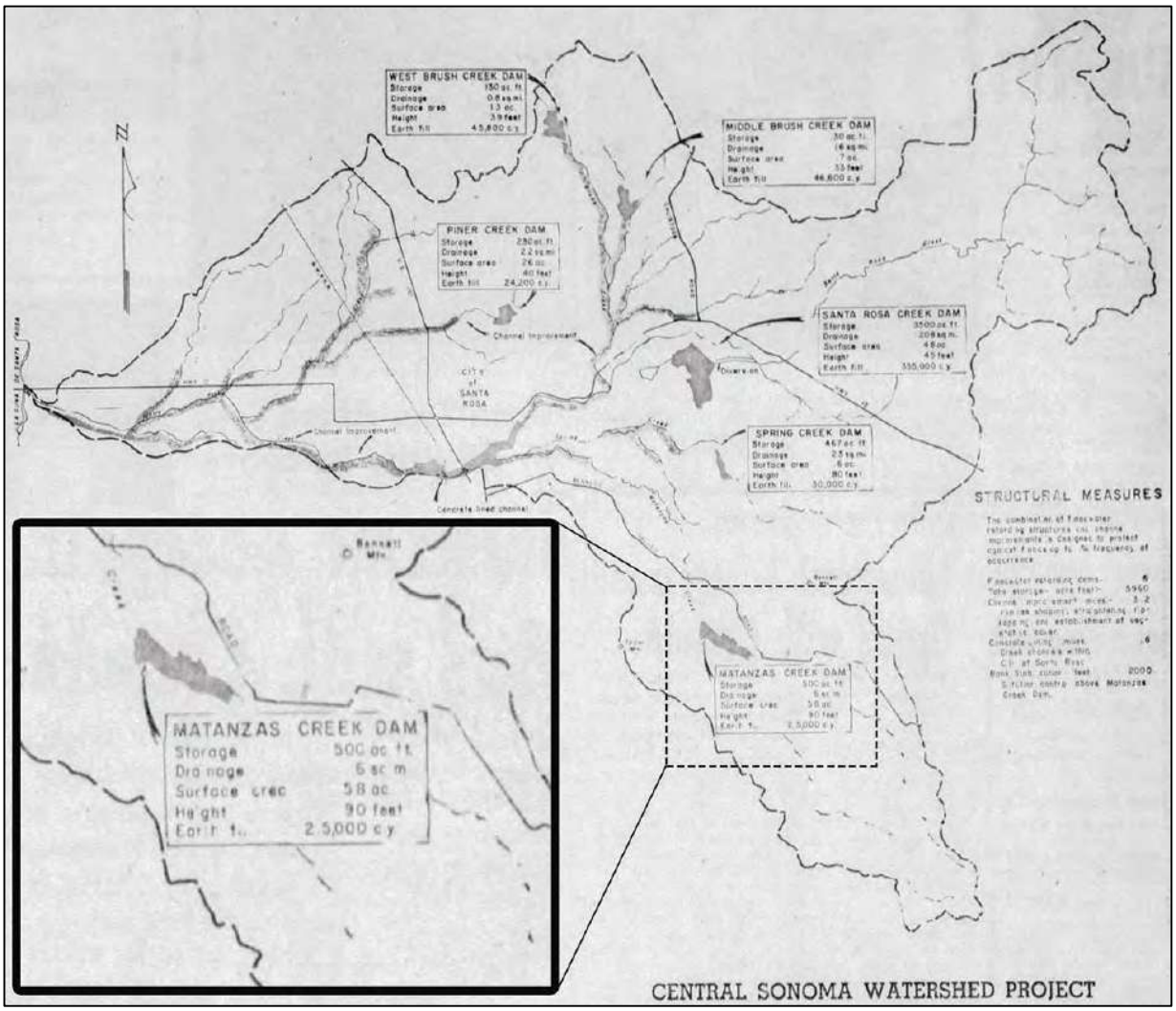


Plate 6. Proposed Central Sonoma Watershed Project with six flood detention structures, Matanzas Creek Dam at bottom within dashed line; edits by AECOM[33]

Only four of the six floodwater protection facilities were constructed; the West Fork Brush Creek Reservoir and the Spring Creek Reservoir were not constructed. What was constructed was "of a conventional design" made with local fill material.[34] Construction was proposed to span 5 to 6 years, with the majority of the project funded with federal monies. After completion, the Sonoma County Flood Control and Water Conservation District would be responsible for ongoing maintenance of the system. When the federal funds were awarded in the summer of 1958, Gordon W. Miller, chief engineer of the Sonoma County Flood Control and Water Conservation District, sought additional engineers to work on the project, either by hiring directly through the district or hiring a private engineering firm to produce the plans under his direction.[35]

[33] *The Press Democrat.* 1959. May 3. "Central Sonoma Watershed Project to End Santa Rosa Valley Annual Flood Peril."
[34] *Ibid*. Santa Rosa Soil Conservation District and Sonoma County Flood Control and Water Conservation District with assistance by U.S. Department of Agriculture Soil Conservation Service. 1958.
[35] *Press Democrat.* July 30. "$11 Million SR Flood Job OK'd."

In the late 1950s, the Matanzas Creek channel in Bennett Valley was large and increasing in size with bank erosion, which was a major problem in the area. Nearly a third of an acre was lost each year to creek bed erosion. Toward the City of Santa Rosa, the channel was partially planted with vegetative protection to slow the erosion, but erosion still occurred. During flood events at the confluence of Santa Rosa Creek and Matanzas Creek near the central core of the City of Santa Rosa, Santa Rosa Creek would overtop and Matanzas Creek would overflow, causing more flood damage in downtown Santa Rosa.[36,37]

The firm of Woodward, Clyde, Sherard & Associates conducted the initial soil and geotechnical studies and designed the Dam Facility. The firm was established in Oakland in 1950 and were consulting soil engineers and geologists.[38] By 1960, the firm had established offices in Oakland, Denver, Omaha, Kansas City, Philadelphia, Montclair, New Jersey, St. Louis, San Diego, and New York City. In 1962 and 1963, four of the firm's senior partners co-authored the book *Earth & Earth-Rock Dams,* which helped establish the firm's technical expertise in embankment dams. In 1978, the firm took the name Woodward Clyde Consultants, which it kept until its acquisition by URS-Greiner in 1997. By that time, they had 162 offices with 7,000 employees in 17 countries. In October 2014, URS was acquired AECOM.[39]

Plumas Development Company, an Oroville-based construction company, was awarded the contract for excavation and construction of the Dam. During excavation activities, a "freakish pocket of quicksand-like material" was discovered while excavating the streambed for the construction of the dam embankment. Although Woodward, Clyde, Sherard & Associates had conducted core drillings of the proposed site for the dam as part of the pre-design studies, all of the cores missed the 60-foot-deep slanted shaft of material at the bottom of the stream bed.[40]

Engineers from the various entities involved in the project designed a solution to place a gravel blanket on top of the quicksand-like material and allow the water to drain downstream at a controlled rate through relief wells and standpipes (see **Plate 7** and **Plate 8**). A similar situation and solution were used at the Coyote Dam for the Russian River flood control project in northern Sonoma and southern Mendocino Counties. Gordon W. Miller, chief of engineering for the project described the modification as a "supercaution" and was confident of the solution.[41]

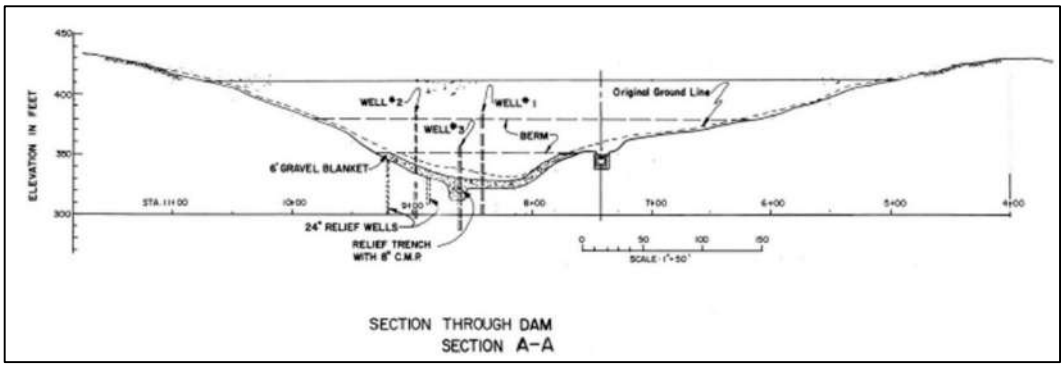


Plate 7. Cross section of gravel blanket solution for quicksand-like material encountered during construction[42]

[36] *Ibid.* City of Santa Rosa Public Works Department. 2006.
[37] *Ibid.* Santa Rosa Soil Conservation District and Sonoma County Flood Control and Water Conservation District with assistance by U.S. Department of Agriculture Soil Conservation Service. 1958.
[38] Rogers, J. David PE, CEG, CHG and Alan L. Kropp, PE, GE. 2021. *Threadlines of Geotechnical and Engineering Firms in Northern California.* Available online at: http://web.mst.edu/~rogersda/Geotechnical-Practice/. Accessed February 2021.
[39] *Ibid.* Rogers and Kropp. 2021.
[40] *Press Democrat.* 1963. August 2. "Santa Rosa Dam: Pocket of Quicksand Hikes Cost of Matanzas Project."
[41] *Ibid.*
[42] *Ibid.* Sonoma County Flood Control District and Water Conservation District. 1962.

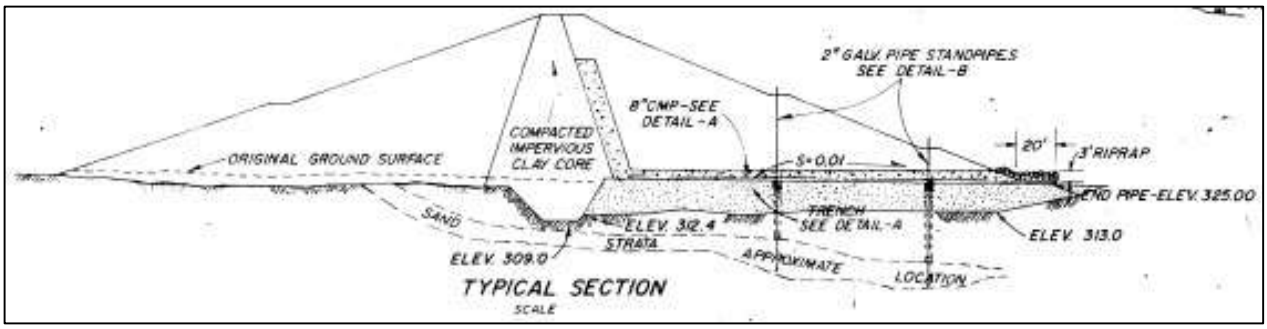


Plate 8. As-built cross-section of earth-fill Matanzas Creek Dam[43]

While excavation of the dam was on hold in early August 1963, the Plumas Development Company constructed the spillway and the 26- by 26-foot concrete spillway intake structure (**Plate 9**). The intake structure was designed to be submerged during normal dam operations and completely underwater during flood season. The spillway conveys flood waters from behind Matanzas dam at a controlled rate until the reservoir fills and activates the emergency spillway.[44]

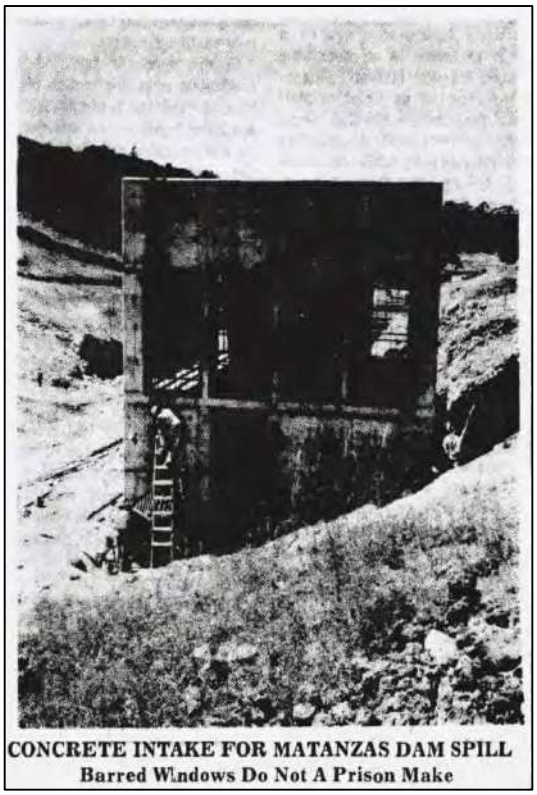

CONCRETE INTAKE FOR MATANZAS DAM SPILL
Barred Windows Do Not A Prison Make

Plate 9. Concrete intake under construction in August 1963[45]

[43] *Ibid*.
[44] *Ibid. Press Democrat*. 1963. August 2. "Santa Rosa Dam: Pocket of Quicksand Hikes Cost of Matanzas Project."
[45] *Ibid. Press Democrat*. 1963. August 2.

Once completed, the Dam Facility consisted of an earthen dike, an outlet channel, the earth-filled dam, the reservoir, the primary spillway with intake structure, the emergency spillway (auxiliary), and an access road.

Evaluation

Evaluation presented in this form concludes that the Matanzas Creek Dam Facility is not individually eligible for listing in the NRHP or CRHR. A full inventory and evaluation of the CSWP facilities is currently underway as part of a separate study being conducted in support of Sonoma Water's Central Sonoma Watershed Plan, a broader NEPA planning study currently being conducted by Sonoma Water in cooperation with NRCS. An evaluation of the entire CSWP is outside of the scope of this current Matanzas Creek Dam Rehabilitation Project study; however, based on research and evaluation conducted for this report, Matanzas Creek Dam may be eligible for listing in the NRHP as a contributing element of a potential Central Sonoma Watershed historic district consisting of earthfill dams, four reservoir facilities, and several improved conveyance channels that were designed and constructed between 1958 and 1964. While the Matanzas Creek Dam Facility is not individually eligible, the integrated flood control system may be significant as a discontiguous historic district because it prevented the constant flooding of the City of Santa Rosa and other areas of Sonoma County, facilitating additional growth and economic development into the latter half of the 20th century and today. The potential period of significance is 1958 to 1964. See Plate 11 for the location of the contributing elements of this potential historic district (the Spring Creek Bypass Culvert was constructed in 1988 after the period of significance and is not a contributing element of the potential historic district):

- Brush Creek Reservoir (1961)
- Piner Creek Reservoir (1964)
- Spring Lake (1963)
- Matanzas Creek Reservoir (1963)
- Diversion structure on Santa Rosa Creek (Vortex Tube) (1962)
- Diversion structure on Spring Creek (1962)
- Myriad channel conveyance facilities (including ~33.6 miles of stream channels and bridges/culverts constructed during the period of significance)

The evaluation below addresses the eligibility of the Matanzas Creek Dam Facility as an individual facility. Evaluation of the entire CSWP for eligibility as a historic district, currently underway for the Central Sonoma Watershed Plan, will be reported on separately.

NRHP/CRHR Criterion A/1: The Dam Facility is an integral part of the CSWP's flood control system, which played an important role in curtailing the nearly annual flooding in and around the City of Santa Rosa prior to the 1960s. The Santa Rosa/Sonoma County area was growing at a rate of 100 to 160 percent between 1940 and 1957, much higher than the rate of population increase experienced in other areas of the state. The CSWP was initiated because, based on population, economic, and building trends, development was going to expand into the floodplains, which would impede future economic growth of the region.

The Dam is the southernmost structure in the flood control system. It occupies an area that was almost 90 percent rural/ agricultural lands and not heavily populated before the construction of the Dam Facility and does not appear to have changed much since. However, the construction of the Dam Facility, in addition to the other CSWP's flood control system, has significantly reduced the constant flooding at the confluence of Matanzas and Santa Rosa creeks in the City of Santa Rosa. Over the subsequent decades, this may have facilitated additional growth of the region southeast of Santa Rosa in the area south of Hoen Avenue and east of Bennett Valley Road, where the CSWP provides considerable flood protection.

Based on these considerations, the Dam Facility is not individually eligible for listing in the NRHP. However, it may be eligible as a contributor to a potentially eligible Central Sonoma Watershed historic district, which meets the NRHP/CRHR Criterion A/1 as the larger flood control system that prevented the constant flooding of the City of Santa Rosa, facilitating additional growth and economic development into the latter half of the 20th century and today. The evaluation of the eligibility of the Central Sonoma Watershed as a historic district is underway and will be reported on separately.

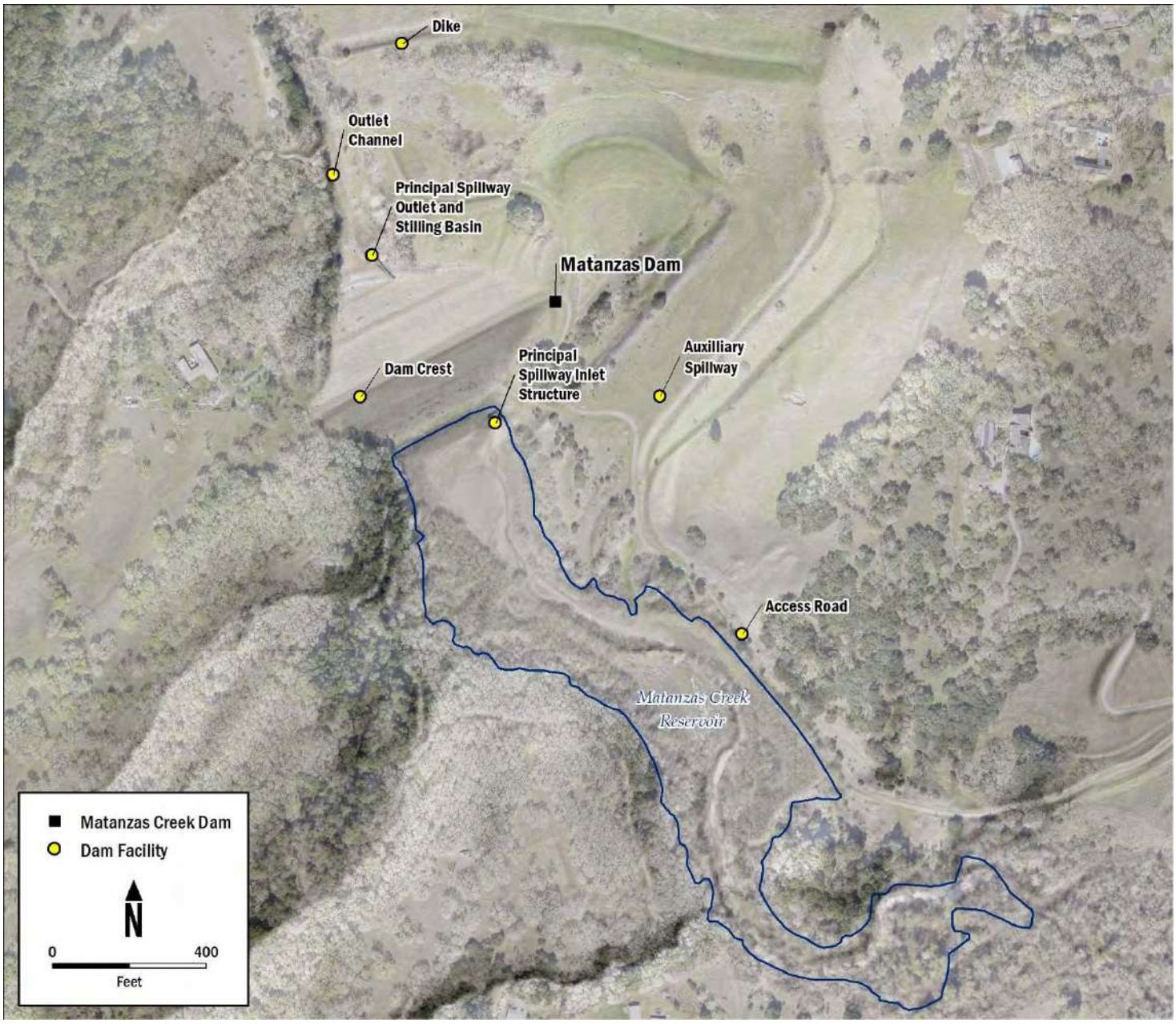
NRHP/CRHR Criterion B/2: The Dam Facility does not have associations with persons who gained prominence in their professions or made significant contributions in local, state, or national history, therefore it does not appear to be eligible under these criteria.

NRHP/CRHR Criterion C/3: The Dam Facility design was called "conventional," although the design later needed to be adapted to account for the quicksand-like material discovered during excavation. However, the same situation and solution were encountered at another flood control facility under construction by Sonoma Water, so the Dam Facility does not appear to exhibit particularly significant design or engineering characteristics. Additionally, although the engineering and design firm, Woodward, Clyde, Sherard & Associates, specialized in soils and geotechnical civil engineering designs and may be considered master engineers, the conventional nature of the design does not rise to the level of significance to be considered an exemplary example of their engineering abilities. In consideration of these factors, the Dam Facility does not appear to meet the NRHP/CRHR Criterion C/3.

NRHP/CRHR Criterion D or 4: This criterion is usually reserved for archaeological sites if they have yielded, or may likely yield, information important in prehistory or history. The property must have or have had information to contribute to our understanding in history, and the information must be considered important. In rare instances, structures such as dams can serve as sources of important information about historic construction materials or technologies; however, this property is otherwise documented and does not appear to be a principal source of important information in this regard.

Integrity: As noted above, integrity of an historic resource is measured by application of seven aspects: location, design, setting, workmanship, materials, feeling, and association. The Dam Facility has retained integrity of all seven aspects. It remains in its original location, with the setting unchanged from its original construction. It has not been substantially altered (the only changes being the removal of sediment from the reservoir), so it retains integrity of design, workmanship, and materials. Its physical elements, function, and setting maintain its integrity of feeling and association.

Site Map:


Dike
Outlet Channel
Principal Spillway Outlet and Stilling Basin
Matanzas Dam
Dam Crest
Principal Spillway Inlet Structure
Auxilliary Spillway
Access Road
Matanzas Creek Reservoir
Matanzas Creek Dam
Dam Facility
N
0
400
Feet

B10. Significance:

Based on the review of aerial photography, project plans, and as-builts, it appears the roadbed (SITE 2020-107-01) recorded in 2021 is associated with the construction of the Matanzas Creek Dam and does not predate the spillway, as described in the site form. The alignment of the roadbed appears to be south of the previously existing fence line that followed parcel lines of the larger farm property owned by the Mitchell family. The construction of the Matanzas Creek Dam and associated structures resulted in the removal of this fence line and the disturbance of much of the area for earthmoving activities associated with the construction of a larger borrow area and the dam overall (see Plate 1 and 2), and neither project plans nor the as-builts indicate a road was extant before the construction of the dam (see Plate 3). As shown in Plate 4 in 1965 aerial, much of the area around the extant roadbed was heavily disturbed after construction of the dam and associated structures. Therefore, it appears the resource is an abandoned roadbed associated with the construction of the Matanzas Creek Dam.

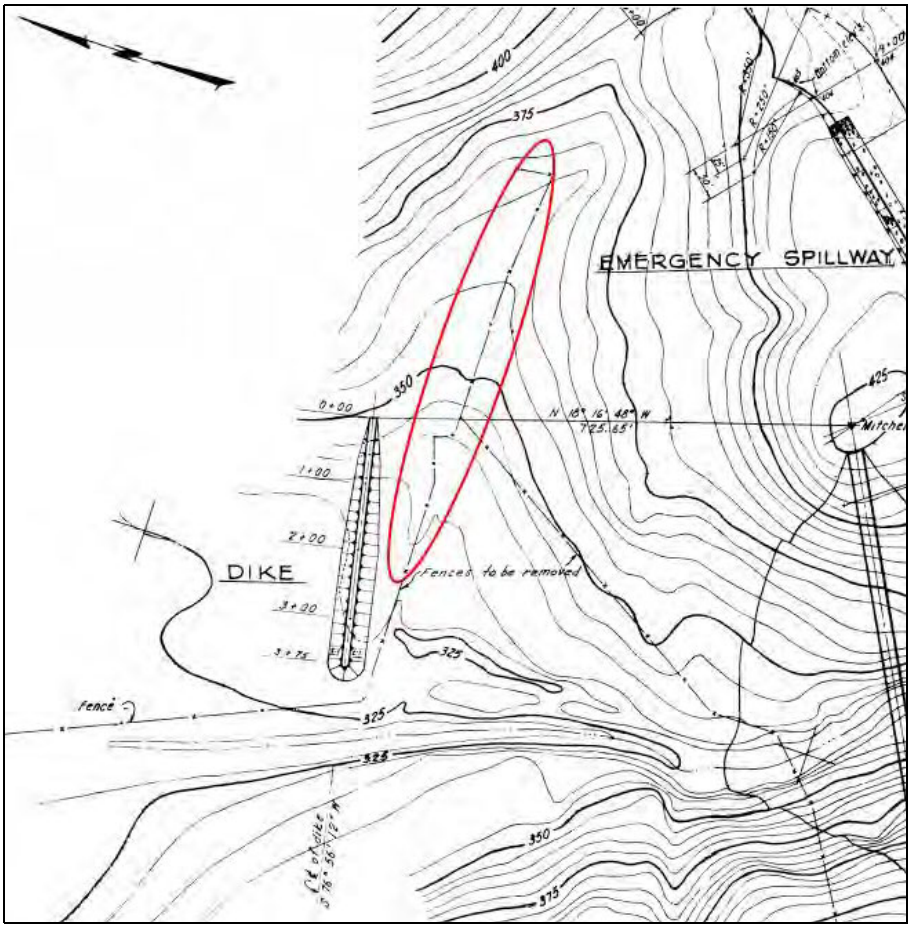


Plate 1. 1962 As-Built of Mitchell fence line circled for removal along the current alignment of the extant Abandoned Construction Road. Circle added by AECOM. (Sonoma County Flood Control District and Water Conservation District 1962: Drawing D57-10)

Plate 2. 1953 aerial photograph of the approximate alignment of extant Abandoned Construction Road circled south of Mitchell fence line before removal for dam construction. Circle added by AECOM (USCB 1953)

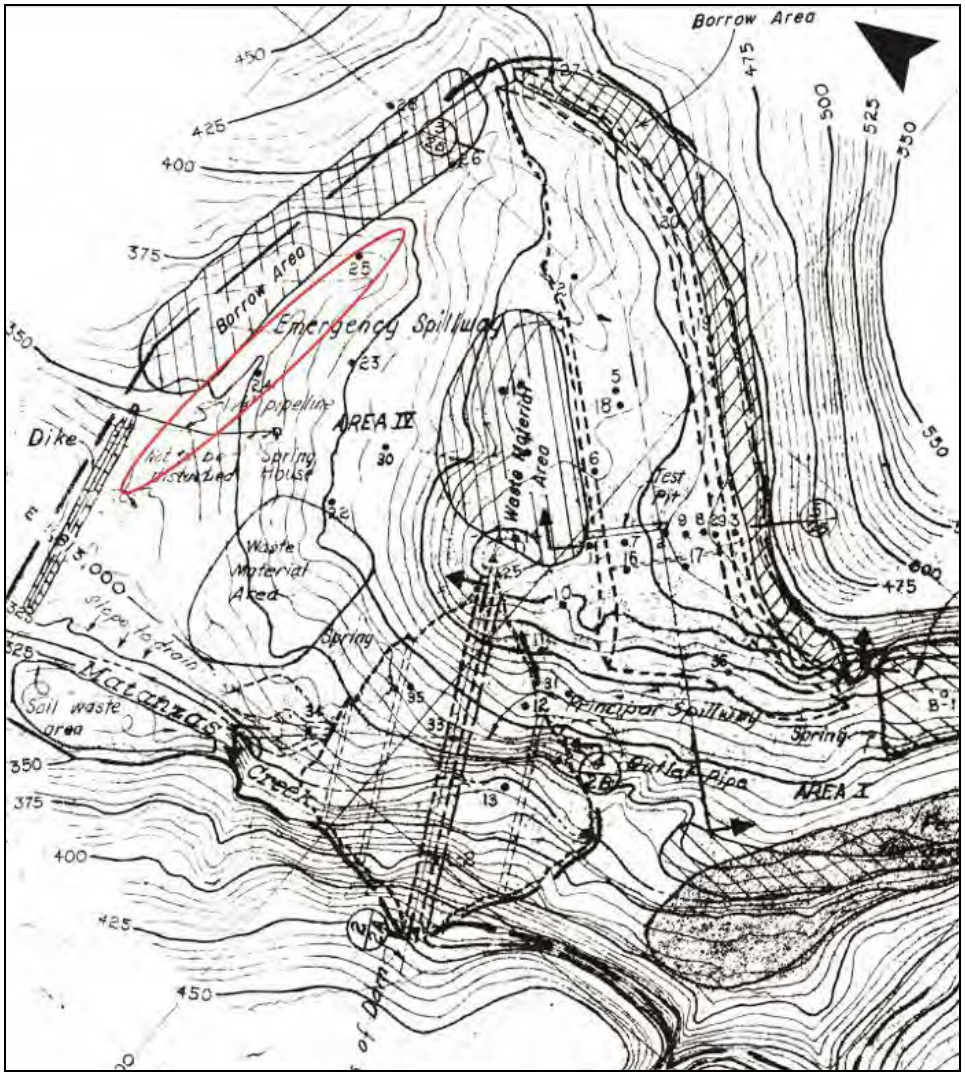


Plate 3. Approximate area of extant Abandoned Construction Road circled. Note large borrow area in the vicinity of Mitchell fence line illustrated in Plate 1. Circle note added by AECOM (Sonoma County Flood Control District and Water Conservation District 1962: Drawing D57-10).

Plate 4. 1965 aerial with the approximate location of extant Abandoned Construction Road circled. Note much of the area has been disturbed for the construction of the dam and associated structures. Circle added by AECOM (UCSB 1965).

Evaluation

The Abandoned Construction Road is not eligible for listing in the NRHP under Criterion A or in the CRHR under Criterion 1 because it is not significant within the context of the construction of the Matanzas Creek Dam or the larger Central Sonoma Watershed Project. The roadbed appears to have been cut to access fence lines for removal of a large borrow area for the construction of the Matanzas Creek Dam and associated structures. The roadbed does not appear to have been maintained and is not historically significant as part of the original construction or the ongoing operations and maintenance of the Matanzas Creek Dam. Roads can be vital support structures for large construction projects to bring people, materials, and equipment into and out of an area; however, this roadbed does not rise to a significant level of historic importance as a means of egress for the construction of the Matanzas Creek Dam or as part of the larger Central Sonoma Watershed Project.

There is no demonstrable evidence that this Abandoned Construction Road has any historically important association with any individuals that would merit significance under NRHP Criterion B or CRHR Criterion 2. The road was cut as part of the construction of the Matanzas Creek Dam as part of the larger Central Sonoma Watershed Project and does not reflect anything historically significant about any individual.

The Abandoned Construction Road is not eligible for listing in the NRHP under Criterion C or in the CRHR under Criterion 3 because it does not appear to be significant for possessing distinctive characteristics of a type, period, or method of construction or engineering, nor does it represent the work of a master. The roadbed does not exhibit qualities that would make it significant for its engineering, and it appears to have been built according to standard and known methods of the time.

The Abandoned Construction Road does not appear to be significant as a source (or likely source) of important information regarding history. It does not appear to have any likelihood of yielding important information to the history of road design and engineering, related technologies of road construction, or development of the Matanzas Creek Dam, the Central Sonoma Watershed Project, the local area, the State of California, or the nation, under NRHP Criterion D or CRHR Criterion 4.

References:

Sonoma County Flood Control District and Water Conservation District. 1962. Central Sonoma Watershed Protection and Flood Prevention Project, Plans for the Construction of Matanzas Creek Reservoir. Prepared by Woodward, Clyde, Sherard & Associates, Consulting Civil Engineers – Oakland, Calif.

University of California, Santa Barbara (UCSB), Aerial Photography Special Collection. 1953. Flight CSH-1953, Frame 8K-82. July 19.

_____.1965. Flight CAS_65-130, Frame 67-98. July 3.

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary #:
HRI #:
Trinomial:
NRHP Status Code:
Other Listings:
Review Code: Reviewer: Date:

 ***Resource Name or #:** SITE 2020-107-01

P1. Other Identifier: None

***P2. Location:** ■ **Not for Publication** ☐ **Unrestricted**

***a. County** Sonoma

***b. USGS 7.5' Quad**: Santa Rosa **Date:** 1994 **T** 7N; **R** 7W; NW **of** SE **of Sec.** 32; Mount Diablo **B.M.**

c. Address: 4960 Bennett Valley Road City: Santa Rosa ZIP: 95404

d. UTM: Zone 10, 530362 mE/ 4251132 mN

e. Other Locational Data: APN 049-130-006

***P3a. Description:**

This resource consists of a road grade and parallel tree alignment, located approximately 240 meters northwest of the Matanzas Creek Reservoir dam. The road segment begins above the eastern bank of Matanzas Creek, and proceeds at an east-northeastern bearing for approximately 300 feet. The road grade measures approximately 10 feet wide, and cuts into the bank at a maximum depth of two feet. An alignment of oak trees follows the road grade along its southern edge. This site is in fair condition.

***P3b. Resource Attributes:** AH7. Roads/trails/railroad grades

***P4. Resources Present:** ☐ Building ☐ Structure ☐ Object ■ Site ☐ District ☐ Element of District ☐ Other:

P5a. Photograph

P5b. Description of Photo: Site 2020-107-01 overview from eastern terminus. IMG_1228, view west, 2/22/2021.

***P6. Date Constructed/Age and Source:**
■ Historic (age unknown)

***P7. Owner and Address:**
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

***P8. Recorded by:**
Alex DeGeorgey, M.A.
Alta Archaeological Consulting, LLC
2681 Cleveland Avenue
Santa Rosa, CA 95403

***P9. Date Recorded:** 2/22/2021

***P10. Survey Type:** Intensive, 20m intervals

***P11. Report Citation**:

DeGeorgey, Alex, and Nicholas Radtkey

2021 *Archaeological Survey Report for Matanzas Creek Dam Spillway Rehabilitation Project.* Manuscript on file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, CA.

***Attachments:** ☐ NONE ■ Location Map ☐ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ■ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (List):

L1.Historic and/or Common Name: Unknown

L2a. Portion Described: ■ Entire Resource ☐ Segment ☐ Point Observation **Designation:** NA

b. Location of point or segment: Approximately 175 meters north of the eastern corner of Matanzas Creek Reservoir dam.

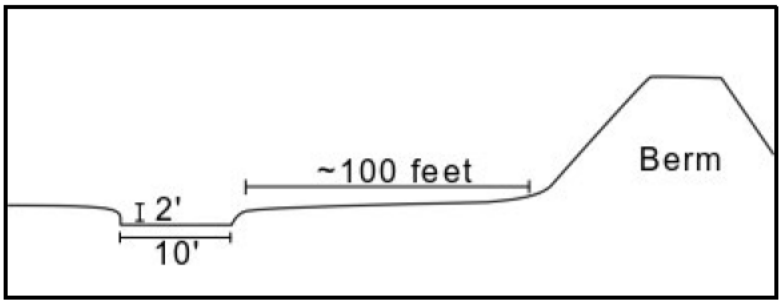
L3. Description: This road leads at an east-northeast bearing from Matanzas Creek, just south of the northern retaining berm for the Matanzas Creek Reservoir spillway. It is an unpaved two-track road, ranging from ground level to two feet deep. The road most likely predates the spillway, as it is constructed on the native land form rather than the abundant imported fill which forms the spillway on either side.

L4. Dimensions:

a. **Top Width:** 10 feet
b. **Bottom Width:** 10 feet
c. **Height or Depth:** 0-2 feet
d. **Length of Segment:** 300 feet

L5. Associated Resources: None.

L4e. Sketch of Cross-Section Facing: West



L6. Setting: This site lies near the eastern bank of Matanzas Creek, in an open grassy floodplain. A line of planted oaks follows the southern edge of the road. Oak and eucalyptus trees abound locally.

L7. Integrity Considerations: This site is located near the outlet of the Matanzas Creek Reservoir's spillway. This predisposes it to impacts by flooding and erosion, though no evidence of such impacts were observed at the time of recording.

L8a. Photograph, Map or Drawing

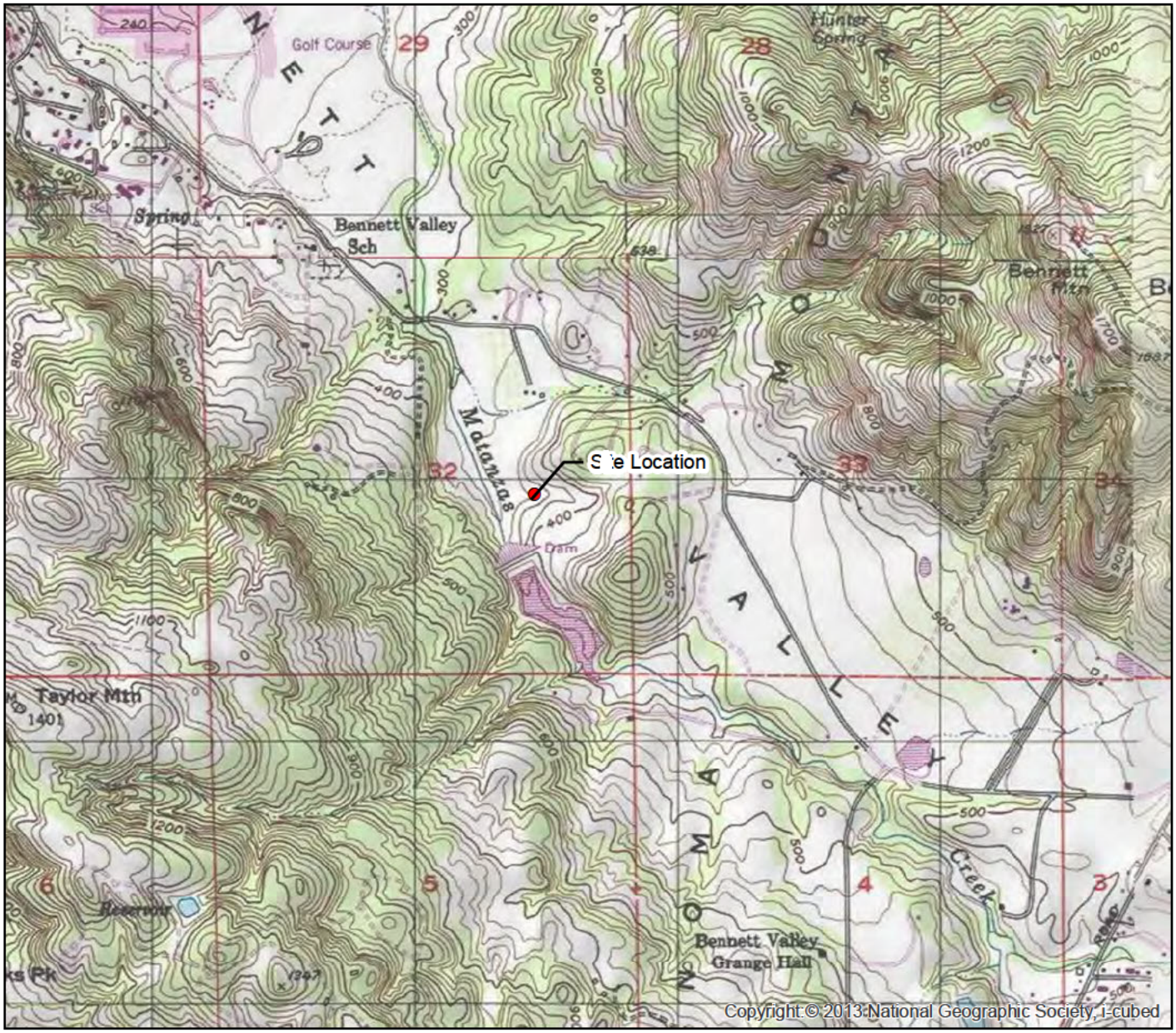
L8b. Description of Photo, Map, or Drawing: Site overview (R) from top of berm. IMG_1748, view east, 2/22/2021.

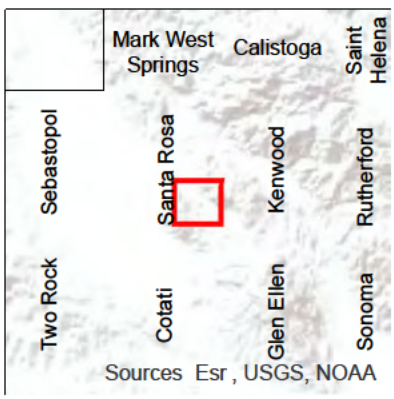
L10. Form Prepared by:
Alex DeGeorgey, M.A.
Alta Archaeological Consulting, LLC
2681 Cleveland Avenue
Santa Rosa, CA 95403

L11. Date: 2/22/2021

LOCATION MAP

*Resource Name or #: SITE 2020-107-01





SITE 2020-107-01

1:24,000
Miles
0 0.25 0.5 1
0 0.25 0.5 1
Kilometers

Map Date: 6/26/2021

*Required Information

B10. Significance:

A historic-age wooden platform and wooden spring house (SITE 2020-107-02) were recorded in 2021 approximately 500 feet north of the eastern edge of the Matanzas Creek Dam under a small stand of oak trees. Based on review of as-built and project plans for the Matanzas Creek Dam, the spring house and a 1.25-inch pipeline pre-date the 1962 construction of the dam and its associated structures and were not to be disturbed during construction (see **Plate 1**). It appears the well within the spring house was still active at that time and water was piped to a 10-acre irrigated pasture area to the north on the larger parcel owned by Edith Mitchell (see **Plate 2**) (Sonoma County Flood Control District and Water Conservation District 1962).

In 1948, a 403-foot-deep artesian well was sunk on the Mitchell property to irrigate a 10-acre pasture used to feed 60 dairy cows on the property. The artesian well was one of the few in the county that flowed year-round, flowing at a rate of 100 gallons per minute over the top of a 12-inch casing. As part of the 1948 well installation, other improvements included the construction of a concrete catch basin which was connected to the well by an open ditch and directed water to a small reservoir that was bulldozed at the corner of a field for use in the irrigation system (*Press Democrat* 1951). The concrete catch basin and small reservoir are visible in 1953 aerial photographs along the edge of the 10-acre pasture (see **Plate 2**) (UCSB 1953). After the completion of the Matanzas Creek Dam and associated structures in 1962, including a dike north of the spring house, the irrigated pasture north of the well was reduced (see **Plate 3**).

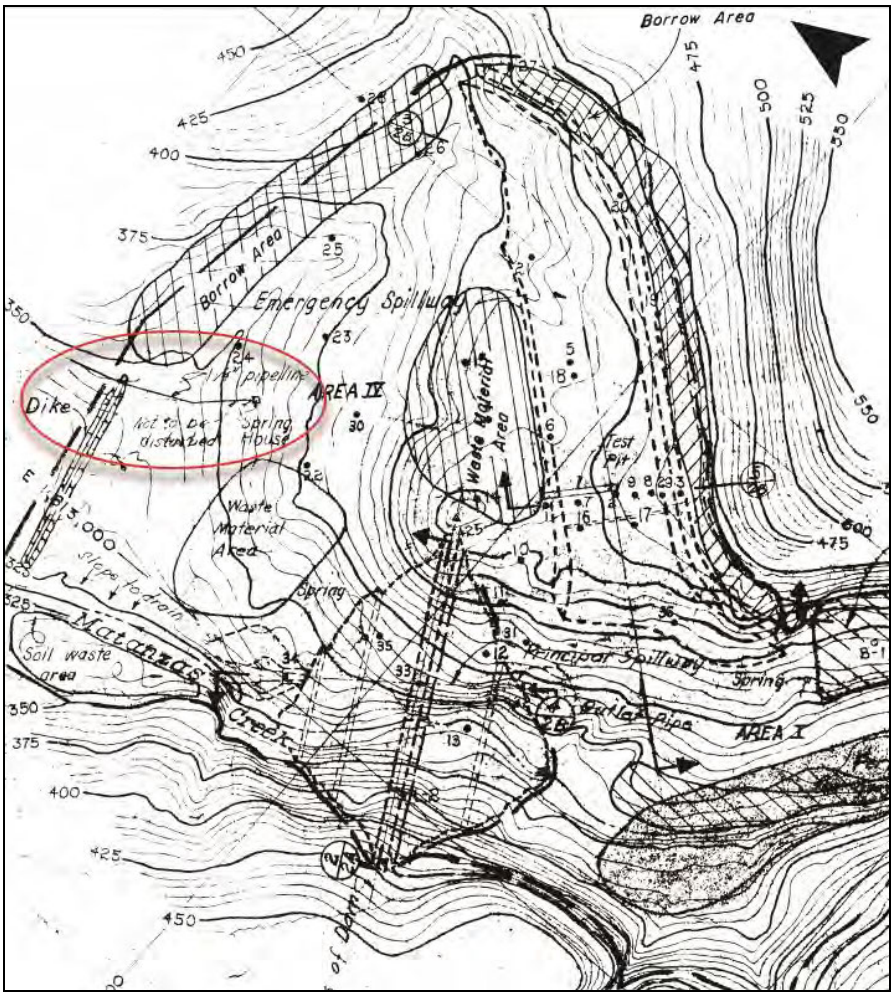


Plate 1. Spring house and pipeline illustrated as "Not to be disturbed" on as-built drawings for Matanzas Creek Dam. Circle note added by AECOM (Sonoma County Flood Control District and Water Conservation District 1962: Drawing D57-2).

Plate 2. 1953 aerial photograph of the spring house and platform south of 10-acre pasture on Edith Mitchell property. Concrete basin and reservoir added to property with sinking of 403-foot artesian well in 1948. Notes added by AECOM (USCB 1953)

Plate 3. 1965 aerial with spring house and platform separated from irrigated pasture by dike constructed for the Mantanzas Creek Dam. Note the southern end of irrigated pasture near the spring house is no longer under cultivation after dike construction. Notes added by AECOM (UCSB 1965).

History of Irrigation in Sonoma County and Bennet Valley

Irrigation in Sonoma County and within the Sonoma and Petaluma valleys was developed after 1900 and limited to gravity-flood irrigation using surface water from creeks. By 1910, there were only 631 acres under irrigation on 38 farms throughout Sonoma County, and 157 of those acres were irrigated by wells. Three years later, only 60 of the 90,000 acres of agricultural land in the Sonoma and Petaluma valleys were reported under irrigation. By 1939, 4,195 acres were under irrigation by surface water and groundwater in Sonoma County (Cardwell 1958: 19; Sonoma County Department of Agriculture 2022). In the 1940s, a major development of irrigation wells occurred in the region. Prior to 1940, the United States Geological Survey identified only one irrigation well in operation in the Bennet Valley. (The one pre-1940 well may have been the well on the Mitchell property, but historical research did not identify any documentation confirming this.)

Between 1941 and 1950, there were 14 new wells in use, which included the 403-foot deep artesian well sunk on the Mitchell property in 1948 (Cardwell 1958:20, 236). By 1949, there were 9,285 acres were under irrigation in the county and most of the increased acreage was in the Santa Rosa and Petaluma valleys. By 1951, wells in the Santa Rosa and Petaluma valleys irrigated 5,200 acres which were largely dedicated to permanent pasture and hay at 3,800 acres. Permanent pasture and hay also have the highest water requirements, as the fields are irrigated for 5-6 months between the last spring rains and early autumn rainfall (Cardwell 1958:20). Review of yearly county agricultural reports indicated the number of acres of irrigated pasture increased from 3,000 in 1948, the first year this crop was recorded as its own commodity, to 15,000 acres by 1958, which corresponded with the increase of the wells sunk in the region for irrigation. Over the decades, irrigated pasture has decreased, and as of 2020 only 6,871 acres of pastureland were under irrigation compared to 328,000-acres of field crops in the county, accounting for only 2.09 percent of the total agricultural acreage in the county (Sonoma County Department of Agriculture 2022).

Mitchell Property in Bennett Valley

The Mitchell family moved to Bennett Valley from Petaluma circa 1926. John Mitchell, as head of household, was conducting general farming (*Santa Rosa Republican* 1939; US Department of Commerce 1930). After John Mitchell's death in 1939 at the age of 80, John's wife, Edith, was listed as head of the household but her sons, Samuel and John, were the only members of the household listed as farmers on the Bennett Valley Road property (*Santa Rosa Republican* 1939; US Department of Commerce 1940). In 1948, the Mitchells were operating a dairy farm with 60 cows on irrigated pasture land (*Press Democrat* 1951). At the time of Edith Mitchell's death in 1962, she was living at 4968 Bennett Valley Road with Samuel and John and her estate consisted of 245 acres of property in Sonoma County (*Press Democrat* 1964). John Mitchell, Jr., continued to operate the farm property on Bennett Valley Road until his death in 1983 (*Press Democrat* 1983).

A 403-foot deep well was sunk on Mrs. Edith Mitchell's property in Township 7 North, Range 7 West, Section 32 in 1948. The Precision Drilling Company drilled the well to a depth of 325 feet on an alluvial plain with a recorded flow of 150 gallons per minute in 1950 and temperature between 72-72 degrees Fahrenheit, which was 6-8 degrees warmer that wells of similar depth elsewhere in the Sonoma Valley (Cardwell 1958: 96, 236). Based on the well locational date provided in the *Geology and Ground Water in the Santa Rosa and Petaluma Valley Areas Sonoma County California* (Cardwell 1958: 7, 236), this well is northwest of the wooden platform and well shed.

The wooden platform and wooden spring house may have been part of a previous well on the Mitchell property that was sunk before the 403-foot deep artesian well was dug in 1948. This earlier well may have continued to be used as a supplemental water source after the 1948 well was excavated, but the Mitchell's likely abandoned it in the 1960s when it became obsolete with the construction of the Matanzas Creek Dam dike to the north and the sale of the southern end of the irrigated pasture to the Central Sonoma Water Project for the construction of the dam facilities.

Evaluation

The wooden platform and wood spring house recorded on this form do not meet NRHP Criterion A/CRHR Criterion 1 for association with events that have made a significant contribution to the broad patterns of history. While associated with the early irrigation efforts in the Bennett Valley sometime within the first half of the twentieth century, the utilitarian platform and spring house are similar to many other ancillary irrigation structures constructed and used throughout California and the United States and do not convey any specific significance to the history of agriculture within the region, state, or nation. The spring house housed a well that conveyed water via a metal pipe to irrigate a 10-acre pasture used to feed dairy cows on the larger agricultural property owned by the Mitchell family. The first county agricultural crop report that listed "irrigated pasture" as its own commodity in 1948 indicated 3,000 acres under cultivation when there was over 70,000 acres of field crops in the county and an additional 50,000 acres of permanent crops. Therefore, irrigated pasture only accounted for 2.5 percent of the total agricultural endeavors in Sonoma County. Irrigated pasture also had no "farm value" as it was used to self-sustain farms and was not sold (Sonoma County Department of Agriculture 2022). While in subsequent years, the number of irrigated pasture acres increased to 15,000-acres, which corresponds with an increase in the number of additional wells sunk in the region, as of 2020 there are only 6,871-acres of irrigated pastureland compared to 328,000-acres of field crops in the county, only 2.09 percent of the total acreage. Therefore, neither the wooden platform nor wood spring house shed are eligible under NRHP Criterion A/CRHR Criterion 1.

The wooden platform and wood spring house recorded on this form do not meet NRHP Criterion B/CRHR Criterion 2 for any direct associations with the productive lives of persons important in local, state, or national history. While the wooden platform and wood spring house appear to have been developed during the ownership of the property by the Mitchell family, there is no evidence to suggest that any members of the Mitchell Family made demonstrably important contributions to history at the local, state, or national level. John Mitchell and his sons John and Samuel were engaged in general farming and dairying on the property from 1925 to 1983, but they do not appear to have made any significant contributions to the agricultural or economic development of Bennett Valley. Therefore, neither the wooden platform nor wood spring house shed are eligible under NRHP Criterion B/CRHR Criterion 2.

The wooden platform and wood spring house recorded on this form do not meet NRHP Criterion C/CRHR Criterion 3 for embodying distinctive characteristics of a type, period, and method of construction, or as the work of an important creative individual, or as having high artistic value. The wood spring house is a vernacular utilitarian building using standard materials and designs of the time and is an unexceptional and common building type found throughout California and nationwide on farms. The wood platform structure is an unremarkable remnant to support an assumed water tank that is no longer extant.

The wooden platform and wood spring house recorded on this form do not meet NRHP Criterion D/CRHR Criterion 4 because they are is unlikely to yield information important to history. It is unlikely that these structures have the potential to broaden our understanding of agricultural practices, or the history of the property, region, state, or nation. Irrigation buildings and structures are well documented in other sources and they do not appear to have any likelihood of yielding important information about historic-period construction materials or technologies. Therefore, neither the wooden platform nor wood spring house shed are eligible under NRHP Criterion D/CRHR Criterion 4.

Integrity Analysis

The wooden platform and wood spring house recorded on this form retain integrity of location, but have compromised integrity of design, setting, materials, workmanship, feeling, and association to any potential period of significance. The agricultural setting was diminished with the construction of the Matanzas Creek Dam dike, and because the wooden platform and wood spring house are physically separated from the larger agricultural property there were once associated with, they also lack of integrity of setting, feeling, and association. Deferred maintenance and the abandonment of the platform and springhouse, as well as the removal of the water tank from the platform, have also compromised their integrity of design, materials, workmanship.

B12. References:

Cardwell, G.T. 1958. "Geology and Ground Water in the Santa Rosa and Petaluma Valley Areas Sonoma County California." *Geological Survey Water-Supply Paper 1427.* Prepared in cooperation with the California Department of Water Resources. Washington DC: United States Government Printing Office. Available: https://pubs.usgs.gov/wsp/1427/report.pdf. Accessed January 19, 2022.

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Santa Rosa Republican. 1939. "Mitchell Rites Conducted Today," August 25. Available: www.newspapers.com. Accessed January 19, 2022.

Sonoma County Department of Agriculture. 2022. "Crop Reports," various years from 1928 to 2020. Available: https://sonomacounty.ca.gov/Agriculture-Weights-and-Measures/Crop-Reports/. Accessed January 2022.

Sonoma County Flood Control District and Water Conservation District. 1962. *Central Sonoma Watershed Protection and Flood Prevention Project, Plans for the Construction of Matanzas Creek Reservoir.* Prepared by Woodward, Clyde, Sherard & Associates, Consulting Civil Engineers – Oakland, Calif.

United States Department of Commerce. 1930. Fifteenth Census of the United States Population Schedule, California, Sonoma County, Santa Rosa Township Matanzas Precinct, Enumeration District 49-59, Sheet 3B.

_____.1940. Sixteenth Census of the United States Population Schedule, California, Sonoma County, Santa Rosa Township, Enumeration District 49-54, Sheet 1A.

University of California, Santa Barbara (UCSB), Aerial Photography Special Collection. 1953. Flight CSH-1953, Frame 8K-82. July 19.

_____.1965. Flight CAS_65-130, Frame 67-98. July 3.

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary #:
HRI #:
Trinomial:
NRHP Status Code:
Other Listings:
Review Code: Reviewer: Date:

 ***Resource Name or #:** SITE 2020-107-02

P1. Other Identifier: None

***P2. Location:** ■ **Not for Publication** ☐ **Unrestricted**

***a. County:** Sonoma

***b. USGS 7.5' Quad**: Santa Rosa **Date:** 1994 **T** 7N; **R** 7W; NE **of** SE **of Sec.** 32; Mount Diablo **B.M.**

c. Address: 4960 Bennett Valley Road City: Santa Rosa ZIP: 95404

d. UTM: Zone 10, 53033mE/ 4251125 mN (NAD 1983)

e. Other Locational Data: APN 049-130-006

***P3a. Description:**

This historic-ear resource consists of two features a wooden platform and a wooden well shed. These features are located approximately 500 feet north of the eastern edge of the Matanzas Creek Reservoir dam. They lie under a small stand of oak trees. The site is in fair condition, due to neglect and vegetation overgrowth.

***P3b. Resource Attributes:** AH2. Foundations/structure pads; AH15. Standing structures

***P4. Resources Present:** ☐ Building ☐ Structure ☐ Object ■ Site ☐ District ☐ Element of District ☐ Other:

P5a. Photograph

P5b. Description of Photo: Wooden platform (Feature 1). IMG_1232, view southeast, 2/22/2021.

***P6. Date Constructed/Age and Source:**
■ Historic CA 1930s

***P7. Owner and Address:**
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

***P8. Recorded by:**
Alex DeGeorgey, M.A.
Alta Archaeological Consulting, LLC
2681 Cleveland Avenue
Santa Rosa, CA 95403

***P9. Date Recorded:** 2/22/2021

***P10. Survey Type:** Intensive, 20m intervals

***P11. Report Citation**:

DeGeorgey, Alex, and Nicholas Radtkey
2021 *Archaeological Survey Report for Matanzas Creek Dam Spillway Rehabilitation Project.* Manuscript on file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, CA.

***Attachments:** ☐ NONE ■ Location Map ■ Sketch Map ■ Continuation Sheet ☐ Building, Structure, and Object Record ■ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (List):

***A1. Dimensions: a. Length:** 160 feet **(NW/SE)** x **b. Width:** 60 feet **(NE/SW)** (approximate)
Method of Measurement: ☐ Paced ■ Taped ☐ Visual estimate ■ Other: Trimble Geo7x datalogger
Method of Determination: ☐ Artifacts ■ Features ☐ Soil ☐ Vegetation ☐ Topography
☐ Cut bank ☐ Animal burrow ☐ Excavation ☐ Property boundary ☐ Other (Explain):

Reliability of Determination: ☐ High ■ Medium ☐ Low Explain:
Limitations: ☐ Restricted access ☐ Paved/built over ☐ Site limits incompletely defined
☐ Disturbances ■ Vegetation ☐ Other:

A2. Depth: ☐ None ■ Unknown Method of Determination:

***A3. Human Remains:** ☐ Present ☐ Absent ☐ Possible ■ Unknown (Explain): Highly unlikely.

***A4. Features:** Feature 1 is a dilapidated redwood platform, constructed over a shallow drainage. It is likely a foundation for a water tank. The platform measures 10 feet by 8 feet, and consists of four parallel 5"×5" circular-cut redwood joists spanning the drainage. These joists were once topped by 1"×4" planks, most of which are now rotted or absent. 16-penny wire nails fasten the planks to the joists. A 1 ½" steel water pipe leads to the platform from the spring house (Feature 2), and features a universal coupler. Poison oak brush covers most of the platform.

Feature 2 is a wooden well shed. This building has a square footprint, measuring 12' 6" on each side, and stands six feet tall. Its exterior siding consists of vertical 1"×12" circular-cut redwood. It is topped by a medium-pitch hipped roof, clad in hand-split redwood shakes. The roof is trimmed with simple 1"×6" fascia. The access door is constructed of siding materials, and affixed to the siding with strap hinges and wire nails. The building houses an open well, which exhibits standing water. It is mostly blanketed in poison oak brush and berry vines.

***A5. Cultural Constituents:** None.

***A6. Were Specimens Collected?** ■ No ☐ Yes

***A7. Site Condition:** ☐ Good ■ Fair ☐ Poor (Describe disturbances.): Heavy brush growth.

***A8. Nearest Water:** Matanzas Creek lies approximately 550 feet to the southwest of the site.

***A9. Elevation:** 410 feet above mean sea level.

A10. Environmental Setting: This site lies near the eastern bank of Matanzas Creek, in an open grassy floodplain. A line of planted oaks follows the southern edge of the road. A row of mature oak trees grow in a row (east-west) along the northern limits of the stie.

A11. Historical Information: None.

***A12. Age:** ☐ Prehistoric ☐ Protohistoric ☐ 1542-1769 ☐ 1769-1848 ☐ 1848-1880 ☐ 1880-1914 ■ 1914-1945 ■ Post 1945 ☐ Undetermined Age

A13. Interpretations: None.

A14. Remarks: None.

A15. References: None.

A16. Photographs: See Continuation Sheet
Original Media/Negatives Kept at: Alta Archaeological Consulting

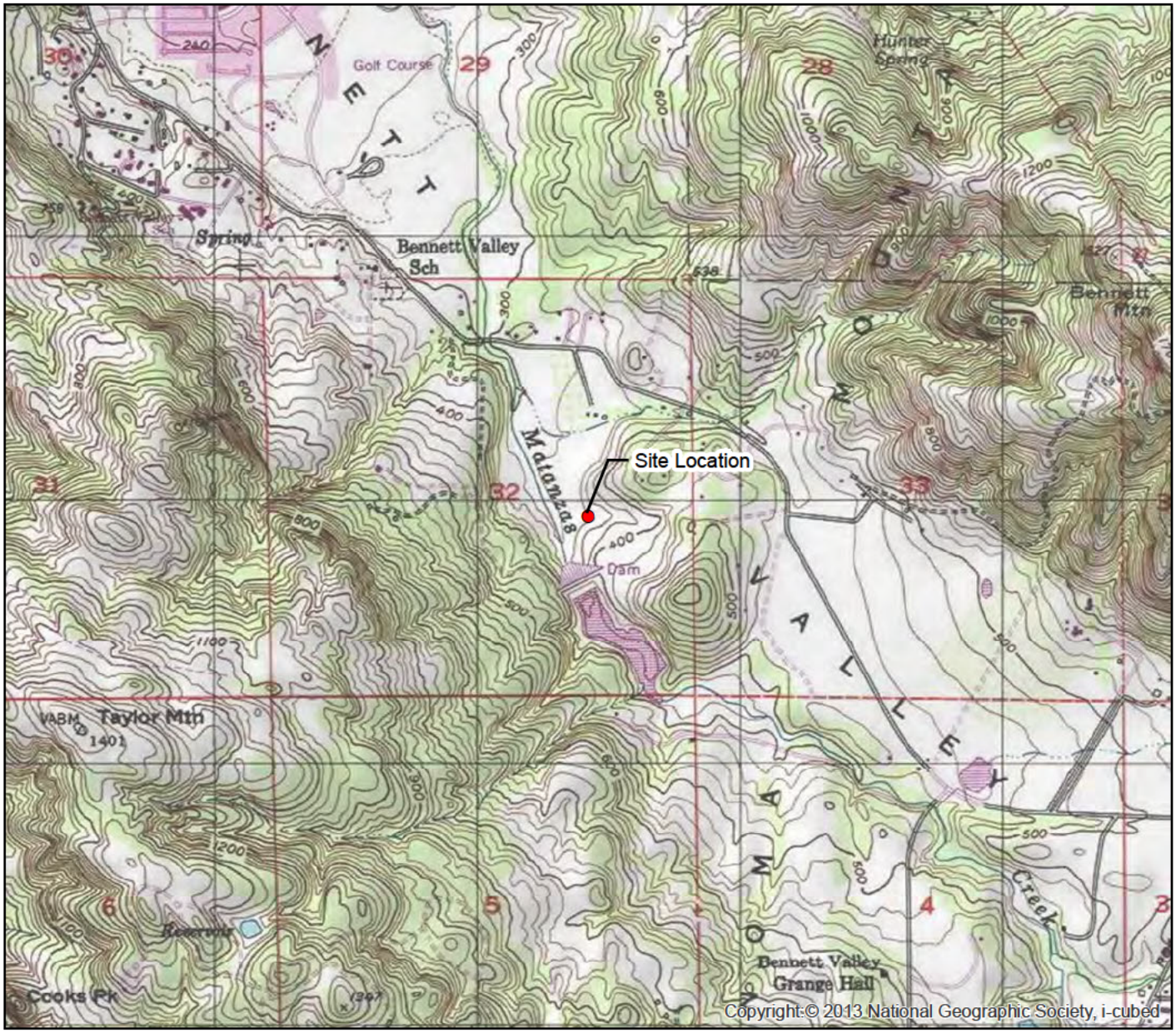
***A17. Form Prepared by:** Alex DeGeorgey **Date:** 02/22/2021
Affiliation and Address: Alta Archaeological Consulting, LLC, 2681 Cleveland Avenue, Santa Rosa, CA 95403

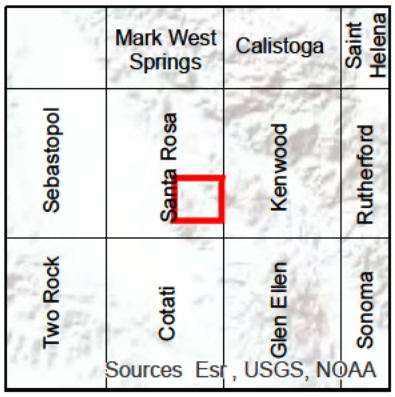
State of California -- The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary #
HRI #
Trinomial

*Resource Name or #: SITE 2020-107-02





SITE 2020-107-02

1:24,000
Miles
0 0.25 0.5 1
0 0.25 0.5 1
Kilometers

Map Date: 6/26/2021

*Required Information

Feature
Site Limits

1:1,500
Feet
0 100 200 400
0 12.5 25 50
Meters

Map Date: 6/26/2021

A16. Photographs

IMG_1231, view east, 2/22/2021: Feature 1, wooden platform, and underlying channel

IMG_1749, view east, 2/22/2021: Feature 2, wooden pump shed.

APPENDIX D. PREPARERS' QUALIFICATIONS

The names and qualifications of the project personnel are as follows:

Karin G. Beck. Ms. Beck has an M.A. degree in Cultural Resources Management from Sonoma State University and 25 years of experience contributing to and writing technical reports through historic research; writing historic contexts; and conducting cultural resources investigations, including archaeological and built environment evaluations, for National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) eligibility. Her experience includes Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), and California Environmental Quality Act (CEQA) compliance process and environmental documents for historical resources. Ms. Beck meets the Secretary of the Interior's Professional Qualifications Standards for work in Archaeology, History, and Architectural History. She is a Registered Professional Archaeologist and a Registered Professional Historian.

Chandra Miller. Ms. Miller has an M.A. in Public History from California State University Sacramento, a B.A. in History from Humboldt State University, and a Certificate in Historic Preservation and Restoration Technology from the College of the Redwoods. Ms. Miller has more than 12 years of experience contributing to and writing technical reports through historic research; writing historic contexts; and conducting cultural resource investigations, including survey and evaluation of various historical resources throughout California for NRHP and CRHR eligibility. Her experience includes Section 106 and CEQA compliance process and environmental documents for historical resources. Ms. Miller meets the Secretary of the Interior's Professional Qualifications Standards for work in History and Architectural History.

Trina Meiser. Ms. Meiser provided technical review of this document. Ms. Meiser has an M.A. in Historic Preservation Planning from Cornell University and is a historic preservation planner who meets the Secretary of Interior's qualifications (36 Code of Federal Regulations Part 61) in Architectural History and History. She has more than 20 years of experience in identifying, evaluating, and planning for cultural resources, including historic structures, districts, and landscapes. She specializes in technical analysis to support regulatory compliance, specifically under Section 106 of the NHPA.

Appendix D.8. Endangered Species Act Section 7 Consultation Documents

MATANZAS CREEK DAM WATERSHED REHABILITATION PROJECT

BIOLOGICAL ASSESSMENT

Prepared for

Jones & DeMille Engineering and the Natural Resources Conservation Service

March 2023

AECOM

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List of Acronyms

AMM	Avoidance and Minimization Measure
BA	Biological Assessment
BMP	Best Management Practice
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
DSOD	Division of Safety of Dams
ESA	Endangered Species Act
°F	degrees Fahrenheit
IPaC	Information, Planning, and Consultation System
NRCS	Natural Resources Conservation Service
PCI	Prunuske Chatham, Inc.
PSH	principle spillway hydrograph
Sonoma Water	Sonoma County Water Agency
SWPPP	Stormwater Pollution Prevention Plan
TM	technical memorandum
USFWS	United States Fish and Wildlife Service
WEAT	Worker Environmental Awareness Training

1 INTRODUCTION

The Matanzas Creek Dam currently provides flood protection for the City of Santa Rosa and adjacent unincorporated areas in Sonoma County, California (Figure 1). Based on recent assessments, the dam no longer meets Natural Resources Conservation Service (NRCS) standards. Sonoma County Water Agency (Sonoma Water, the Project Sponsor) and the NRCS propose the Matanzas Creek Dam Rehabilitation Project (Proposed Action), which would fully rehabilitate the dam by raising the dam crest by 7.4 feet, raising the auxiliary spillway crest by 11.4 feet, grading the spillway to a uniform 200-foot width, removing accumulated sediment from the inundation area, installing embankment stability buttresses, and extending the primary spillway to accommodate the new buttresses. This Biological Assessment (BA) analyzes the potential effects of the Proposed Action for consultation with the U.S. Fish and Wildlife Service (USFWS). The NRCS is the lead federal agency for the Proposed Action.

1.1 PURPOSE AND NEED OF THE PROPOSED ACTION

The purpose of the Proposed Action is dam rehabilitation to preserve flood protection downstream of Matanzas Creek Dam. In 2016, the dam was evaluated according to NRCS and California Division of Safety of Dams (DSOD) criteria. This assessment concluded that the principal spillway hydrograph (PSH) cannot be routed through the principal spillway without activating the earthen auxiliary spillway; therefore, the dam no longer meets NRCS standards. The auxiliary spillway crest elevation was originally designed to allow for routing of the 100-year 24-hour storm event solely through the principal spillway; however, the current hydrologic and hydraulic analyses of the dam have determined that the flood storage capacity of the dam is limited to routing the 25-year 24-hour storm event solely through the principal spillway. In addition, the dam embankment does not meet current NRCS and California DSOD dam safety requirements for seismic stability. The Proposed Action would bring the dam into compliance with current standards and would reduce flood damage risk, resulting in beneficial impacts to public health and safety.

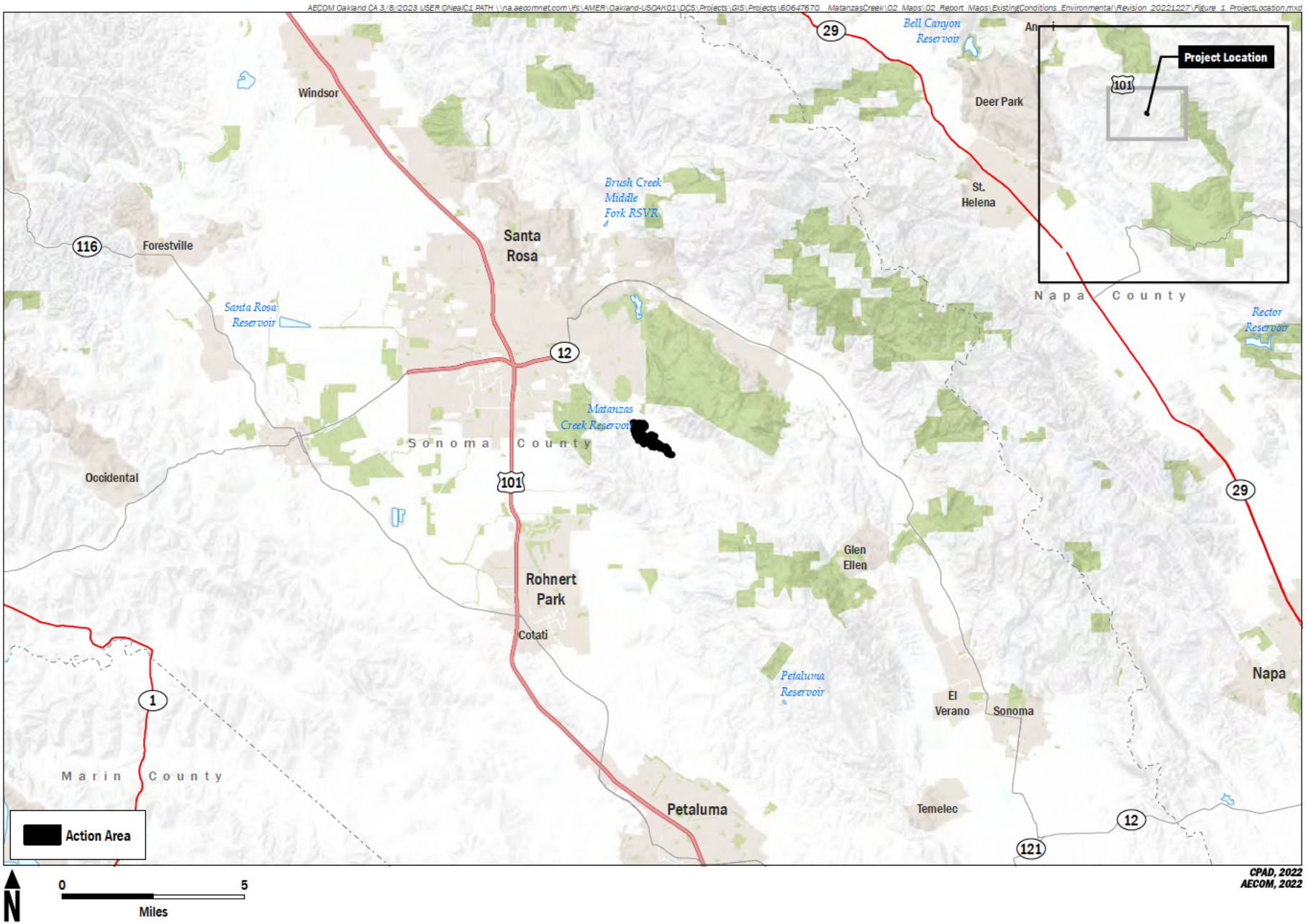
1.2 CONSULTATION HISTORY

The following consultations and personal communications have occurred with the USFWS regarding the Proposed Action:

- On March 20, 2021, Jenna Jorgensen (Jones & DeMille Engineering), in coordination with the NRCS and Sonoma Water, emailed a Matanzas Creek Dam Rehabilitation Project fact sheet and invitation to the April 13, 2021, virtual scoping meeting for the Matanzas Creek Dam Rehabilitation Project to Ellen McBride (USFWS). USFWS did not attend the scoping meeting.
- On June 8, 2021, Jon Stead (AECOM), in coordination with the NRCS and Sonoma Water, sent two reports (*Matanzas Creek Dam Watershed Rehabilitation, Summary of Existing Environmental Conditions* and *California Red-legged Frog Site Assessment, Matanzas Creek Dam Watershed Rehabilitation Project*) to Leif Goude (USFWS) via email. The transmittal offered the USFWS an opportunity to meet, discuss the project, and provide feedback on the need for California red-legged frog surveys and any other USFWS concerns.
- On June 8, 2021, Leif Goude (USFWS) responded to Jon Stead's (AECOM) email suggesting the project team consider measures in programmatic consultations.
- On October 10, 2021, Jon Stead (AECOM), in coordination with the NRCS and Sonoma Water, sent a follow up email to Leif Goude (USFWS) requesting feedback on the California

red-legged frog site assessment and tentative plan to move forward with protocol California red-legged frog surveys. L. Goude redirected the inquiry to Ryan Olah (USFWS).

- On December 3, 2021, Ryan Olah (USFWS) responded to the above inquiry and advised to proceed with the protocol surveys.



AECOM

Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 1

Project Location

2 PROJECT DESCRIPTION

The following sections include a description of the project footprint, Action Area, and existing infrastructure in the Action Area; details about implementation of the Proposed Action; and measures incorporated into the Proposed Action to minimize impacts to natural resources.

2.1 PROJECT FOOTPRINT AND ACTION AREA

The project footprint includes the areas that would be directly impacted by implementation of the Proposed Action. These include the dam, the principle and auxiliary spillways, a temporary work area around the dam and spillways to allow for staging and access, and a portion of the reservoir in which sediment would be excavated (Figure 2).

The Action Area includes the project footprint and the post-project 100-year reservoir inundation area (i.e., after implementation of the Proposed Action, the area that would be inundated in a 100-year storm), plus a 250-foot buffer (Figure 2). The Action Area is intended to capture the areas that would be directly impacted by Proposed Action implementation (i.e., the project footprint), the maximum post-project reservoir inundation area upstream of Matanzas Creek Dam, and an additional buffer around both to account for noise and visual disturbances.

2.2 EXISTING INFRASTRUCTURE

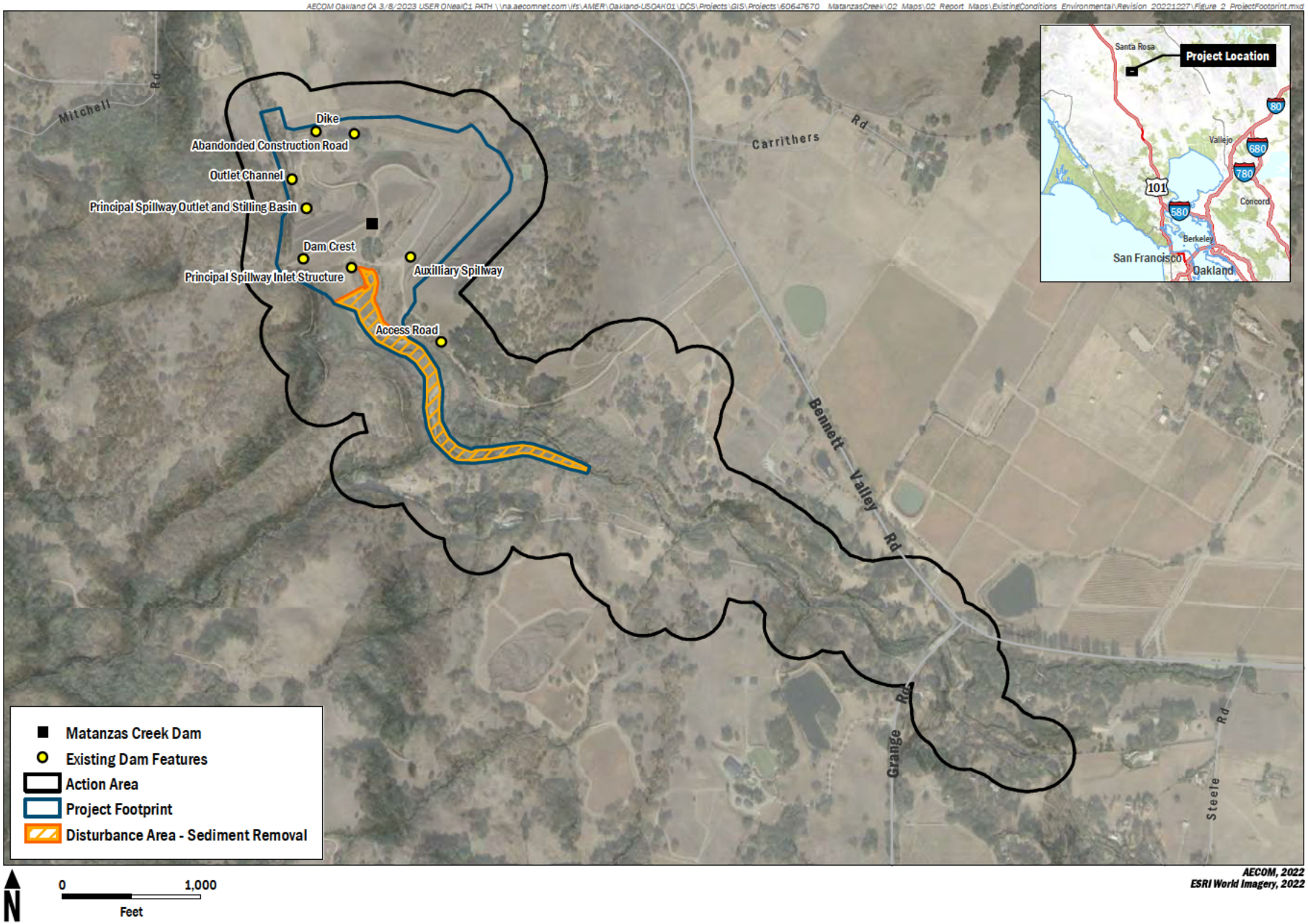
Matanzas Creek Dam is an earthen embankment dam that was designed and built in 1964 to provide flood control to downstream infrastructure. Matanzas Creek Dam is currently owned, operated, and maintained by Sonoma Water. The watershed area for the dam is approximately 11.45 square miles. The current flood storage capacity is 1,445 acre-feet. The earthen embankment dam has a crest length of approximately 685 feet, a crest top width of 24 feet, a total height of approximately 95 feet, and a crest elevation of approximately 428 feet. The dam features a 10-foot by 10-foot principal spillway intake structure, which reduces down to a 5.25-foot by 5.25-foot reinforced concrete conduit that runs through the embankment to the outlet structure. The auxiliary spillway is a vegetated earthen spillway with a crest elevation of 412.63 feet and a weir length of 200 feet. The designed sediment storage capacity for the dam is 245 acre-feet. The dam is currently classified as a high hazard dam for NRCS and an extremely high hazard dam for California DSOD.

An assessment in 2016 determined that the PSH cannot be routed through the principal spillway without activating the earthen auxiliary spillway; therefore, the dam is not in compliance with current NRCS standards. Recent studies indicate that the dam embankment does not meet current NRCS and California DSOD dam safety requirements for seismic stability.

2.3 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action would bring Matanzas Creek Dam into compliance with NRCS and California DSOD standards by raising the auxiliary spillway crest, raising the dam crest, and installing upstream and downstream earthen embankment stabilization buttresses. The Proposed Action includes the following components:

1. Raise the dam crest to 435.0 feet (raise of 7.4 feet). Suitable material would be imported from an existing permitted or commercial source.



AECOM

Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 2

Project Footprint and Action Area

2. Raise the auxiliary spillway crest to 424.0 feet (raise of 11.4 feet) while maintaining a 200-foot width. Construct a roller-compacted concrete spillway crest/apron and concrete cutoff wall near the crest.
3. Regrade the auxiliary spillway to an average -5.8 percent grade and maintain a 200-foot width.
4. Remove approximately 104 acre-feet of accumulated sediment from within the impoundment area to establish 50 years of future sediment capacity. Excavated sediment would be exported to existing permitted or commercial sources.
5. Install upstream and downstream embankment stability buttresses to address seismic and liquefaction issues and bring the embankment in compliance with NRCS and California DSOD seismic criteria. Suitable material would be imported from an existing permitted or commercial source.
6. Extend the primary spillway conduit by 175 feet upstream and 181 feet downstream and construct a new inlet and stilling basin on the primary spillway conduit as required due to accommodate installation of embankment stability buttresses.

The Proposed Action would disturb approximately 48.2 acres. The project footprint would be accessed by an existing road from Bennett Valley Road. Proposed Action activities would take up to 24 months to complete. In-stream project activities would take place between June 15 and October 15.

The Proposed Action would increase the flood storage capacity to 2,322 acre-feet, which is sufficient for the dam to route the 100-year 24-hour storm event through the principal spillway; this is an increase of 877 acre-feet from the existing condition. The 100-year inundation area behind the dam would be 87.2 acres, which is an increase of 16.3 acres from the existing. A majority of the proposed inundation area is within Sonoma Water's existing flood easements; less than 5 acres of additional easement would be required to cover the increased area. The entire reservoir inundation area would drain within 4 days after the 100 year 24-hour event, and the upper margins of the reservoir would drain more quickly.

The Proposed Action would not modify the dam's high hazard potential classification; however, it would reduce the risk of the catastrophic failure. The service life of the dam would be extended for a minimum of 50 additional years.

Maintenance for the Proposed Action would generally consist of the following items:

- The dam and appurtenances would be inspected annually and after critical events.
- A periodic engineer inspection would be conducted by California DSOD annually.
- Deep-rooted vegetation (trees and shrubs) would be removed from the embankment and abutments annually.
- Erosional channels would be repaired annually through grading, seeding, or riprap placement.

2.4 AVOIDANCE AND MINIMIZATION MEASURES

Project Design Features were developed as part of the *Draft Supplemental Watershed Plan No. 1 and Environmental Assessment for the Central Sonoma Watershed Matanzas Creek Dam Rehabilitation Project* (Draft Supplemental Plan-EA) (NRCS 2023) to avoid or minimize adverse impacts associated with the Proposed Action. These Project Design Features are based upon best management practices (BMPs) and standard operating procedures that have been employed and proven effective in avoiding

or minimizing adverse effects to special-status species and their habitats. Project Design Features relevant to the biological resources discussed in this BA, hereafter referred to as Avoidance and Minimization Measures (AMMs), are presented in Table 1 and are incorporated as an integrated part of the Proposed Action. Measures not relevant to this BA have been omitted for brevity, but the numbering of each measure has been kept consistent with the Draft Supplemental Plan-EA; therefore, some AMM numbers are intentionally missing from Table 1.

Table 1 Avoidance and Minimization Measures

Resource Area	Avoidance and Minimization Measure
Air Quality 1	Disturbed soil within the project footprint will be sprayed with water or another approved dust suppressant/soil binder. The quantity of water used for dust control will be minimized to prevent water from leaving the site.
Air Quality 2	Procedures to reduce emissions during material transportation or handling may include wetting materials hauled in trucks, providing adequate freeboard (space from the top of the material to the top of the truck), or covering loads.
Air Quality 5	Material stockpiles will be wetted or covered to prevent wind-blown dust.
Air Quality 6	Vegetative cover will be established on bare ground as soon as possible after grading to reduce wind-blown dust.
Air Quality 8	Only properly operating construction equipment will be used.
Dewatering 1	Dewatering operations include but are not limited to the removal of groundwater through well and sump developments, the removal of perched water, and the removal of stored surface water (considered separate from collected storm waters). Construction contractors will install a system of wells to dewater the granular soils to within a few feet of the contact. Removal of the remaining water resting on the fine-grained soils and bedrock will be performed by installing sumps and routing the water via trenches to the closest well or sump. Finer soils may require the use of active groundwater control measures such as vacuum wellpoint and eductor systems, which induce a vacuum in the borehole that enhances groundwater flow towards the well. Depending on the turbidity of dewatering flows, it may be necessary to treat via a settling basin or sand filters to meet regulatory discharge requirements. All pump intakes will be covered with 0.125 inch mesh to prevent entrainment of fish or amphibians. Pump intakes will be periodically checked for impingement of fish or amphibians. Preconstruction biological surveys will be conducted and an aquatic species rescue and relocation plan will be developed. After the creek diversion system is in place, if authorized in the California Department of Fish and Wildlife (CDFW) 1600 agreement issued for the project, qualified biologists will rescue native aquatic species from the ponded water within the work area and relocate them to a safe location.
Noise 1	Operation of equipment at the site will only occur during daylight hours.
Reclamation 1	As practicable, the embankment and other disturbed areas will be seeded or planted with appropriate species per NRCS Practice Standard "Critical Area Planting" (342).
Vegetation 1	Vegetation removal will be limited as much as practicable.
Vegetation 2	Environmental fencing or other protective measures will be installed around the vernal pools adjacent to the proposed auxiliary spillway that are occupied by Lobb's aquatic buttercup to protect the pools from disturbance during construction activities.

Resource Area	Avoidance and Minimization Measure
Water Quality 1	Equipment servicing and refueling areas will be located at least 300 feet away from any stream channels. So that accidental spills do not enter waters, the storage of petroleum-based fuels and the refueling of construction machinery will not occur outside of approved designated staging areas. The Proposed Action will comply with state and federal water quality standards and toxic effluent standards to minimize any potential adverse impacts from discharges to waters of the U.S.
Water Quality 2	A stormwater pollution prevention plan (SWPPP) will be prepared prior to initiation of ground disturbance. The SWPPP will detail the best management practices and site-specific control features to prevent sediment and other pollutants from discharging off the site during construction. BMPs may include silt fence, fiber wattles, and earthen berms.
Wildlife 3	In-channel work will be restricted to occur only between June 15 and October 15. Dewatering, aquatic species capture and relocation, and construction activities within any wetted and/or flowing creek channel will only occur within this window. Planting activities outside the active channel may occur beyond October 15 if necessary to improve plant establishment during the onset of winter precipitation.
Wildlife 4	Preconstruction surveys will occur within 5 days of initial ground disturbance, within 5 days of initial dewatering, and within 5 days of re-initiation of ground-disturbing work if there is more than a 14-day pause in ground-disturbing work. During the preconstruction survey(s), biologists will survey for special-status species and nesting birds that may be impacted by implementation of the Proposed Action.
Wildlife 5	To prevent inadvertent entrapment of terrestrial wildlife during construction, excavated holes or trenches more than 1 foot deep with walls steeper than 30 degrees will be covered at the close of each working day by plywood or similar materials. Alternatively, one or more escape ramps constructed of earth fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. Any animals discovered in the holes or trenches will be allowed to leave on their own volition, and work around the hole or trench will cease until the animal has left.
Wildlife 6	Prior to construction, a qualified biologist with experience in the ecology and identification of the special-status species that may occur in the Action Area will conduct a Worker Environmental Awareness Training (WEAT) for all construction personnel, including contractors and subcontractors. The WEAT will include, at a minimum: • a brief description of special-status species that may occur in the Action Area, including species identification and habitat requirements; • an explanation of the species' status and protection; • communication and work stoppage procedures in case a special-status species is observed within the Action Area; and • a list of measures being taken to reduce effects to the species during Proposed Action implementation. Brochures conveying this information with color photographs of the species will be prepared for distribution to construction personnel working in the Action Area.
California Red-Legged Frog 1	If a California red-legged frog is found in the Action Area, work will cease within a 50-foot buffer of the frog. The frog will be allowed to move out of the work area on its own volition. USFWS will be contacted within 48 hours.

3 AFFECTED ENVIRONMENT

The following sections outline the methods used to assess existing environmental conditions in the Action Area and the potential for Endangered Species Act (ESA)-listed species to occur; describe the soils, vegetation communities, and aquatic habitats in the Action Area; and discuss ESA-listed species that may occur in the Action Area.

3.1 METHODS

For this report, the term "ESA-listed species" includes species federally listed as endangered, threatened, or proposed for federal listing under the ESA (50 Code of Federal Regulations [CFR] 17.12 [listed plants]); 50 CFR 17.11 (listed animals); and various notices in the Federal Register (proposed species).

Database searches and a literature review were conducted to identify ESA-listed species that could potentially occur in the Action Area. Databases searched included the California Natural Diversity Database (CNDDB); a USFWS Information, Planning, and Consultation System (IPaC) official species list (Attachment A); and eBird, an online database of bird observations made by birdwatchers. CNDDB occurrences of federally-listed wildlife and plants are presented in Figure 3 and Figure 4, respectively. Databases and background documents were also reviewed to understand soils, vegetation communities, and aquatic habitats in and around the Action Area, as well as previous vegetation and wildlife survey efforts in the area.

Following the background information review, several surveys were conducted in 2021 and 2022:

- On January 19, 2021, AECOM biologists conducted a 1-day reconnaissance visit to Matanzas Creek Dam and Reservoir to evaluate habitat conditions and assess their suitability for ESA-listed species. The reconnaissance visit focused on the dam, spillways, and lower reservoir inundation area, but also included accessible portions of the upper reservoir inundation area and Matanzas Creek upstream of the current reservoir extent. The entire Action Area could not be surveyed during the 1-day reconnaissance visit, and areas of the Action Area containing dense vegetation were surveyed from a distance.
- In February 2021, Prunuske Chatham, Inc (PCI) biologists conducted a California red-legged frog (*Rana draytonii*) site assessment and in 2022, PCI biologists conducted California red-legged frog surveys following the protocol in USFWS (2005) *Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog*. The California Red-legged Frog Protocol-Level Survey and Site Assessment Report are included as Appendix A.
- From March through June 2021, PCI biologists conducted botanical surveys in the Action Area to characterize plant communities, compile an inventory of species observed, and evaluate the potential for presence of special-status plant species. Results of those surveys are discussed in the Botanical Assessment Report (PCI 2021).

A Summary of Existing Environmental Conditions Technical Memorandum (TM) was prepared, which includes a description of the environmental setting and an assessment of special-status resources in the Action Area (AECOM 2021).

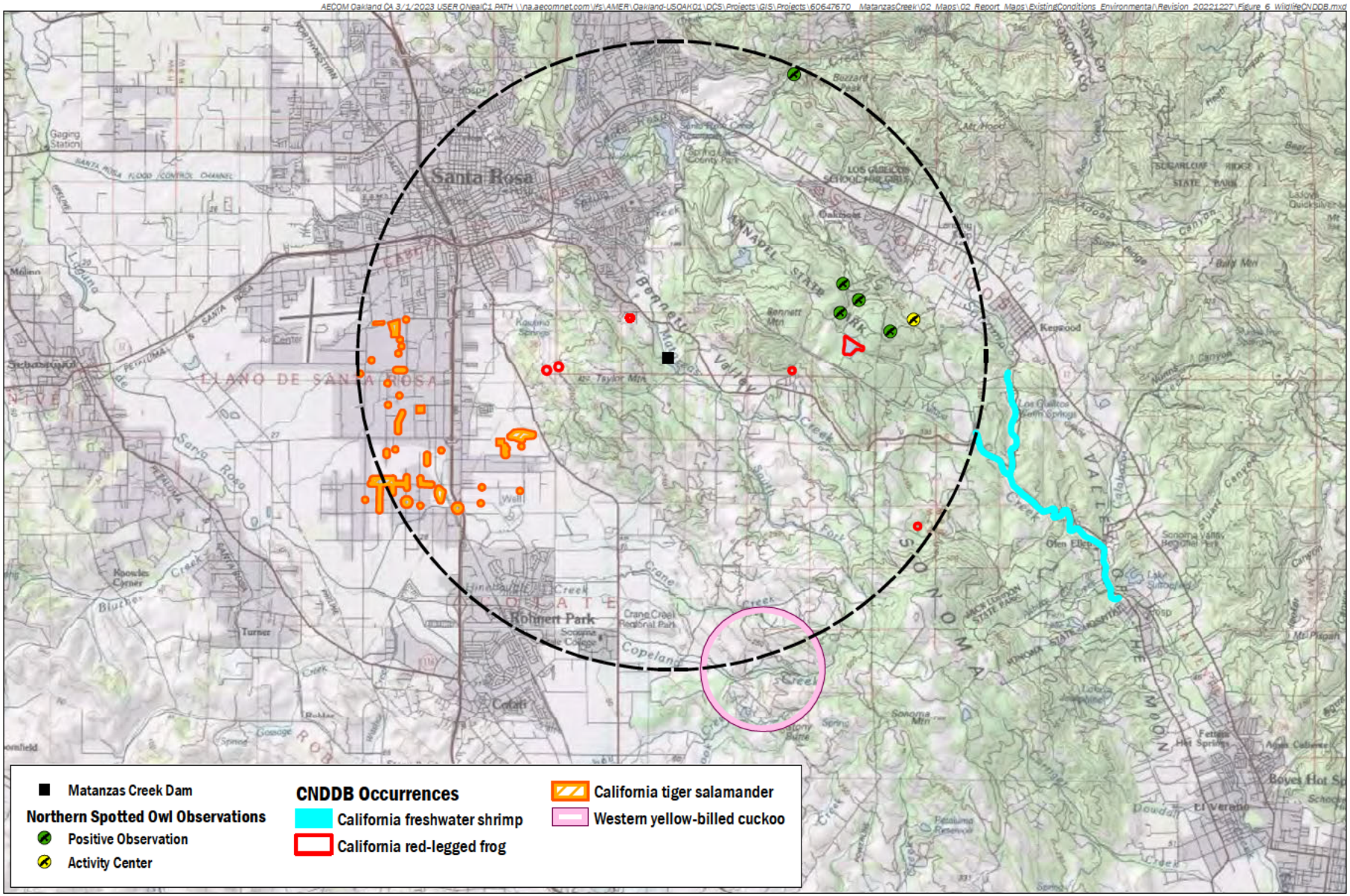


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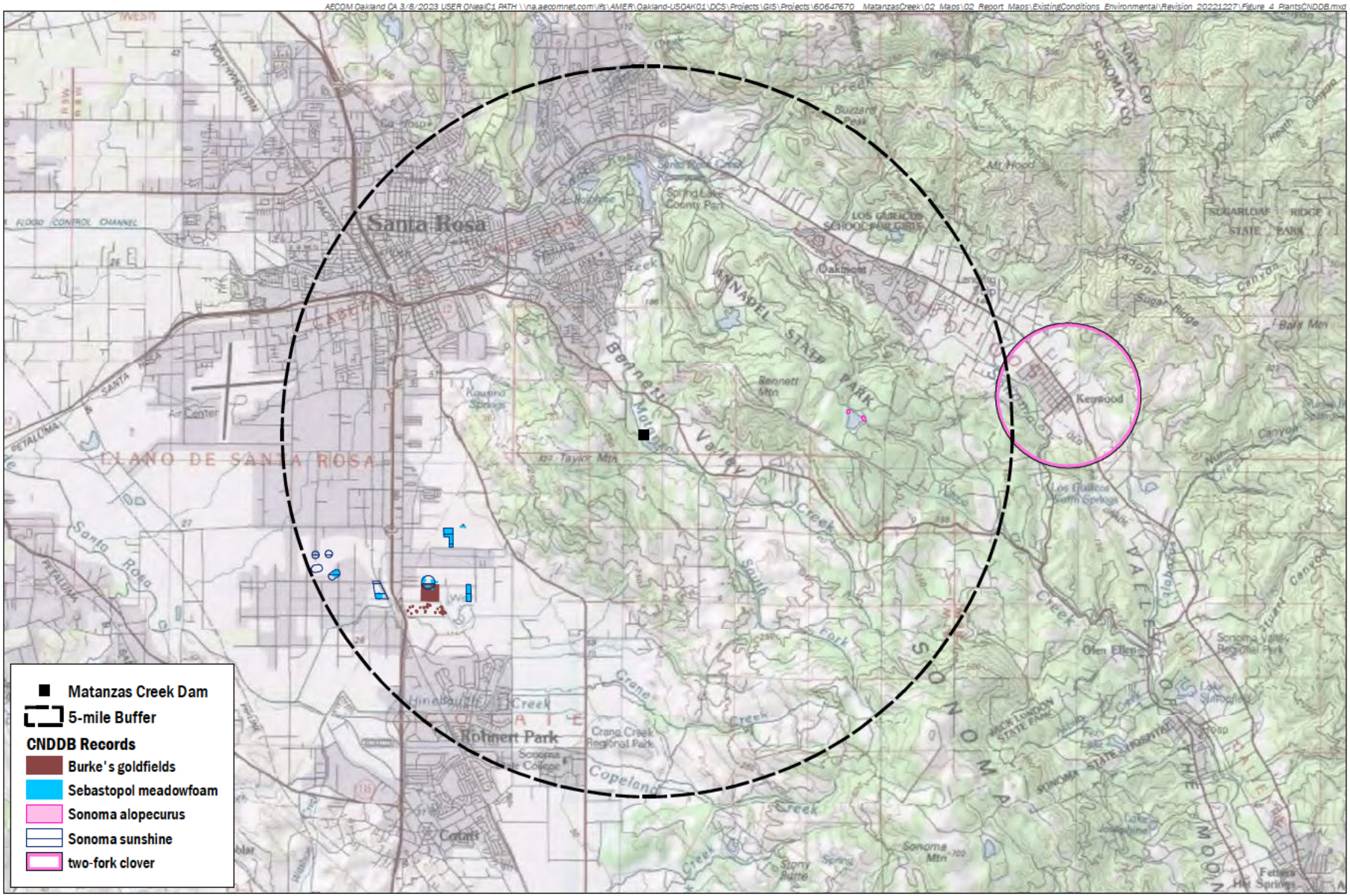
FIGURE 3

Federally-Listed Wildlife CNDDB Records within 5 miles of Matanzas Creek Dam



CDFW (CNDDB), 12/2022
USGS (Topo Basemap), 2019
AECOM, 2022

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FIGURE 4

Federally-Listed Plant CNDDB Records within 5 miles of Matanzas Creek Dam

Based on the information compiled from the background information review, reconnaissance visit, California red-legged frog surveys, and botanical surveys, the potential for each ESA-listed species to occur in the Action Area was evaluated according to the following criteria:

- **None.** The Action Area is outside of the species' range, or habitat in the Action Area is clearly unsuitable for the species (e.g., cover, substrate, elevation, hydrology, plant community, site history, or disturbance regime are incompatible with the species' requirements). This category also includes highly mobile species that could have rare, transitory presence in the Action Area, but due to lack of suitable habitat and their mobility, would not be affected by the Proposed Action.
- **Low.** Few of the habitat components required by the species are present, and/or the majority of habitat in the Action Area is unsuitable or of very poor quality; or focused surveys for the species in the Action Area have been negative. The species is not likely to be found in the Action Area.
- **Moderate.** Some of the habitat components required by the species are present, and/or only some of the habitat in the Action Area is unsuitable. The species has some potential to be found in the Action Area.
- **High.** All habitat components meeting the species requirements are present and/or most of the habitat in the Action Area is suitable. The species is likely to be found in the Action Area.
- **Present.** The species was observed in the Action Area or has been recorded (e.g., in CNDDB) in the Action Area.

ESA-listed species' regulatory status, habitat requirements, nearby occurrences, and potential to occur in the Action Area are summarized in Attachment B. The only species addressed in detail in this BA is California red-legged frog. Although their potential to occur in the Action Area is low and 2022 surveys following the USFWS (2005) *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* resulted in a negative finding, suitable dispersal habitat is present in the Action Area and there is limited potential for the species to disperse through the Action Area. Therefore, we believe an effects analysis for California red-legged frog is warranted. Based on the Summary of Existing Environmental Conditions TM (AECOM 2021), the Botanical Assessment Report (PCI 2021), and the information summarized in the Species Potential to Occur table (Attachment B), the Proposed Action is not expected to impact any other ESA-listed species returned in the CNDDB search or iPaC official species list. There are two federally-listed plant species with low potential to occur in the Action Area (Sebastopol meadowfoam [*Limnanthes vinculans*] and Kenwood Marsh checkerbloom [*Sidalcea oregana* ssp. *valida*]); however, consultation was determined to be unnecessary because recent botanical surveys resulted in a negative finding for these species and these species are not expected to be impacted by the Proposed Action.

3.2 EXISTING ENVIRONMENTAL CONDITIONS

Matanzas Creek Dam and the Action Area are in Bennett Valley, approximately 2 miles southeast of the city of Santa Rosa in Sonoma County. Bennett Valley is bordered by Taylor Mountain to the west and Bennett Mountain to the east. Daily average temperatures between 1971 and 2021 at the nearby Santa Rosa Station ranged from 48.3 degrees Fahrenheit (°F) in December to 67.5°F in August (NRCS 2021a, Table 2). Average precipitation ranged from 0.04 inch in July to 5.63 inches in January.

Matanzas Creek's headwaters are south of the Action Area near Sonoma Mountain. Two headwater streams, Matanzas Creek and South Fork Matanzas Creek, meet between Sonoma Mountain Road and Grange Road upstream of the Action Area. From that confluence, Matanzas Creek flows northwest

until it reaches Matanzas Creek Reservoir and Matanzas Creek Dam. The watershed drainage area upstream of Matanzas Creek Dam is 11.5 square miles (USGS 2016). Downstream of Matanzas Creek Dam, Matanzas Creek flows north through Bennett Valley, then turns west and flows through the city of Santa Rosa to its confluence with Santa Rosa Creek. Santa Rosa Creek continues west to its confluence with Laguna de Santa Rosa, which flows north for a short stretch before meeting Mark West Creek, a tributary to the Russian River.

Table 2 Climate Data for Santa Rosa, California Station (1971 – 2021)

Month	Average Daily Temperature (°F)	Average Precipitation (inches)
January	48.4	5.63
February	51.5	5.73
March	53.8	4.38
April	56.7	1.89
May	60.9	1.09
June	65.6	0.17
July	67.2	0.04
August	67.5	0.08
September	67.1	0.36
October	62.6	1.70
November	54.0	4.02
December	48.3	5.51

°F – degrees Fahrenheit

3.2.1 VEGETATION COMMUNITIES

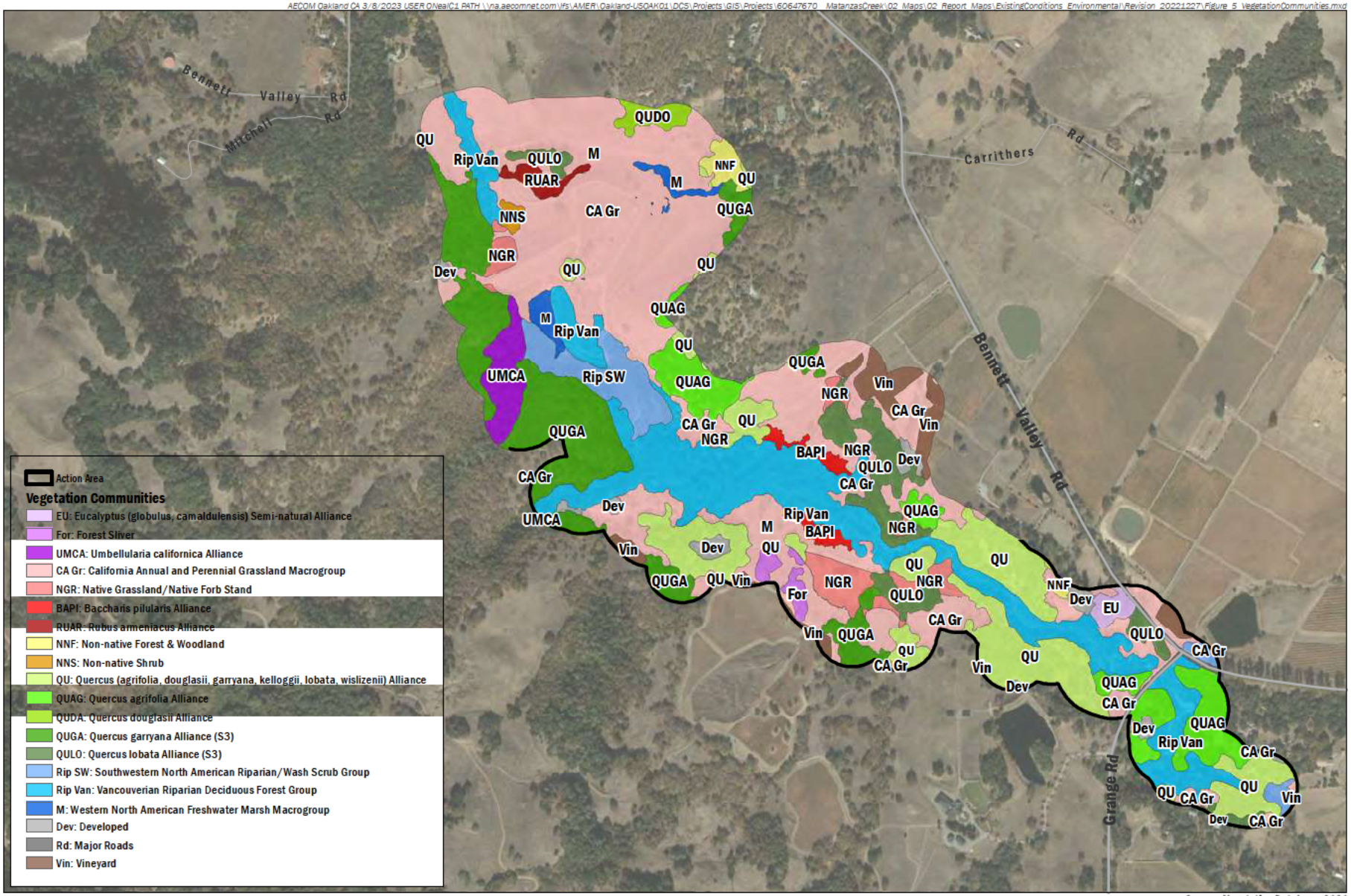
Fine-scale vegetation communities and habitats were mapped across Sonoma County as part of the Sonoma County Vegetation Mapping and LiDAR Program (SCAPOSD 2019). This body of work, described in the Sonoma Vegetation and Habitat Map Final Report and with spatial data available for download, is known as the Sonoma Veg Map. The Sonoma Veg Map shows 16 unique vegetation communities in the Action Area (Figure 5). These vegetation communities were generally mapped in the Action Area at the alliance level (consistent with the National Vegetation Classification system), and sometimes at the group or macrogroup level. A description of each of these vegetation communities is included in Table 3, primarily from the Sonoma Veg Map, but with relevant observations from the reconnaissance visit. Based on fieldwork conducted in 2021, including a reconnaissance visit and wetland delineation conducted by AECOM (AECOM 2022) and botanical surveys conducted by PCI (PCI 2021), the Sonoma Veg Map vegetation communities data were refined in the Action Area.

3.2.2 AQUATIC HABITATS

This section provides a summary of available information relevant to aquatic habitats in the Action Area, drawn primarily from the *Matanzas Creek Dam Rehabilitation Project Aquatic Resources Delineation Report* (AECOM 2022).

Matanzas Creek flows through Matanzas Reservoir. Matanzas Creek originates on the slopes of Sonoma Mountain. It is an intermittent stream fed by many small, unnamed intermittent tributaries to

AECOM Oakland CA 3/8/2023 USER ONeal\C1 PATH \\na.aecomnet.com\fs\AMER\Oakland-USOAK01\DCS\Projects\GIS\Projects\60647670_MatanzasCreek\02_Maps\02_Report_Maps\ExistingConditions_Environmental\Revision_20221227\Figure_5_VegetationCommunities.mxd



Sonoma Vegetation Database, 2020
AECOM, 2023
ESRI World Imagery, 2023

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FIGURE 5

Vegetation Communities in the Action Area

Table 3 Vegetation Communities in the Action Area

Sonoma Veg Map Class	Map Code	Description	Location in the Action Area
California Annual and Perennial Grassland Macrogroup	CA Gr	A catch-all for many grassland types, both native and nonnative. Grasslands observed in the Action Area during the reconnaissance visit were dominated by nonnative annual and perennial species.	This classification is found throughout the Action Area, on the dam face, spillway, and in gaps between forest and woodland communities.
Baccharis pilularis Alliance	BAPI	This alliance consists of shrubland dominated by coyote brush.	This alliance is found in the central part of the Action Area, on both sides of Matanzas Creek.
Umbellularia californica Alliance	UMCA	This alliance consists of forest and woodland dominated by California bay.	This alliance is found on one slope extending south from the base of the upstream side of the dam, west of Matanzas Creek.
Eucalyptus (*globulus, camaldulensis*) Semi-Natural Alliance	EU	This is a nonnative forest community dominated by *Eucalyptus* spp.	This community is found in one small polygon mapped adjacent to Bennet Valley Road at the southeastern end of the Action Area.
Forest Sliver	For	This community consists of small forested areas not identified by dominant species in the Sonoma Veg Map. The Sonoma Veg Map defines these areas as between ½ and 1 acre in size, surrounded by nonforested map classes. During the reconnaissance visit, the forest sliver mapped near the eastern end of the dam was dominated by coast live oak (*Quercus agrifolia*); other forest slivers in the Action Area are also likely oak-dominated.	This community is found in one polygon near the eastern end of the dam and three polygons south of Matanzas Creek in the central portion of the Action Area.
Rubus armeniacus Alliance	RUAR	This alliance consists of blackberry patches dominated by the highly invasive Himalayan blackberry.	One small polygon of this type occurs in the Action Area toward the downslope end of the spillway.
Nonnative Forest and Woodland	NNF	This is a broad category for forest and woodland communities dominated by nonnative species. These areas were not visited during the reconnaissance visit, so the dominant species in these polygons in the Action Area was not determined.	Two small polygons of this type occur in the Action Area—at the northeastern end, on the slopes above the spillway, and at the eastern end near Bennet Valley Road.
Nonnative Shrub	NNS	In the Action Area, this mapping unit is composed of the highly invasive Spanish broom (*Spartium junceum*).	One small polygon of this community occurs on the bank of Matanzas Creek at the base of the dam outlet.
Quercus (*agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni*) Alliance	QU	This alliance consists of forest and woodland in which multiple oak species are co-dominant.	This alliance is prevalent in the eastern half of the Action Area, along both sides of Matanzas Creek.
Quercus agrifolia Alliance	QUAG	This alliance consists of forest and woodland dominated by coast live oak.	This alliance is scattered throughout the Action Area in several polygons.

Sonoma Veg Map Class	Map Code	Description	Location in the Action Area
Quercus douglasii Alliance	QUDO	This alliance consists of forest and woodland dominated by blue oak.	This alliance is found in one small polygon at the northern end of the Action Area.
Quercus garryana Alliance	QUGA	This alliance consists of forest and woodland dominated by Oregon white oak.	This alliance is prevalent throughout the Action Area, particularly on north-facing slopes south of the Matanzas Creek corridor.
Quercus lobata Alliance	QULO	This alliance consists of forest and woodland dominated by valley oak.	This alliance is prevalent throughout the central and eastern end of the Action Area.
Southwestern North American Riparian/Wash Scrub Group	Rip SW	This is a general vegetation type in which a variety of riparian shrubs or small trees are dominant. Deciduous riparian trees lacked leaves during the reconnaissance visit and could not be identified, and riparian vegetation communities could not be distinguished.	This alliance is found primarily in the Matanzas Creek floodplain on the upstream side of the dam, surrounding the area mapped as marsh. Two small polygons are also present in the far eastern end of the Action Area.
Vancouverian Riparian Deciduous Forest Group	Rip Van	This is a general vegetation type dominated by large riparian trees such as alders (*Alnus* sp.) or Pacific willow (*Salix lasiandra*). Deciduous riparian trees lacked leaves during the reconnaissance visit and could not be identified, and riparian vegetation communities could not be distinguished.	This type is found throughout the Matanzas Creek floodplain.
Western Northern American Freshwater Marsh Macrogroup	M	This group consists of marshes and wet meadows dominated by silverweed (*Potentilla* spp.), sedge (*Carex* spp.), rush (*Juncus* spp.), water parsley (*Oenanthe sarmentosa*), bulrush (*Schoenoplectus* spp. and *Scirpus* spp.), and cattail (*Typha* spp.).	This group is found in the reservoir inundation area from the Matanzas Creek Dam to approximately 0.25 mile upstream of the dam.
Developed	Dev	This classification consists of man-made developed areas greater than 0.2 acre. Areas were considered developed if they contain significant man-made impervious cover or are highly altered by man. This includes lawns, heavily landscaped garden and patio areas, bocce and tennis courts, horse riding areas, baseball and soccer fields, swimming pools, and playground areas.	Small developed areas are scattered around the Action Area, primarily near the outer perimeter of the Action Area.
Major Roads	Rd	This classification consists of major paved roads, including highways and some major arterial roads. Minor paved roads and dirt roads are not included.	This classification includes portions of Bennett Valley Road and Grange Road that intersect with the Action Area.
Vineyard	Vin	This classification consists of vineyards, as observed in the fall 2013 imagery.	Vineyards are found in several areas near the outer perimeter of the Action Area, including along the western edge of the Action Area and along Bennett Valley Road on the eastern edge of the Action Area.

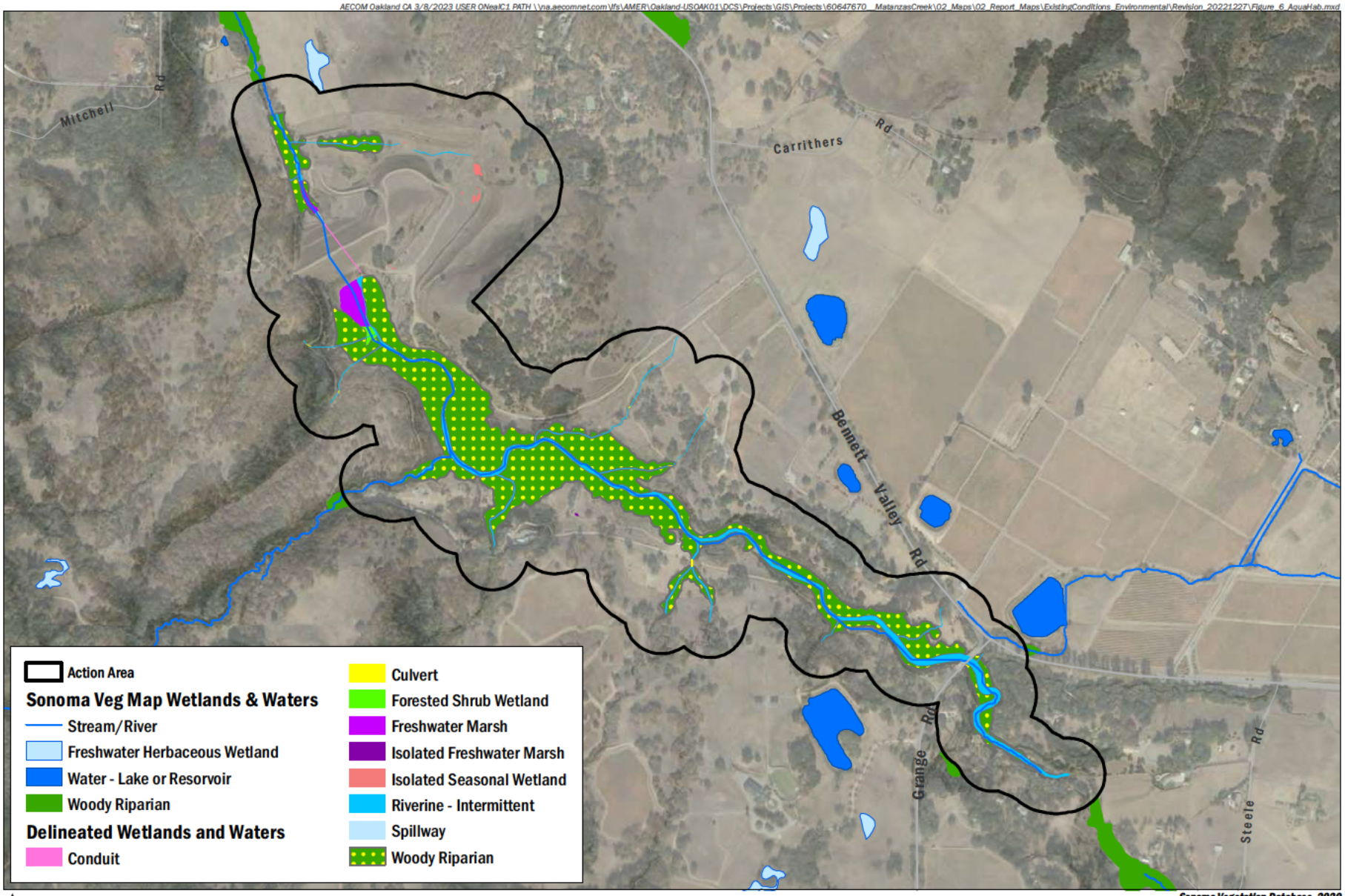

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FIGURE 6

Aquatic Habitats in the Action Area

the east and west of Matanzas Creek (Figure 6); the tributaries appear to only carry flows for a few months of the year. Several of the tributaries are culverted. Riparian woodlands occur along Matanzas Creek and the adjacent intermittent streams. The habitat is dominated by willows (*Salix* spp.), boxelder (*Acer negundo*), white alder (*Alnus rhombifolia*), and oaks (e.g., coast live oak), with a number of understory species. A total of 43 acres of woody riparian vegetation is mapped in the Action Area.

In the floodplain of Matanzas Creek and in the potential inundation footprint of the Matanzas Creek Reservoir, there is a freshwater emergent marsh. This approximately 1-acre wetland is dominated by facultative wetland plants, mixed with upland species. Near the base of the dam in the Matanzas Creek floodplain, there is a small 0.14-acre forested/scrub wetland. This wetland is dominated by arroyo willow (*Salix lasiolepis*). Downstream of the primary spillway, emergent wetland vegetation occurs along the edges of Matanzas Creek, with areas of cattails, bulrush, and other wetland plants. This emergent marsh is 0.15 acre.

Beyond the limits of Matanzas Creek, there are eleven isolated wetlands mapped in the Action Area (AECOM 2022). In the auxiliary spillway, there is a depressional freshwater marsh that appears to be a created feature. The marsh supports obligate wetland plants and holds water into spring. Isolated seasonal wetlands occur in the cut surface that forms the floor of the auxiliary spillway. The pools are dominated by nonpersistent emergent vegetation, such as annual herbs and grasses adapted to these unique conditions. These 11 isolated wetlands comprise 0.15 acre in the Action Area.

Detailed descriptions of aquatic habitats as they relate to potential California red-legged frog habitat are available in Appendix A, *California Red-legged Frog Site Assessment, Matanzas Creek Dam Watershed Rehabilitation Project.*

3.3 ESA-LISTED SPECIES AND CRITICAL HABITATS

This section includes a description of ESA-listed species with potential to be affected by the Proposed Action and critical habitats that overlap with the Action Area.

3.3.1 CALIFORNIA RED-LEGGED FROG

California red-legged frog is federally listed as a threatened species and is also a CDFW Species of Special Concern. The original listing described a zone of integration with the northern red-legged frog, extending north from Walker Creek in Marin County to southern Mendocino County (61 FR 25813). However, the intergrade zone between the two species is now defined as a narrow band between Big River and Mills Creek in Mendocino County (Nafis 2021), and the listing was updated in 2006 to include Sonoma County (71 FR 19244). Critical habitat was designated in 2006 (71 FR 19244) and was revised in 2010 (75 FR 12816).

The Action Area is within the current range of the California red-legged frog. This California endemic was historically documented in 46 counties in California, but is now confined to 23 counties, with greater abundance in the San Francisco Bay area and central California coast than in other historical locations. In Sonoma County, California red-legged frogs occur in many drainages, ponds, and man-made stock ponds (CDFW 2021). There are a handful of documented occurrences from within 5 miles of Matanzas Creek Dam, west (Taylor Mountain), east (Annadel State Park), and southeast (Sonoma Mountain) of the Action Area (Figure 3). The closest known occurrence in the CNDDB is a single report from a pond on private property on the eastern flank of Taylor Mountain, approximately 0.8 mile from Matanzas Creek Dam.

In 2010, Sonoma Water conducted California red-legged frog surveys following the USFWS (2005) *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* protocol at the Matanzas Creek Reservoir inlet, located in the Action Area (Sonoma Water 2010). In 2022, PCI conducted California red-legged frog surveys in the Action Area following the USFWS 2005 survey protocol. Both the 2010 and 2022 protocol survey efforts resulted in a negative finding for California red-legged frog. Detailed results from the 2022 survey are available in Appendix A, *California Red-legged Frog Site Assessment, Matanzas Creek Dam Watershed Rehabilitation Project.*

The Action Area supports native upland and aquatic communities but has experienced significant habitat alteration from anthropogenic activities. The on-channel dam on Matanzas Creek was constructed in 1964 and it continues to be maintained as an active flood control feature. There are two habitat features within the Action Area (a seasonal pond immediately upstream of the dam and the stilling basin at the outlet of the principle spillway) that appear to meet the depth requirements for suitable California red-legged frog breeding habitat; however, successful breeding is unlikely at these locations due to the pulsed high flow velocities through the Matanzas Creek during winter storms that would likely wash away egg masses and tadpoles should California red-legged frog breed in these locations. While the Action Area does not contain suitable breeding habitat, various upland and aquatic habitats in the Action Area could provide opportunity for California red-legged frog dispersal, shelter, predator avoidance, and forging. Detailed descriptions of habitat in the Action Area, including photographs, are available in Appendix A, in the site assessment report titled *California Red-legged Frog Site Assessment, Matanzas Creek Dam Watershed Rehabilitation Project*, which is included with the 2022 survey report.

California red-legged frog has not been observed previously in the Action Area despite several focused surveys, and the availability of suitable breeding habitat is likely limiting. Based on several known occurrences from around the Action Area and the presence of diverse upland and aquatic habitats that could provide dispersal or foraging habitat, California red-legged frog has a low potential to disperse into or through the Action Area. Although the species has low potential to occur in the Action Area, the Proposed Action could impact California red-legged frogs if they do disperse into the Action Area before, during, or after construction; therefore, potential impacts are addressed in this BA, avoidance measures have been developed, and an effects determination has been made.

3.3.2 CALIFORNIA RED-LEGGED FROG CRITICAL HABITAT

The critical habitat designation for California red-legged frog was finalized in 2010 (75 FR 12816). Critical habitat Unit SON-1 is a little over 1 mile east of Matanzas Creek Dam, and Unit SON-2 is approximately 5 miles south of the dam. The dam, reservoir footprint, and Action Area are all outside of designated critical habitat. Therefore, California red-legged frog critical habitat is not discussed further in this document.

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4 POTENTIAL EFFECTS OF THE PROPOSED ACTION

There is low potential for California red-legged frogs to disperse through the Action Area. However, if an individual is present in the Action Area, it may be impacted by the Proposed Action. The following sections assess the potential effects of the Proposed Action on California red-legged frog and discuss how the AMMs will be implemented to avoid or minimize these potential effects.

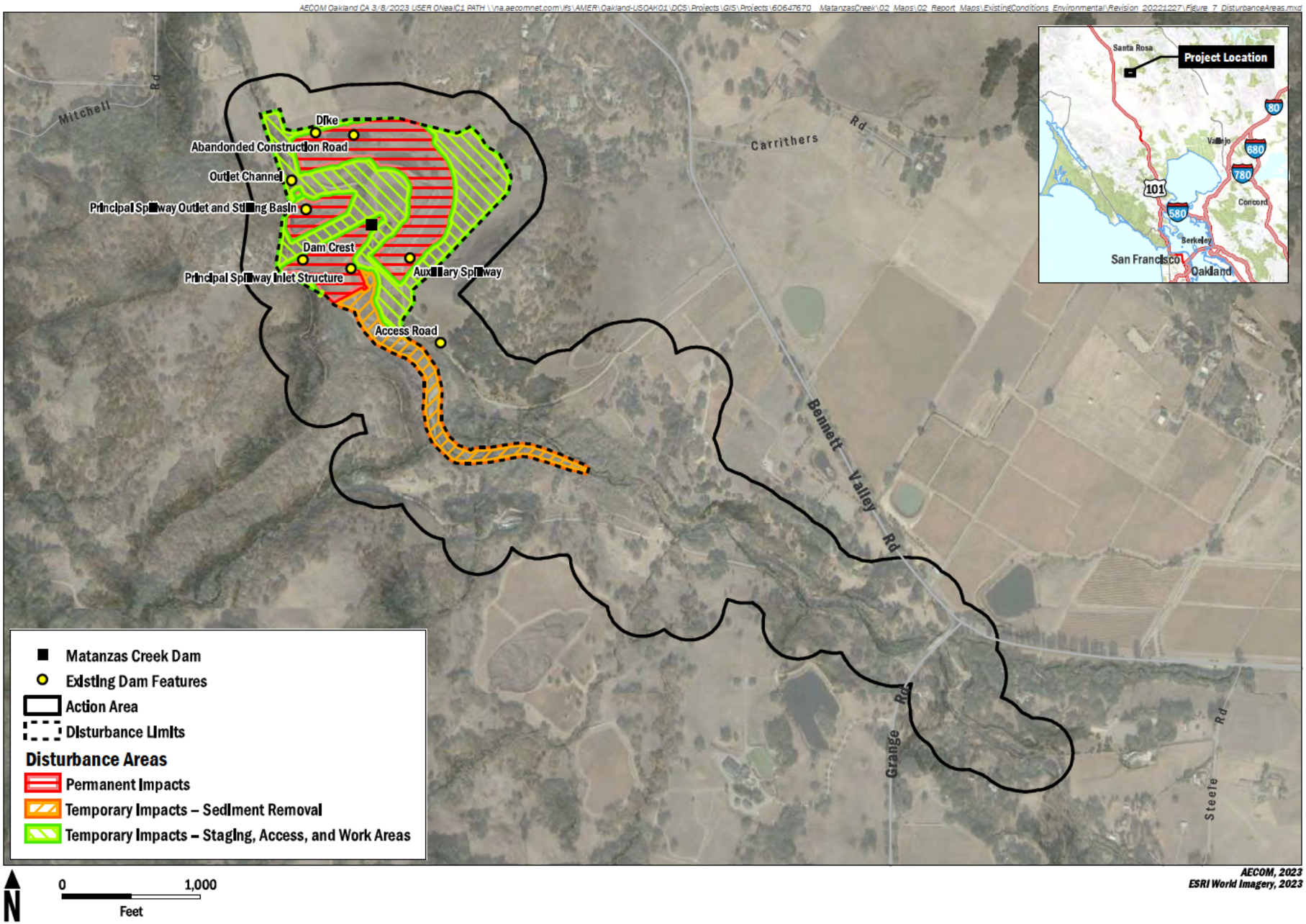
4.1 INJURY AND MORTALITY

As with any project involving use of heavy equipment near wildlife habitat, there is potential for equipment or materials to come into contact with wildlife, causing injury or mortality. Although the potential for California red-legged frog to occur in the Action Area is low, in the unlikely event that a frog is dispersing through the Action Area during construction, it is possible that it could be injured or killed if it is trampled by vehicles, equipment, or construction personnel working in the Action Area, or if it becomes entrapped in open, excavated areas used for construction.

The AMMs in Section 2.4 would minimize the risk of California red-legged frog injury or mortality resulting from the Proposed Action to the greatest extent possible. These measures include scheduling in-channel work during the dry season when California red-legged frogs are unlikely to be moving across the landscape; conducting a preconstruction survey for California red-legged frogs and other wildlife within 5 days of initial ground disturbance, initial dewatering, and re-initiation of ground-disturbing work after pauses in work lasting more than 14 days; conducting a native aquatic species capture and relocation effort prior to dewatering; working only during daytime hours when frogs are less active and more visible; covering trenches or providing escape ramps in trenches; and stopping all work activities within a 50-foot radius if a California red-legged frog is encountered and allowing the frog to leave on its own volition. With implementation of the AMMs, and considering multiple negative surveys and the low likelihood of presence, the potential for the Proposed Action to injure or kill a California red-legged frog is discountable.

4.2 TEMPORARY HABITAT DISTURBANCE

The Proposed Action would cause 28.9 acres of temporary habitat disturbance to Matanzas Creek Dam and Reservoir and the surrounding habitats (Figure 7, Table 4). Temporary access and staging would occur in 21.5 acres around the dam and auxiliary spillway and would consist of vegetation removal in portions of this area to facilitate vehicle and equipment access and staging, vehicles and construction equipment driving on access roads, and equipment and material storage and use in staging and construction areas. An additional 7.4 acres of temporary habitat disturbance would occur due to removal of accumulated sediments in a portion of the reservoir. These temporary habitat disturbances would occur in riparian, freshwater marsh, California bay forest, oak woodland, scrub, and grassland habitats, all of which are suitable California red-legged frog dispersal habitats. Although the potential for California red-legged frog to occur in the Action Area is low, in the unlikely event that a frog is dispersing through the Action Area during construction, it could encounter temporarily disturbed dispersal habitat conditions, there would be less dispersal habitat available, and dispersal routes through the Action Area would be temporarily impacted.



AECOM

Natural Resources Conservation Service

Matanzas Creek Dam Watershed Rehabilitation Project

FIGURE 7

Proposed Action Impacts

Table 4 Summary of Temporary and Permanent Impacts

Impact Type	Impact Description	Impact Area (acres)	Notes
Temporary	Access & Staging	21.5	This area would be revegetated following disturbance.
Temporary	Reservoir Accumulated Sediment Removal	7.4	This area would be revegetated following sediment removal.
Permanent	Dam and Spillway Repairs	19.3	Most of these impacts would consist of placement of earthen material and would continue to serve as dispersal habitat. A small area would be converted to concrete.
Permanent	Increase in 100-Year Inundation Area	16.3	This additional area around the rim of the existing reservoir inundation area would be inundated for a brief duration following a 100-year storm event.
Total Temporary and Permanent Impact Area		**64.5**	

The AMMs in Section 2.4 would minimize the extent of temporary habitat disturbance in the Action Area. These measures include limiting vegetation removal as much as practicable and establishing vegetative cover on bare ground as soon as possible after grading. With implementation of the AMMs, and given the low potential for California red-legged frogs to occur in the Action Area, the magnitude of impacts resulting from temporary habitat disturbance on California red-legged frogs would be insignificant.

4.3 PERMANENT HABITAT IMPACTS

The Proposed Action would result in 19.3 acres of permanent impacts to Matanzas Creek Dam and to the auxiliary spillway (Figure 7, Table 4). Permanent impacts at the dam would include adding earthen material to raise the dam crest, installing upstream and downstream earthen embankment stability buttresses, extending the primary spillway conduit by 175 upstream and 181 feet downstream to accommodate the wider dam, and constructing a new inlet and stilling basin. Permanent impacts at the auxiliary spillway would consist of raising the spillway crest using earthen material, regrading the auxiliary spillway to reestablish a consistent slope, and constructing a concrete spillway crest/apron and concrete cutoff wall near the crest. Most of the permanent habitat impacts associated with the Proposed Action would involve placing or redistributing earthen material; the primary areas where concrete would be placed would be the auxiliary spillway crest/apron and cutoff wall, and the new inlet and stilling basin on the primary spillway conduit.

In addition to permanent impacts associated with placement of earthen material and concrete, the Proposed Action would increase the flood storage capacity of Matanzas Creek Reservoir. The 100-year inundation area behind the dam would be 16.3 acres larger than the existing condition (Table 4). The entire reservoir inundation area would drain within 4 days after a 100-year storm. The 16.3-acre permanent impact area would consist of a "ring" of habitat around the reservoir that, after Proposed Action implementation, would be inundated for a brief duration after a 100-year storm, but would be outside of the inundation area in the absence of the Proposed Action.

There is low potential for California red-legged frogs to disperse through the Action Area during and after Proposed Action implementation. Most of the permanent impacts associated with the Proposed

Action would involve placement or redistribution of earthen material; these areas would be revegetated after the completion of construction and would therefore continue to provide suitable dispersal habitat for California red-legged frog. Limited placement of concrete is consistent with how concrete is used in the existing structures; concrete is already present at the auxiliary spillway crest and throughout the primary spillway conduit. The additional area that would be inundated after a 100-year storm is dispersed around the reservoir and would be impacted very infrequently and for a short duration. Furthermore, brief inundation during a 100-year storm is not likely to adversely affect dispersing California red-legged frogs. Once complete, the Proposed Action would not substantially alter the type of habitat present in the Action Area and would not reduce the ability of California red-legged frog to disperse through the Action Area; therefore, the magnitude of impacts resulting from permanent habitat alteration on California red-legged frogs would be insignificant.

4.4 VISUAL AND NOISE DISTURBANCE

In the unlikely event that a California red-legged frog disperses into the Action Area during Proposed Action implementation, it could be exposed to visual and noise disturbances associated with vegetation removal, operation of heavy equipment, vehicle traffic, and movement and placement of construction materials. The AMMs in Section 2.4 would minimize the adverse effects of visual and noise disturbances. These measures include working only during daylight hours, limiting vegetation removal as much as practicable, conducting in-channel work during the dry season when California red-legged frogs are unlikely to be moving across the landscape, and stopping all work activities within a 50-foot radius if a California red-legged frog is encountered. With implementation of the AMMs, the effects of visual and noise disturbances associated with the Proposed Action on California red-legged frogs would be insignificant.

4.5 EROSION/SEDIMENTATION/HAZARDOUS MATERIALS SPILLS

There is a small chance that, during implementation of the Proposed Action, a hazardous material could spill, or erosion or sedimentation could occur. Hazardous materials spills could injure or kill a California red-legged frog in the unlikely event an individual is dispersing through the Action Area during construction and comes into contact with the spilled material. Erosion and sedimentation could adversely impact California red-legged frog dispersal habitat. The AMMs in Section 2.4 would minimize the likelihood of erosion, sedimentation, and hazardous materials spills to the greatest degree possible. These measures include spraying disturbed soils with water or another approved dust suppressant/soil binder, wetting or covering stockpiles, only using equipment in good working condition, servicing and refueling equipment at least 300 feet from stream channels, and preparing and implementing a SWPPP that includes erosion and sediment controls such as silt fences, fiber wattles, and/or earthen berms. With implementation of the AMMs, the potential for the Proposed Action to cause erosion, sedimentation, or a hazardous materials spill would be discountable.

5 EFFECTS DETERMINATIONS

The Proposed Action would result in limited temporary habitat disturbance and permanent habitat impacts to the area around Matanzas Creek Dam and Reservoir, which has low potential to serve as dispersal habitat for California red-legged frog. Proposed Action implementation would cause some noise and visual disturbances, and there is potential that a California red-legged frog could be injured or killed in the unlikely event it is present in the Action Area during construction, or that erosion, sedimentation, or a hazardous materials spill could degrade dispersal habitat for California red-legged frog. However, with implementation of the AMMs in Section 2.4, the effects of the Proposed Action on California red-legged frog would be insignificant or discountable.

Although the Proposed Action has the potential to impact California red-legged frog and its dispersal habitat, all impacts associated with the Proposed Action will be insignificant or discountable, and therefore the Proposed Action **may affect, but is not likely to adversely affect** California red-legged frog.

6 REFERENCES

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ATTACHMENT A IPAC OFFICIAL SPECIES LIST

United States Department of the Interior

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

In Reply Refer To: December 23, 2022
Project Code: 2023-0028269
Project Name: Matanzas Creek Dam Watershed Rehabilitation Project

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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

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

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

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

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Project Code: 2023-0028269
Project Name: Matanzas Creek Dam Watershed Rehabilitation Project
Project Type: Dam - Maintenance/Modification
Project Description: The Project will fully rehabilitate the dam and raise the dam crest by 3.4 feet to preserve flood protection downstream of the dam.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.4021934,-122.64765177077612,14z

Counties: Sonoma County, California

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

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

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

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

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

Birds

NAME	STATUS
Northern Spotted Owl *Strix occidentalis caurina* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1123	Threatened

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: East Pacific DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (CA - Sonoma County) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Crustaceans

NAME	STATUS
California Freshwater Shrimp *Syncaris pacifica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7903	Endangered

Flowering Plants

NAME	STATUS
Burke's Goldfields *Lasthenia burkei* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4338	Endangered
Clara Hunt's Milk-vetch *Astragalus clarianus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3300	Endangered
Sebastopol Meadowfoam *Limnanthes vinculans* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/404	Endangered
Showy Indian Clover *Trifolium amoenum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6459	Endangered
Sonoma Sunshine *Blennosperma bakeri* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1260	Endangered
White Sedge *Carex albida* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3063	Endangered

Critical habitats

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

IPaC User Contact Information

Agency: Natural Resources Conservation Service
Name: Katie McLean
Address: 300 Lakeside Drive Suite 400
City: Oakland
State: CA
Zip: 94612
Email kmclean1022@gmail.com
Phone: 9252168909

ATTACHMENT B ESA-LISTED SPECIES POTENTIAL TO OCCUR IN THE ACTION AREA

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Invertebrates					
California freshwater shrimp	*Syncaris pacifica*	FE, SE	Low-gradient, clear, cool freshwater perennial streams in Marin, Napa, and Sonoma counties. Optimal habitat includes some emergent vegetation as well as undercut banks to provide shelter during high velocity storm events.	A single CNDDB occurrence sits 4.9 miles east of the project in Sonoma and Yulapa Creeks between Kenwood and Glen Ellen, encompassing upper Sonoma Creek. Habitat in this vicinity consists of exposed bedrock and deep pools with minimal undercut banks. Riparian overstory composition includes alders, bay laurel, and willows.	**None.** California freshwater shrimp are considered extirpated from Santa Rosa Creek since the 1960s.
San Bruno elfin butterfly	*Callophrys mossii bayensis*	FE	Inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco Peninsula, in the fog belt of north-facing slopes from 200 to 5,000 feet elevation; known host plant stonecrop (*Sedum spathulifolium*).	Historical range encompasses parts or all of the nine Bay Area Counties (including Sonoma County). Current distribution is limited to four known populations of this species, all of which occur in San Mateo County.	**None.** All known populations are found in San Mateo County; the Action Area is outside of the range of this species.
Amphibians					
California red-legged frog	*Rana draytonii*	FT, SSC	Occurs in or near permanent water of streams, marshes, ponds, lakes, and other bodies of water from sea level to 4,921 feet in elevation. Frequently found in woodlands, grasslands, or other plant cover adjacent to streams. In summer, estivate in small mammal burrows, leaf litter, or other moist sites in or near riparian areas. Adults disperse into riparian corridors and in damp thickets and forests typically within 300 feet of aquatic habitat. However, during wet periods, they can travel up to 1 mile between aquatic features.	Five occurrences of California red-legged frogs are found within 5 miles of Matanzas Creek Dam. The closest occurrence to the dam is 0.8 mile northwest, where 1 adult and 25 metamorphs were observed in a pond on the eastern flank of Taylor Mountain in 2017. Most records in the vicinity are from perennial ponds with emergent vegetation, surrounded by rangelands. Surveys following the USFWS (2005) *Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog* conducted in 2010 and 2022 resulted in negative findings for the species in the Action Area.	**Low.** Two survey efforts resulted in negative findings for California red-legged frogs in the Action Area. There is only one CNDDB occurrence within the species' 1-mile dispersal distance despite these survey efforts and others in the area. The Action Area does not contain suitable breeding habitat. At most, California red-legged frogs are expected to occasionally disperse through the Action Area.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
California tiger salamander	*Ambystoma californiense*	FT, ST	Found in grassland and oak savanna of the valleys and foothills. Requires vacant or mammal-occupied burrows (e.g., California ground squirrel, valley pocket gopher) for aestivation and standing water until late spring (May) for larvae to metamorphose. Adults may move as far as 1.24 miles between breeding ponds and upland aestivation sites. Breeding occurs in shallow ephemeral or semi-permanent pools and ponds that fill during heavy winter rains or in permanent ponds.	There are 25 occurrences of California tiger salamanders within 5 miles of Matanzas Creek Dam, all are west of Petaluma Hill Road in the Santa Rosa Plain. The nearest occurrence is found 2.5 miles from the dam. Habitat around the occurrences consists of natural and constructed wetlands and vernal pools surrounded by nonnative, grazed grasslands intermixed with residential development.	**None.** The species is not known to occur in Bennett Valley. When Matanzas Creek and Reservoir are inundated, flows are too high to provide suitable aquatic habitat for the species. The surrounding uplands contain some scattered pocket gopher mounds, but California ground squirrel burrows were not observed on site; absence of ground squirrel burrows limits the suitability of the upland habitats in the Action Area for this species.
Reptiles					
green sea turtle	*Chelonia mydas*	FT	Beaches for nesting, open ocean convergences zone, and coastal areas for benthic feeding. Globally distributed in tropical and subtropical waters. In California, they most commonly occur while foraging in coastal waters near San Diego.	There are no CNDDB occurrences for this species within 5 miles of Matanzas Creek Dam.	**None.** This species is found in open water marine habitats and sandy beaches. The Action Area contains oak woodland, riparian, and grassland habitats and is therefore not suitable for this species.
Birds					
northern spotted owl	*Strix occidentalis caurina*	FT	Unfragmented old growth mixed-conifer forests with multi-layered canopy and fragmented Douglas fir (*Pseudotsuga menziesii*), and redwood (*Sequoia sempervirens*) forests. Preferred habitat is typically characterized by dense canopy closure with a variety of different species, habitat structures, and open spaces to allow flight under the canopy. Spotted owls nest in treetops, tree cavities, caves, and cliff edges.	There is a single activity center for this species in Annadel State Park, north of the project. There are five positive survey records associated with this activity center within 5.0 miles of Matanzas Creek Dam. Habitat near this occurrence is dense coniferous forest.	**None.** Requires old growth and mature redwood or coniferous forests. Habitat in the Action Area consists primarily of grassland, oak woodland, and riparian habitats that are unsuitable for northern spotted owl.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT, SE	Woodlands, willow thickets, deciduous forests, abandoned farmland, and areas with scrubby overgrown vegetation along riparian corridors and marshlands. Nesting typically occurs from May through September along low gradient streams with cottonwood-willow groves.	A single CNDDB record for yellow-billed cuckoo is found in the project vicinity, 4.2 miles from the dam. Birds were observed along Copeland Creek near the Sonoma State College Campus in 1975. The creek is bordered by mature riparian habitat with oaks, bay laurels, alders, and maples and blackberry and willow thicket understory. There are no nearby eBird occurrences.	**None.** Breeding populations in California are believed to occur only in the Sacramento River Valley, the South Fork Kern River Valley, and the Colorado River Valley (Dettling et al. 2014). The lack of recent eBird occurrences in Bennett Valley and the greater region around Santa Rosa along with the single sighting in CNDDB being more than 45 years old suggests that the area is not suitable for this species.

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Plants					
Sonoma alopecurus	*Alopecurus aequalis* var. *sonomensis*	FE, 1B.1	Freshwater marshes, swamps, and riparian scrublands in Sonoma and Marin Counties. Elevations between 15 and 1,200 feet. Bloom period: May - July.	There is a single CNDDB occurrence 2.8 miles east of the dam in Ledson Marsh inside Annadel State Park. USFWS identified the only extant population of this species in Sonoma County as the one in Annadel State Park. Habitat for this species in Ledson Marsh is along the shallow, semi-upland area at the border of the marsh.	**None.** Freshwater marsh habitat within the Action Area is disturbed, relatively low in species diversity. In addition, this species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021).
two-fork clover	*Trifolium amoenum*	FE, 1B.1	Coastal bluff scrub, swales, and valley and foothill grassland. Occasionally found on serpentinite derived soils. Elevations between 15 and 1,360 feet. Bloom period: April - June.	There is a single natural population of this species in Marin County, two experimental populations in the Point Reyes National Seashore, and two experimental populations in Sonoma County. The dam is located 4.9 miles west of a CNDDB occurrence for this species in the town of Kenwood.	**None.** The Action Area is farther from the coast than this species is typically found. This species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021).
white sedge	*Carex albida*	FE, SE	Freshwater marshes, meadows, and seeps in Sonoma County. Bloom period: May - July.	There are no CNDDB occurrences recorded within 5.0 miles of the project. There is one known population of this plant species in Pitkin Marsh in Sonoma County. The marsh is a riparian wetland fed almost year-round by underground seeps.	**None.** There is only one known population of this species in Sonoma County at Pitkin Marsh, which does not overlap with the Action Area. Additionally, this species is no longer recognized and is synonymous with the common *Carex lemmonii*. This species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021).
Sonoma sunshine	*Blennosperma bakeri*	FE, SE, 1B.1	Vernal pools and wet grasslands with clay and loam soils at elevations below 330 feet. Only known to occur in Sonoma and Mendocino Counties. Bloom period: March - May.	Five CNDDB occurrences for this species are found west of the project in Santa Rosa Plain, the nearest 3.1 miles from the dam. Plants were found in both natural and created vernal pool and seasonal wetland habitats surrounded by grazed grassland.	**None.** Although there are seasonal wetlands found in the dam spillway that could be suitable for the species, the Action Area is above the known elevational range for this species and the species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021).
Burke's goldfields	*Lasthenia burkei*	FE, SE, 1B.1	Vernal pools, meadows and seeps with sloping loams, clay loams, and clay soils. Elevations less than 1,640 feet. Bloom period: April - June.	Three CNDDB occurrences of this species are found in the Horn Avenue Mitigation Bank, the nearest 3.1 miles from the dam. Habitat at this site includes created vernal pool habitats where natural clay soils have formed but Burke's goldfields were seeded.	**None.** In Sonoma County this species is known from lower elevations and soil types not present in the Action Area (soil types in the Action Area described in AECOM 2021). This species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021).

Common Name	Scientific Name	Status	Habitat Requirements	Nearby (within 5 miles) Occurrence(s)	Potential to Occur
Sebastopol meadowfoam	*Limnanthes vinculans*	FE, SE, 1B.1	Meadows and seeps, valley and foothill grasslands, stream banks, and Northern Basalt Flow and Northern Hardpan vernal pools. This species is also known to occur in artificial habitats like ditches. Elevations less than 980 feet. Bloom period: April - May.	There are five CNDDB occurrences for this species within 5 miles of the dam, all recorded east of the dam in the Santa Rosa Plain. The nearest occurrence is 2.7 miles west of the dam. Records of this species include populations found in both natural and created vernal pool and seasonal wetland habitat. Created wetlands are located at the Horn Avenue Mitigation Bank.	**Low.** Although there are seasonally-ponded depressions in the auxiliary spillway that could be suitable for the species, the species typically occurs at lower elevations (like on the Santa Rosa Plain) and in soil types not present in the Action Area. This species was not observed during the 2021 botanical surveys in the Action Area despite detection of Lobb's aquatic buttercup (*Ranunculus lobbii*), a commonly co-occurring species, at multiple locations (PCI 2021). Based on the lack of detection during botanical surveys and the suboptimal soil and elevation conditions, this species is not expected to be present in the Action Area or affected by the Proposed Action.
Kenwood Marsh checkerbloom	*Sidalcea oregana* ssp. *valida*	FE, SE, 1B.1	Freshwater marshes and swamps in Sonoma county. Elevations less than 500 feet. Bloom period: June - September.	This species is known from two populations, one at Kenwood Marsh on the Deerfield Ranch Winery and the other at Knights Valley, both in Sonoma County. The dam is located approximately 5 miles west of the population located at Kenwood Marsh. Kenwood Marsh is a freshwater marsh surrounded by grassland adjacent to Sonoma Creek.	**Low.** Although there is freshwater marsh habitat in the Action Area that could be suitable for the species, marsh habitat in the Action Area is limited, relatively disturbed, and dries seasonally. This species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021). Based on the lack of detection during botanical surveys and suboptimal habitat conditions, this species is not expected to be present in the Action Area or affected by the Proposed Action.
Clara Hunt's Milk-vetch	*Astragalus clarianus*	FE, ST, 1B.1	Chaparral, cismontane woodlands, and valley and foothill grasslands on thin rocky clay soils derived from serpentine or volcanic rock. Elevations between 250 and 740 feet in east Sonoma and northwest Napa counties. Bloom period: March - May.	The species is known to occur at 5 sites: Bale Grist Mill State Historic Park, Lewelling Lane, Spring Valley and Saint Helena Roads, and Lake Hennessey, none of which are within 5.0 miles of the dam.	**None.** Volcanic and metavolcanics soils present in the Action Area (AECOM 2021), but all known occurrences are from the Santa Rosa Plain. The species was not observed during the 2021 botanical surveys in the Action Area (PCI 2021).

1B.1 – California Rare Plant Rank. Rare throughout its range; seriously threatened in California (>80 percent of occurrences threatened/high degree and immediacy of threat)
CNDDB – California Natural Diversity Database
FE – Federally Endangered
FT – Federally Threatened
SE – State Endangered
SSC – CDFW Species of Special Concern
ST – State Threatened
USFWS – United States Fish and Wildlife Service

APPENDIX A CALIFORNIA RED-LEGGED FROG PROTOCOL-LEVEL SURVEY AND SITE ASSESSMENT REPORT

Results of California Red-legged Frog Protocol-level Surveys
Matanzas Creek Dam Watershed Rehabilitation Project
Santa Rosa, Sonoma County
August 2022

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1 Introduction

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) is completing a dam assessment in the Matanzas Creek watershed in Sonoma County, California. The Matanzas Creek dam has been identified as a high hazard dam (NRCS 2020), based on the size of the reservoir and the potential to cause loss of life downstream in the event of dam failure. The dam was constructed in 1964 to control flooding in the City of Santa Rosa and reduce sedimentation in the creek downstream (City of Santa Rosa 2006). The site is owned and managed by Sonoma Water. NRCS, in collaboration with Sonoma Water, is evaluating potential changes to the dam to ensure it meets NRCS design criteria. Project alternatives are currently being developed.

As part of project planning, AECOM, under contract with Jones & DeMille Engineering, requested Prunuske Chatham, Inc. (PCI) completed a California red-legged frog (CRLF, *Rana draytonii*) site assessment for the project site to assist U.S. Fish and Wildlife Service (USFWS) in determining whether or not focused surveys for California red-legged frog are warranted (PCI 2021). USFWS determined that the finding from the CRLF Site Assessment warranted protocol-level surveys for CRLF in order to determine the presence or absence of CRLF in the project area. The Site Assessment found that:

- the project site is within the historic range of CRLF
- there is one known active breeding pond within one mile of the project site's lower reaches, with no known barriers between it and the project site, and three additional known occurrences within two miles
- there is suitable aquatic and upland habitat present within the site for foraging and dispersal, and
- there is possible suitable breeding habitat present immediately upstream and downstream of Matanzas Creek dam and within the project site.

Numerous site assessments and CRLF surveys have been completed in the area in recent history (primarily by Sonoma Water; see Appendix C) and no CRLF have been found; however, that does not preclude the possibility that they could migrate into the project site in any given year. PCI completed protocol-level California red-legged frog surveys according to USFWS *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (USFWS 2005) beginning in January 2022 and concluding in July 2022 in order to determine whether CRLF are currently present within the project site. This report summarizes the survey methods and findings.

2 Setting

Matanzas Reservoir is the result of an on-channel dam constructed on Matanzas Creek in Bennett Valley, Sonoma County. Since 2010 it has been a flow-through flood detention reservoir, which no longer supports a filled reservoir unless the spillway is closed to control floods. The site is located 0.7 miles south of Santa Rosa city limits and directly west of Bennett Valley Road (Figure 1). The project site includes the reservoir upstream of the dam (Matanzas Reservoir; which includes the reach of Matanzas Creek within the

reservoir footprint and a small wetland with a seasonal pond adjacent to the creek); principal spillway outlet, stilling basin, and outlet channel (downstream reach of Matanzas Creek); auxiliary spillway; dam; and surrounding lands owned and maintained by Sonoma Water (Figure 2). It comprises 118 acres and five assessor parcels (APNs 049-130-006; 049-150-009 and 010; 049-060-009 and 054). It is mapped on the Santa Rosa USGS 7.5' quadrangle (38.405872°N and 122.653254°W at dam) at approximately 375' to 425' in elevation. Matanzas Creek is an 11.4-mile-long stream originating on the northern slopes of Sonoma Mountain. The stream flows north through Bennett Valley and joins Santa Rosa Creek near the Luther Burbank Home and Gardens in downtown Santa Rosa. From there, Santa Rosa Creek joins the Laguna de Santa Rosa, Mark West Creek, and the Russian River before reaching the Pacific Ocean. Land uses surrounding the project site include natural open space, rural residential properties, and vineyards.

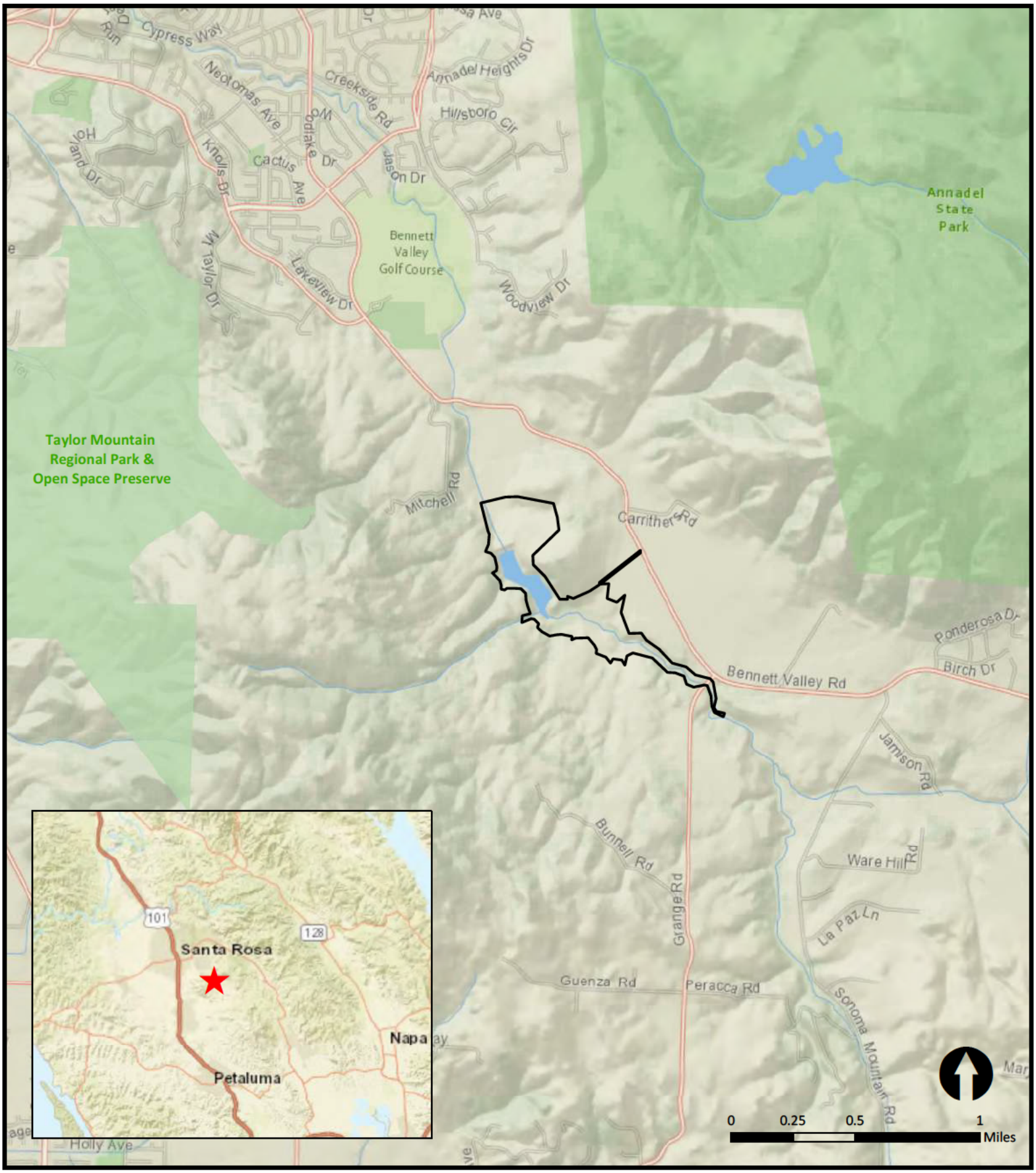

Figure 1

Project Location

Project Site

PRUNUSKE CHATHAM, INC.

Matanzas Creek Dam
Watershed Rehabilitation Project
Protocol-Level California Red-legged Frog Surveys

August 2022
Sources:
Aerial- ESRI
Project Area - AECOM

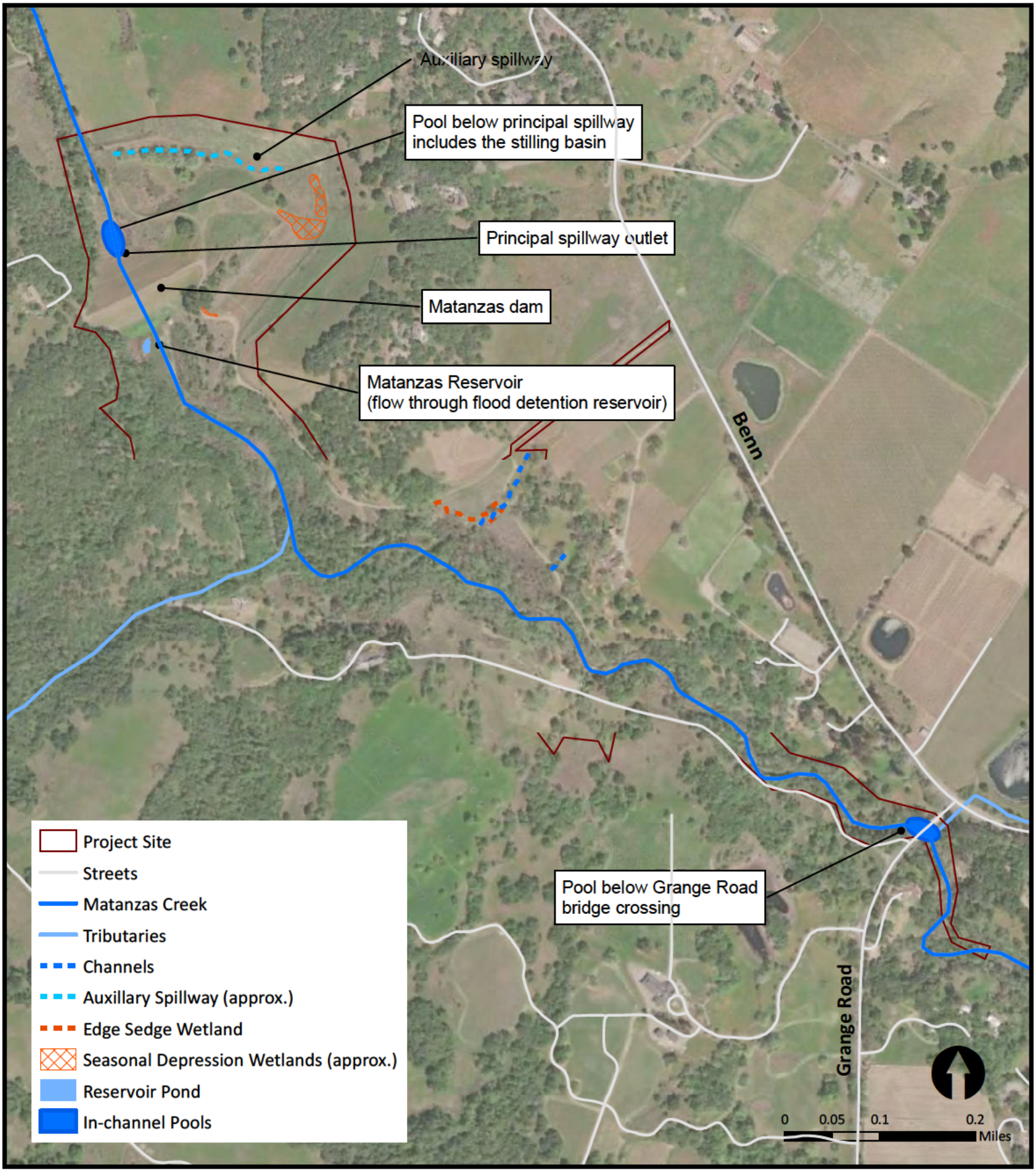

Figure 2

Project Site

Matanzas Creek Dam
Watershed Rehabilitation Project
Protocol-Level California Red-legged Frog Surveys

PRUNUSKE CHATHAM, INC.

August 2022
Sources:
Aerial- ESRI
Project Area - AECOM
Creek & Roads - Sonoma County

3 Species Account

Listing Status

The California red-legged frog was listed as threatened on May 23, 1996, by USFWS (61 FR 25813; USFWS 1996). Critical habitat was designated for this species on April 13, 2006 (71 FR 19244; USFWS 2006) and subsequently revised and republished on March 17, 2010 (USFWS 2010). A Recovery Plan was approved on September 12, 2002 (USFWS 2002).

General Description

California red-legged frogs are the largest native frogs in the western U.S., with females reaching up to 5¼ inches in length and males being slightly smaller. They are most common in marshes, streams, lakes, reservoirs, ponds, and other water sources with plant cover. Breeding occurs in deep, slow-moving waters with dense shrubby or emergent vegetation from late November through April. Successful breeding sites typically remain inundated, without rapid water fluctuations, from December through September (optimal) to allow for tadpole survival and metamorphosis. Tadpoles require 3½ to 7 months to attain metamorphosis. Breeding sites typically include open water areas and vegetated cover. Floating egg masses are attached to emergent vegetation (e.g., *Typha* sp. or *Scirpus* sp.) near the water's surface. If breeding sites are free of non-native predators or have enough vegetated cover to avoid predation, California red-legged frogs can successfully breed in wetlands with depths of 4 to 24 inches. They can survive in ponds with a wide range of water quality conditions.

During the non-breeding season, California red-legged frogs can remain at the breeding site (in the presence or absence of water) or move into surrounding non-breeding habitats. Upland refuge habitat needs to provide adequate moisture and vegetative cover to allow survival and predator avoidance. Radio tracking of frogs in Marin County by Fellers and Kleeman (2007) noted the dispersal of frogs at a median distance of 500 feet from breeding sites (range of 100 to 4,600 feet). They also noted year-round, small-scale (<100-foot) movements around breeding sites. These results indicate the importance of uplands for non-breeding season and migratory corridor habitat. After their first winter, juveniles disperse widely over the landscape. Grasslands and savannahs are the primary terrestrial habitat used. Habitats with tall, dense herbaceous vegetation may slow dispersal. Adults eat invertebrates and small vertebrates. Larvae are thought to be algal grazers.

Overall Threats to the Species

The California red-legged frog is threatened by human activities and natural disasters (USFWS 2002). Factors contributing to declining populations include degradation and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, impoundments, water diversions, degraded water quality, use of pesticides, and introduced predators. Predation by introduced species has been a

significant factor in their decline, especially non-native American bullfrog, crayfish, and fish (USFWS 2002).

4 Site Assessment Summary

The following is a summary of the California red-legged frog site assessment findings for the Matanzas Creek Dam Watershed Rehabilitation Project. PCI completed this assessment for AECOM in April 2021 as the initial step in determining the necessity for protocol-level surveys. The full site assessment is included in Appendix C.

- The project site is located within the current range of the California red-legged frog.
- There is one reported occurrence of California red-legged frog within 1 mile of the project site. Frogs have been reported at a pond on private property on the eastern flank of Taylor Mountain. The pond is 0.4 miles west of Matanzas Creek and 0.7 miles northwest of the project site. There are additional sightings reported at a private pond within 1.1. miles, at Taylor Mountain Park and Open Space Preserve within 1.7 miles, at Annadel State Park within 2 miles, and additional sightings on Sonoma Mountain (see Appendix C, Figure 2).
- There are two habitat features within the project site that appear to have adequate depth for suitable CRLF breeding habitat; however, breeding is unlikely due to the high flow velocities through the project reach during winter storms. These features include a recently formed pond with a seasonal water source immediately upstream of the dam in the reservoir footprint. The water depth in February 2021 was 18 inches. There is also a perennial pool in Matanzas Creek at the outlet of the principal spillway that provides potentially suitable breeding habitat (see Figure 3)
- The project site supports potential non-breeding aquatic habitat. Wetlands and wetted riparian habitats may provide shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs.
- Riparian woodlands and upland habitats also may provide frogs shelter, forage, and predator avoidance. Frogs could use the channel and surrounding habitat for dispersal and movement.
- Numerous CRLF site assessment/surveys have been completed in recent history. Sonoma Water completed a CRLF site assessment in 2006, focused surveys of portions of the project site (2000, 2001, 2010), and reconnaissance surveys in 2013-2016. No CRLF have been documented in the areas surveyed by Sonoma Water.
- No CRLF were observed within the project site by PCI February 18 and 23, 2021. Treefrogs were observed throughout the project site aquatic habitats. A single frog was observed in the pond within the reservoir; it could not be identified to species as it retreated quickly and never resurfaced. The frog measured between 2-3 inches.

5 Methods

PCI biology staff completed USFWS protocol-level surveys for California red-legged frog within the project site[1]. The surveys followed protocols outlined in the *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (USFWS 2005). Surveys were completed on January 6 and 27, February 21, and March 29 by Jennifer Michaud, Sr. Wildlife Biologist formerly with PCI and on April 25, May 20, July 13 and 20, 2022 by Celia Chatham, PCI Biologist II who assisted with the surveys led by Jennifer Michaud and was approved to conduct protocol-level CRLF surveys on April 8, 2022 by USFWS.

The surveys consisted of evaluating all accessible mapped aquatic habitat features within the project site by walking meandering transects throughout to provide adequate coverage across the area. Locations surveyed included the pool at the base of the principal spillway outlet (partially formed by the stilling basin); the channelized pool extending downstream of the stilling basin and the Matanzas Creek channel downstream to the project area boundary; the creek, wetlands and pond in the reservoir area upstream of the dam; the seasonal wetlands in the auxiliary spillway and pools in the channel traveling downslope through the auxiliary spillway; pools in seasonal drainages upstream of the dam; all accessible portions of Matanzas Creek within the project site; the pool in Matanzas Creek under the Grange Road bridge and adjacent upstream and downstream portions of the channel; and all associated bank and upland habitat for 2 meters or greater where accessible. Surveys were completed with assistance of binoculars (e.g., Swarovski 10x42) and multi-mode LED flashlights (e.g., Bercol). During the surveys, care was taken to minimize disturbance to the vegetation and aquatic habitats to prevent the accidental disturbance to any potential California red-legged frogs. Surveyors spent several minutes listening for calls at each location upon arrival and again periodically while walking aquatic habitat edges and conducting the visual-encounter surveys. No aquatic sampling was completed as part of the surveys.

Field data and observations were recorded digitally using the ESRI FieldMaps application. Appendix A includes *California Red-legged Frog Survey Data Sheets* for each survey.

6 Survey Summaries

No CRLF were observed during PCI's surveys. The following amphibians were observed: Sierran treefrog (*Pseudacris sierra*), California slender salamander (*Batrachoseps attenuates*), western toad (*Anaxyrus boreas*), and American bullfrog (*Lithobates catesbeianus*).

[1] The project site includes the Matanzas Reservoir and the surrounding environs within the lands owned and managed by Sonoma Water; see Figure 1. Surveys were conducted within the project site where potential suitable CRLF habitat (i.e., aquatic features) occurred; see Methods section, second paragraph, for detail.

Table 1. Protocol-level California Red-legged Frog Surveys Schedule

Survey Number	Survey Date	Season	Timing
1	January 6	Breeding	Day
2	January 27	Breeding	Day
3	February 21	Breeding	Night
4	March 29	Breeding	Night
5	April 25	Breeding	Night
6	May 20	Breeding	Night
7	July 13	Non-breeding	Day
8	July 20	Non-breeding	Night

Table 2. Summary of Amphibian Observations

Survey Number	Amphibian Species	# of Individuals	Life Stages
1 January 6 Day	Sierran Treefrog	5	Adult
	Sierran Treefrog	20	Egg mass
	Sierran Treefrog	40	Tadpole
	California Slender Salamander	4	Adult
2 January 27 Day	Sierran Treefrog	11	Adult
	Sierran Treefrog	1	Egg mass
	Sierran Treefrog	25	Tadpole
3 February 21 Night	Sierran Treefrog	20	Adult
	Sierran Treefrog	approx. 300	Tadpole
	Western Toad	1	Adult
4 March 29 Night	Sierran Treefrog	40	Adult
	Western Toad	1	Adult
	Western Toad	approx. 300	Tadpole
5 April 25 Night	Sierran Treefrog	28	Adult
	Sierran Treefrog	approx. 170	Tadpole
	Sierran Treefrog	4	Egg mass
	Western Toad	2	Adult
	Western Toad	approx. 100	Tadpole
	American Bullfrog	2	Adult
6 May 20 Night	Sierran Treefrog	20	Adult
	Sierran Treefrog	4	Metamorph
	Sierran Treefrog	approx. 145	Tadpole
	Western Toad	1	Adult
	Western Toad	approx. 55	Tadpole
	American Bullfrog	2	Adult

Survey Number	Amphibian Species	# of Individuals	Life Stages
7 July 13 Day	Sierran Treefrog	8	Juvenile
	Western Toad	approx. 200	Juvenile
	Western Toad	30	Tadpole
	American Bullfrog	3	Adult
8 July 20 Night	Sierran Treefrog	2	Juvenile
	Western Toad	1	Adult
	Western Toad	3	Juvenile
	Western Toad	30	Tadpole
	American Bullfrog	5	Adult

Matanzas Creek channel
downstream of dam
- Sierran Treefrog

tadpoles & adults
- American Bullfrog
adults

Principal spillway pool

Auxiliary spillway
seasonal depression wetlands
- Sierran Treefrog

Many of the amphibian observation points displayed on the map represent repeated location sightings from more than one date.
See the report 'Survey Summaries Section' for detailed information on amphibian observation numbers by date, species and location.

Seasonal depression wetland
- Sierran Treefrog

Reservoir pond

Wetland and pond in reservoir
west of channel
- Sierran Treefrog
adults

Valley Road

Middle reach of Matanzas Creek in
riparian forest understory debris
- Slender Salamander (approx. location)
adults

Matanzas Creek channel -
small pools and riffles near access road
- Sierran Treefrog
tadpoles, metamorphs, juveniles & adults

Grange Road
pool

Grange Road

Figure 3

Amphibian Observations

Matanzas Creek Dam Watershed
Rehabilitation Project
Protocol-Level Surveys
California Red-legged Frog

- American Bullfrog
- Sierran Treefrog
- Slender Salamander
- Western Toad
- Matanzas Creek
- Tributaries
- Channels
- Auxillary Spillway (approx.)
- Edge Sedge Wetland
- In-channel Pools
- Reservoir Pond
- Wetland
- Seasonal Wetlands (approx.)
- Willow Scrub
- Riparian Forest
- Freshwater Marsh
- Project Site

0 190 380 760 Feet

August 2022
Sources:
Aerial - ESRI 2019
Project Site - AECOM
Vegetation types - Sonoma
veg mapping & LiDAR project

PRUNUSKE CHATHAM, INC.

Survey 1 - January 6, 2022

A daytime breeding season survey was completed on January 6, 2022. The survey was completed from 10:15 am to 1:45 pm. Conditions during the survey were overcast and cool with no wind and good visibility. The air temperature ranged from 56-57°F. The water temperature in Matanzas Creek was 51°F. Cloud cover was 100% for the duration of the survey. There was no precipitation and humidity was 100%.

No California red-legged frogs were documented within the survey area. Amphibians observed included Sierran treefrog (egg masses, tadpoles, and adults) and slender salamander. Treefrog egg masses were observed in most of the seasonally ponded areas with small tadpoles in the seasonal depression wetlands within the auxiliary spillway. California slender salamanders were observed in understory debris along the service road. Additional wildlife observed during the surveys is listed in Table 4 at the end of the section.

Conditions within the reservoir are subject to change over time based on stream flows and management activities, and site conditions within the reservoir have changed since the assessment work was completed in 2021 (PCI 2021). In 2021, there was a seasonal pond established immediately upstream of the dam with a water surface area of approximately 2,700 square feet and maximum depth of 18 inches. In fall of 2021, Sonoma County received a significant amount of precipitation during an atmospheric river event. This rain event resulted in the deposition of a large quantity of sediment within the reservoir, including 6-8” of sediment within the pond bottom. The sediment deposition reduced the potential CRLF habitat quality and water depths with the pond.

Survey 1 - January 6, 2022

Matanzas Reservoir upstream of the dam.

Seasonal pond within the reservoir.

Matanzas Creek upstream of the dam.

Seasonally ponded area at the downstream end of a seasonal tributary.

Seasonal tributary along the access road.

Middle reach of Matanzas Creek.

Middle reach of Matanzas Creek.

Matanzas Creek near Grange Road.

Seasonal depression wetlands within the auxiliary spillway area (above and below).

Matanzas Creek downstream of the dam.

Slender salamander in understory near the access road.

Treefrog egg masses in the seasonal depression wetlands (above and below).

Survey 2 - January 27, 2022

A daytime breeding season survey was completed on January 27, 2022. The survey was completed from 9:50 am to 2:30 pm. Conditions during the survey were clear and sunny with no wind and good visibility. The air temperature ranged from 50-63ºF. The water temperature in Matanzas Creek was 45-51ºF. Cloud cover was 0% for the duration of the survey. There was no precipitation and humidity was 30-80%. This survey was completed when other local populations of California red-legged frog were actively breeding; a reference site at Taylor Mountain Regional Park was visited on January 23 and California red-legged frog egg masses were confirmed present.

No California red-legged frogs were documented within the survey area. Sierran treefrog was the only amphibian species observed. All life stages were observed – adults were seen and heard, a single egg mass was present, and numerous tadpoles were present in the seasonal depression wetlands within the auxiliary spillway.

With limited precipitation in January 2022, aquatic features were noted as drying fairly quickly since the survey on January 6. Areas with flowing water at the beginning of the month supported only standing water in deeper pools (e.g., channel within auxiliary spillway, seasonal tributaries were not flowing).

Survey 2 - January 27, 2022

Looking upstream at reservoir from the dam.

Pool within the reservoir.

Middle reach of Matanzas Creek.

Matanzas Creek near Grange Road.

Seasonal depression wetlands at the top of auxiliary spillway (above and below).

Channel within the auxiliary spillway.

Matanzas Creek downstream of the dam.

Adult treefrog in the pond within the reservoir.

Survey 3 – February 21, 2022

A nighttime breeding season survey was completed on February 21, 2022. The survey was completed from 6:00 pm to 9:45 pm. Conditions during the survey were partly cloudy with light wind and good visibility. The air temperature ranged from 50-54°F. The water temperature in Matanzas Creek was 47°F. Cloud cover was 0-20%. There was no precipitation and humidity was 50%.

No California red-legged frogs were documented within the survey area. Sierran treefrog and western toad were observed. Adult treefrogs were seen and heard throughout the survey area. Tadpoles were abundant in the seasonal depression wetlands within the auxiliary spillway. An adult western toad was observed in Matanzas Creek; this was a 3" snout to vent adult attached to emergent vegetation.

Aquatic habitats continued to dry with the lack of rain. Small depressions near the parking area at the dam that were previously ponded were nearly dry. Seasonal depression wetlands within the auxiliary spillway had a maximum depth of 6" in the deepest spots, compared to 12" at the January survey. Seasonal tributaries supported standing water but little to no flow. Mosquito larvae were seen in areas with standing water.

Survey 3 - February 21, 2022

Adult western toad in Matanzas Creek below the principal spillway.

Survey 4 – March 29, 2022

A nighttime breeding season survey was completed on March 29, 2022. The survey was completed from 7:00 pm to 10:15 pm. Conditions during the survey were partly cloudy with no wind and good visibility. The air temperature ranged from 50-56°F. The water temperature in Matanzas Creek was 55°F. Cloud cover was 0-20%. There was no precipitation and humidity was 50%.

No California red-legged frogs were documented within the survey area. Sierran treefrog and western toad were observed. Adult treefrogs were seen and heard throughout the survey area, but no tadpoles or egg masses were present, likely due to drying conditions. An adult western toad was observed in Matanzas Creek below the principal spillway. This was a 3.5" snout to vent adult sitting on the bottom of the pool. Western toad tadpoles (approx. 300) were also seen in the pool approximately 50' from the adult sighting.

Aquatic habitats continued to dry with the lack of rain. Small pools near the parking area at the dam were dry, and seasonal depression wetlands within the auxiliary spillway had minimal standing water (small pockets with 1" of water). Seasonal tributaries supported standing water but no flowing water. A small amount of rain fell several days before the survey. Mosquito larvae were seen in areas with standing water.

Survey 4 -March 29, 2022

Adult western toad (above) and tadpoles (below) in Matanzas Creek below primary spillway

Survey 5 – April 25, 2022

A nighttime breeding season survey was completed on April 25, 2022. The survey was completed from 8:50 pm to 11:50 pm. Conditions during the survey were clear at the start and partly cloudy by the end. There was with no wind and visibility was good. The air temperature ranged from 54-60°F. The water temperature in Matanzas Creek was 58°F. Cloud cover was 0-50%. There was no precipitation and humidity was 50%.

No California red-legged frogs were documented within the survey area. Sierran treefrog, western toad and American bullfrog were observed. Egg masses, tadpoles and adult treefrogs were seen and heard throughout the survey areal; treefrog breeding activity likely increased due to the precipitation that occurred in mid-April. The egg masses were located within the seasonal depression wetlands in the auxiliary spillway. Two adult western toads were observed in Matanzas Creek downstream of the dam; one in the channel and the other in the pool at the base of the principal spillway. Both were approximately 3 ½" snout to vent. Western toad tadpoles (approximately 75) were also seen in the pool containing one of the adult sightings. Toad tadpoles (approximately 25) were seen in the pool beneath Grange Road upstream of the dam. Two American bullfrogs were observed (both approximately 2.5" snout to vent). One was seen in the pool below the Grange Road crossing and the other was observed in the pool below the principal spillway within 50' of one of the adult western toads. Several small (<2") unidentified fish were seen in the channel downstream of the dam.

Aquatic habitats continued to dry with the lack of rain. Seasonal pools within the auxiliary spillway had minimal standing water (small pockets with 1" of water, similar to the conditions during the March survey). Seasonal tributaries continued to support standing water but no flowing water. Portions of Matanzas Creek above the dam were subsurface.

Survey 5 - April 25, 2022

Treefrog egg mass in the seasonal depression wetlands in the auxiliary spillway.

Western toad adult (left) and tadpoles (right) in Matanzas Creek downstream of dam.

Survey 6 – May 20, 2022

A nighttime breeding season survey was completed on May 20, 2022. The survey was completed from 8:50 pm to 12:05 am. Conditions during the survey were clear with a slight southerly breeze (<3 mph) and good visibility. The air temperature ranged from 50-62°F. The water temperature in Matanzas Creek was 62-67°F. Cloud cover was 0%. There was no precipitation and humidity was 50%.

No California red-legged frogs were documented within the survey area. Sierran treefrog, western toad and American bullfrog were observed. Adult sierran treefrogs were heard and seen throughout the survey area. Approximately 145 treefrog tadpoles were observed in Matanzas creek upstream and downstream of the dam; approximately 50% of the tadpoles were starting metamorphosis and had legs. Four recently metamorphosed treefrogs (on land with remnant tail still present) were seen in Matanzas Creek; two were seen upstream of the dam near the access road adjacent to the neighbor's house and two were seen in the pool at the base of the damn below the principal spillway. One adult western toad (approximately 3.5" snout to vent) was observed in Matanzas Creek below the principal dam spillway in the same area adult toads were observed during the previous three surveys. Western toad tadpoles (approximately 55) were seen both in the pool just downstream of the dam and in the pool upstream near the Grange Road crossing. Two American bullfrogs were observed (4" and 4.5" snout to vent); one adult was observed in the pool below the dam principal spillway, where bullfrogs were observed during the April site visit, and the other was seen in the pool near the Grange Road crossing. Several small (<2") unidentified fish were seen in the channel downstream of the dam.

Aquatic habitats continued to dry with the lack of rain. Pools within the seasonal depression wetlands in the auxiliary spillway had completely dried. Seasonal tributaries were mostly dry with some areas of damp soil. Portions of Matanzas Creek remained subsurface.

Survey 6 - May 20, 2022

In-channel pool below Grange Road.

Matanzas Creek near Grange Road.

Dried seasonal depression wetland (left) and Matanzas Creek channel downstream of dam near the project site boundary (right)

Sierran treefrog metamorphosing still with remnant tail.

Sierran treefrog tadpole in Matanzas Creek above dam near access road crossing

American bullfrog near pool below primary spillway (left) and western toad tadpole with legs (right)

Survey 7 – July 13, 2022

A daytime non-breeding season survey was completed on July 13, 2022. The survey was completed from 11:00 am to 2:15 pm. Conditions during the survey were overcast with no wind and good visibility. The air temperature ranged from 63-75°F. The water temperature in Matanzas Creek was 65°F. Cloud cover was 80%. There was no precipitation and humidity was 70%.

No California red-legged frogs were documented within the survey area. Sierran treefrog, western toad and American bullfrog were observed. 16 recently metamorphosed western toads (0.25-1" snout to vent) and two recently metamorphosed treefrogs (0.25-0.5" snout to vent) were seen along the banks of the pool in Matanzas Creek under the Grange Road crossing and in the dry channel downstream of the pool; there were also approximately 30 toad tadpoles seen in the pool, several with legs. An additional 200+ recently metamorphosed toads and 6 recently metamorphosed treefrogs were observed around the perimeter of the pool at the base of the dam principal spillway hiding in the dense vegetation (dominated by *Typha* sp, *Ludwigia* sp., *Alisma* sp.) surrounding the pool. Three adult American bullfrogs were observed (4" and 4.5" snout to vent) around the perimeter of the principal spillway pool; bullfrogs have been observed in this location during the previous two surveys (April and May) and are likely gathering for possible breeding in the pool, which may be perennial. No bullfrog egg masses or tadpoles were observed during this visit. Several small (<2") unidentified fish were seen in the channel downstream of the dam and several unidentified large fish (12-18") in the pool.

Aquatic habitats were significantly drier than during the previous survey in May. The majority of Matanzas Creek was dry within the project site with the exception of the pool near the Grange Road crossing (depths less than 8") and the pool directly below (downstream) of the principal spillway outlet (undetermined depth, but the bed was not visible in the deepest areas). The area directly upstream of the dam that was previously the reservoir was mostly dry with some continued wet clay soil in the previously ponded area on the east side; there was no standing water. All the seasonal pools and drainages were dry.

Survey 7 - July 13, 2022

Downstream portion of the pool below the Grange Road crossing.

Upstream portion of the pool below the Grange Road crossing.

Matanzas Creek near Grange Road downstream of the pool.

Matanzas Creek near seasonal drainage upstream of the dam.

Matanzas Creek upstream of the dam near access road and adjacent to neighbor's home.

Seasonal depression wetlands near the top of the auxiliary spillway.

Matanzas Creek channel downstream of the dam.

Matanzas Creek channel with remnant moisture near downstream extent of channelized pool present in February. Dam primary spillway and dam visible in the background.

Principal spillway and pool.

Reservoir area upstream of the dam.

Sierran treefrog in vegetation surrounding principal spillway pool.

Juvenile toad on the banks of the pool below the Grange Road crossing.

Survey 8 – July 20, 2022

A nighttime non-breeding season survey was completed on July 20, 2022. The survey was completed from 9:45 pm to 11:45 pm. Conditions during the survey were clear with a slight breeze (<3 mph) and good visibility. The air temperature ranged from 52-58°F. The water temperature in Matanzas Creek was 62-70°F. Cloud cover was 0%. There was no precipitation and humidity was 70-80%.

No California red-legged frogs were documented within the survey area. Sierran treefrog, western toad and American bullfrog were observed. One recently metamorphosed western toad (1" snout to vent) and one recently metamorphosed treefrog (0.5" snout to vent) were seen along the banks of the pool in Matanzas Creek under the Grange Road crossing and in the dry channel downstream of the pool; there were also approximately 30 toad tadpoles seen in the pool, several with legs. An additional two recently metamorphosed toads and one recently metamorphosed treefrog were observed around the perimeter of the pool (includes the stilling basin) at the base of the dam principal spillway. One adult toad (4" snout to vent) was seen on a rock adjacent to the principal spillway pool. Five adult American bullfrogs were also observed (4" - 4.5" snout to vent) around the perimeter of principal spillway pool; three adult bullfrogs were observed in this location during the previous survey the week before (July 13).

Aquatic habitats conditions were nearly the same as the previous survey completed July 13. The majority of Matanzas Creek was dry within the project site with the exception of the pool near the Grange Road crossing (depths less than 8") and the pool directly downstream of the principal spillway (undetermined depth, but bed was not visible in the deepest areas). The area directly upstream of the dam that was previously the reservoir was mostly dry with some continued wet clay soil in the previously ponded area on the east side and no standing water. All the seasonal pools and drainages were dry.

Survey 8 - July 20, 2022

Sierran treefrog near pool below the Grange Road crossing.

Juvenile western toad near the dam principal spillway pool.

Table 3. Wildlife Species Observed

Scientific Name	**Common Name**
Reptiles	
Sceloporus occidentalis bocourtii/ occidentalis	Western Fence Lizard
Amphibians	
Anaxyrus boreas	Western Toad
Batrachoseps attenuatus	California Slender Salamander
Lithobates catesbeianus	American Bullfrog (non-native)
Pseudacris sierra	Sierran Treefrog
Birds	
Accipiter striatus	Sharp-shinned Hawk (probable)
Aphelocoma californica	California Scrub-jay
Baeolophus inornatus	Oak Titmouse
Bubo virginianus	Great Horned Owl
Buteo jamaicensis	Red-tailed Hawk
Buteo lineatus	Red-shouldered Hawk
Callipepla californica	California Quail
Calypte anna	Anna's Hummingbird
Cathartes aura	Turkey Vulture
Colaptes auratus	Northern Flicker
Haemorhous mexicanus	House Finch
Junco hyemalis	Dark-eyed Junco
Melanerpes formicivorus	Acorn Woodpecker
Melospiza lincolnii	Lincoln's Sparrow
Melospiza melodia	Song Sparrow

Scientific Name	**Common Name**
Melozone crissalis	California Towhee
Pipilo maculatus	Spotted Towhee
Poecile rufescens	Chestnut-backed Chickadee
Regulus calendula	Ruby-crowned Kinglet
Sayornis nigricans	Black Phoebe
Setophaga coronata	Yellow-rumped Warbler
Sialia mexicana	Western Bluebird
Turdus migratorius	American Robin
Vireo huttoni	Hutton's Vireo
Zonotrichia leucophrys	White-crowned Sparrow
Zonotrichia atricapilla	Golden-crowned Sparrow
Mammals	
Lepus californicus	Black-tailed Jackrabbit
Neotoma fuscipes	Dusky-footed Woodrat
Odocoileus hemionus	Black-tailed Deer
Sciurus griseus	Western Gray Squirrel
Invertebrates	
Nymphalis antiopa	Mourning Cloak Butterfly
Junonia sp.	Buckeye Butterfly
NA	Unidentified aquatic macroinvertebrates

7 Conclusions

No California red-legged frogs were detected within the project site during the protocol-level surveys conducted January – July 2022. Three native amphibians (Sierran treefrog, western toad and slender salamander) and one invasive exotic (American bullfrog) were found in multiple locations within the project site. Invasive American bullfrogs were observed at two locations within the project site: the pool in Matanzas Creek below the

Grange Road crossing and the pool at the base of the dam below the principal spillway outlet. Both these locations also supported successful western toad and treefrog reproduction (i.e, tadpoles, metamorphs and juveniles were all seen in and around the pool in chronological succession). Treefrog adults, tadpoles and juveniles were also found breeding in several additional locations throughout the site including the seasonal depression wetlands and several reaches of Matanzas Creek upstream of the dam. No American bullfrog egg masses or tadpoles were found during the surveys, although the increasing number of adults detected as the summer progressed (2 in May, 3 in early July, 5 in late July) suggests that they may begin breeding in the pool below the principal spillway later in the summer. California slender salamanders were observed in leaf litter along the Matanzas Creek riparian corridor adjacent to the access road.

PCI's surveys followed the procedures and protocols described in the *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (USFWS 2005) and represent PCI's best professional effort to locate all amphibians utilizing the aquatic and surrounding upland habitat within the survey area. However, due to the camouflaging abilities of the focal species, wildlife activity patterns, accessibility barriers to portions of the project site and other environmental factors it is possible not all amphibians were detected.

As described in the Site Assessment and summarized earlier in this report, the project site is within 2 miles of four known CRLF populations (less than 1 mile from one) and the site contains suitable breeding habitat, aquatic and upland habitat. There are several possible reasons that CRLF do not appear to occupy the project site. These are discussed in the Site Assessment (Appendix C) and include:

- partial movement barriers (e.g., Bennett Valley Road, which supports heavy, fast moving traffic),
- breeding habitat quality (e.g., high flows that could dislodge egg masses),
- presence of aquatic predators (e.g., fish and bullfrogs).

During the protocol-level surveys PCI observed two changes/updates to these factors. First, 2021-2022 winter rain events deposited significant amounts of sediment into the pond located in the reservoir footprint. This location was one of two areas identified in the Site Assessment as possible breeding habitat for CRLF. The additional sediment build-up reduced the depth of the pond and the quality of CRLF breeding habitat. Second, PCI confirmed the presence of American bullfrogs within the project site. Bullfrogs were found in the pool at the base of the principal spillway. This is the second location identified as possible CRLF breeding habitat in the Site Assessment. Large (12-18") unidentified fish were also observed in this pool. Both the bullfrogs and the fish could prey on CRLF tadpoles and reduce the likelihood of successful CRLF breeding.

8 References

Fellers, G. M., & Kleeman, P. M. 2007. California Red-legged Frog (*Rana draytonii*) Movement and Habitat Use: Implications for Conservation. Journal of Herpetology 41:276-286.

Prunuske Chatham, Inc. (PCI). 2021. California red-legged frog Site Assessment, Matanzas Creek Dam Watershed Rehabilitation Project, Santa Rosa, Sonoma County, April 2021.

U. S. Fish and Wildlife Service (USFWS). 1996. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California red-legged frog. Federal Register 61:25813-25833.

U.S. Fish and Wildlife Service (USFWS). 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. August 2005.

U.S. Fish and Wildlife Service (USFWS). 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). Portland, Oregon.

U. S. Fish and Wildlife Service (USFWS). 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California red-legged frog (*Rana aurora draytonii*), and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities; Final Rule. Federal Register 71:19244-19346.

U. S. Fish and Wildlife Service (USFWS). 2010. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for California red-legged frog; Final Rule. Federal Register 75: 12815-12959.

Appendix A: California Red-legged Frog Survey Data Sheets

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 01/06/2022 (mm/dd/yyyy) **Survey Biologist:** Michaud, Jennifer (Last name) (first name)

Survey Biologist: Parelka, Claire (Last name) (first name)

Site Location: Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam
Brief description of proposed action: Watershed Rehabilitation Project

Type of Survey (circle one): **DAY** NIGHT **BREEDING** NON-BREEDING

Survey number (circle one): **1** 2 3 4 5 6 7 8

Begin Time: 10:15 am **End Time:** 1:45 pm

Cloud cover: 100% **Precipitation:** Ø

Air Temperature: (am) 57°F - 56°F (pm) **Water Temperature:** 51°F

Wind Speed: Ø **Visibility Conditions:** 10 miles

Moon phase: 1st quarter **Humidity:** 100%

Description of weather conditions: overcast all day, no wind but good visibility

Brand name and model of light used to conduct surveys: Ø

Were binoculars used for the surveys (circle one)? **YES** NO
Brand, model, and power of binoculars: Swarovski 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Sierran treefrog	5	H	adults	unk.	yes
" "	10	O	egg mass	-	yes
" "	40	O	tadpole	-	yes
Slender salamander	4	O	adult		yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: no wildlife threats, lots of sediment in creek due to recent rain events

Other notes, observations, comments, *etc.*

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

1/6/22

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 04/27/22 (mm/dd/yyyy) **Survey Biologist:** Michaud, Jennifer (Last name) (first name)

Survey Biologist: _____ (Last name) (first name)

Site Location: Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam
Brief description of proposed action: Watershed Rehabilitation Project

Type of Survey (circle one): (DAY) NIGHT (BREEDING) NON-BREEDING

Survey number (circle one): 1 (2) 3 4 5 6 7 8

Begin Time: 9:50 am **End Time:** 2:30 pm

Cloud cover: 0% **Precipitation:** Ø

Air Temperature: 50-63°F **Water Temperature:** 45° - 51°F

Wind Speed: Ø **Visibility Conditions:** 10 miles

Moon phase: Third Quarter **Humidity:** 80% - 30% (am / pm)

Description of weather conditions: Clear, sunny, no cloud cover or wind, unseasonably warm and dry

Brand name and model of light used to conduct surveys: Ø

Were binoculars used for the surveys (circle one)? (YES) NO
Brand, model, and power of binoculars: Swarovski 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Sierran Treefrog	1	O	adult	1 3/4" sr	yes
Sierran Treefrog	25	O	tadpoles	–	yes
Sierran Treefrog	10	H	adult	unk.	yes
Sierran Treefrog	1	O	egg mass	–	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: no visible threats from wildlife dry conditions resulting in low water levels in wetlands

Other notes, observations, comments, *etc.*

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

1/27/22

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) (date) (biologist)

Date of Survey: 02/21/2022 (mm/dd/yyyy) **Survey Biologist:** Michaud, Jennifer (Last name) (first name)
Survey Biologist: Chatham, Celia (Last name) (first name)

Site Location: Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)****

Proposed project name: Matanzas Creek Dam
Brief description of proposed action: Watershed Rehabilitation Project

Type of Survey (circle one): **DAY** (**NIGHT**) (**BREEDING**) **NON-BREEDING**

Survey number (circle one): **1** **2** (**3**) **4** **5** **6** **7** **8**

Begin Time: 6:00 pm **End Time:** 9:45 pm

Cloud cover: 50 → 20% **Precipitation:** none

Air Temperature: 54-50°F **Water Temperature:** 47°F

Wind Speed: 0-5mph → none **Visibility Conditions:** good, 10 miles

Moon phase: Waning Gibbons 73% **Humidity:** 50%

Description of weather conditions: Partly cloudy and light wind clearing with still conditions as survey progressed

Brand name and model of light used to conduct surveys: BERCOL - XHP970

Were binoculars used for the surveys (circle one)? (**YES**) **NO**
Brand, model, and power of binoculars: Swarovski 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
western toad	1	O	Adult	2 3/4" SV	yes
treefrog	20	O, H	Adult	≈ 1 1/2"	yes
tree frog	300	O	tadpole	≈ 3/4"	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: no threats, dry conditions due to lack of rain

Other notes, observations, comments, *etc.*

See report

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

2/21/2022

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 03/29/2022 (mm/dd/yyyy) **Survey Biologist:** Michaud, Jennifer (Last name) (first name)

Survey Biologist: Parelka, Claire (Last name) (first name)

Site Location: Matanzas Creek Dam

(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam

Brief description of proposed action:

Watershed rehabilitation project

Type of Survey (circle one): **DAY** (**NIGHT**) (**BREEDING**) **NON-BREEDING**

Survey number (circle one): 1 2 3 (4) 5 6 7 8

Begin Time: 7:00 pm **End Time:** 10:15 pm

Cloud cover: 20 → 0% **Precipitation:** none

Air Temperature: 56 → 50°F **Water Temperature:** 55°F

Wind Speed: no wind **Visibility Conditions:** good, 10 miles

Moon phase: almost new moon 3/31 **Humidity:** 50%

Description of weather conditions: clear, no wind, few clouds but clearing as survey progressed

Brand name and model of light used to conduct surveys: BERCOL - XPH970

Were binoculars used for the surveys (circle one)? (**YES**) **NO**

Brand, model, and power of binoculars: Swarovski 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
western toad	1	O	Adult	3 1/2" SV	yes
western toad	≈300	O	tadpoles	75mm	yes
treefrog	40	O, H	Adults	≈1 1/2"	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: no threats, dry conditions due to rain

Other notes, observations, comments, *etc.*

See report

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

3/29/17

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 4/25/2022 (mm/dd/yyyy) **Survey Biologist:** CHATHAM (Last name) CELIA (first name)
Survey Biologist: PAVELKA (Last name) CLAIRE (first name)

Site Location: Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam Watershed Rehabilitation Project
Brief description of proposed action:

Type of Survey (circle one): **DAY** (**NIGHT**) **BREEDING** (**NON-BREEDING**)

Survey number (circle one): **1** **2** **3** **4** (**5**) **6** **7** **8**

Begin Time: 8:50pm **End Time:** 11:50 pm

Cloud cover: 0% at start, 50% 10pm **Precipitation:** None

Air Temperature: 60°F **Water Temperature:** 58°F upper channel 60°F pool below dam

Wind Speed: Calm 0 **Visibility Conditions:** Good / 10 miles

Moon phase: Waning crescent 20% **Humidity:** 50%

Description of weather conditions: Clear skys at start of survey, ~50% cloud cover by end, good visibility

Brand name and model of light used to conduct surveys: BERCOL - XPH970

Were binoculars used for the surveys (circle one)? (**YES**) **NO**
Brand, model, and power of binoculars: Atlas Optics Intrepid ED 8 x 42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Sierran Treefrog	28	O, H	Adults	≈ 1 1/2"	yes
Sierran Treefrog	~170	O	Tadpoles	~ 3/4"	yes
" "	4	O	eggmass	—	yes
Western Toad	≈100	O	Tadpoles	1/2 - 3/4"	yes
Western Toad	2	O	Adult	3"	yes
American bullfrog	2	O	Adult	~2.5"	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Bullfrogs observed in two locations during survey, no other threats observed

Other notes, observations, comments, *etc.*

See Report

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

4/25/2022

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 5/20/22 (mm/dd/yyyy)

Survey Biologist: Chatham (Last name) Celia (first name)

Survey Biologist: Pavelka (Last name) Claire (first name)

Site Location: Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam Watershed Rehabilitation Project
Brief description of proposed action:

Type of Survey (circle one): **DAY** (**NIGHT**) (**BREEDING**) **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** (**6**) **7** **8**

Begin Time: 8:50 pm **End Time:** 12:05 am

Cloud cover: Clear 0% **Precipitation:** None

Air Temperature: 62°F Start 50°F end **Water Temperature:** 67°F – 62°F pools/channels

Wind Speed: None 0 **Visibility Conditions:** Good / 10 mile

Moon phase: Waning ~~crescent~~ gibbous 75% **Humidity:** ~ 50%

Description of weather conditions: calm and clear, a slight breeze from north picked up near end of survey

Brand name and model of light used to conduct surveys: BERCOL – XPH970

Were binoculars used for the surveys (circle one)? (**YES**) **NO**
Brand, model, and power of binoculars: Atlas Optics Intrepid ED 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Western toad	~55	O	Tadpoles	~1/2 - 1"	yes
Western toad	1	O	Adults	3"	yes
Sierran treefrog	~145	O	Tadpoles	~3/4"	yes
Sierran treefrog	4	O	Metamorph	0.5"	yes
Sierran treefrog	20	O, H	Adult	1 - 1 1/2"	yes
American bullfrog	2	O, H	Adult	4"	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: 2 bullfrogs observed - one in creek pool below Grang Road crossing the other on downstream side of dam in pool.

Other notes, observations, comments, *etc.*

See Report

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

5/20/2022

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Survey: 7/13/2022 (mm/dd/yyyy)
Survey Biologist: CHATHAM (Last name) CELIA (first name)
Survey Biologist: SCHWAN (Last name) JOAN (first name)

Site Location: Matanzas Creek · Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam Watershed
Brief description of proposed action: Rehabilitation Project

Type of Survey (circle one): (**DAY**) **NIGHT** **BREEDING** **(NON-BREEDING)**

Survey number (circle one): **1** **2** **3** **4** **5** **6** **(7)** **8**

Begin Time: 11:00 AM **End Time:** 2:15 pm

Cloud cover: 80% overcast **Precipitation:** None

Air Temperature: 63°F **Water Temperature:** 65°F

Wind Speed: None **Visibility Conditions:** Good / 10 mile

Moon phase: N/A (Full moon) **Humidity:** 70%

Description of weather conditions: Calm and mostly overcast - breeze on top of dam

Brand name and model of light used to conduct surveys: NA - daytime

Were binoculars used for the surveys (circle one)? (**YES**) **NO**
Brand, model, and power of binoculars: Atlas Optics Intrepid ED 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Western Toad	30	O	Tadpoles	~3/4"-1 1/2"	yes
Western toad	200+	O	Juvenile	1/4" - 1"	yes
Sierran treefrog	8	O	Juvenile	~1/2"	yes
American bullfrog	3	O, H	Adult	4-4 1/2"	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Bullfrogs in pools cut off from other water sources, large (~1'-1.5') visible in deep water in pool at the base of downstream side of the dam (NOT able to get definitive ID due to poor water clarity)

Other notes, observations, comments, *etc.*

See Report

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

7/13/2022

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Survey: 7/20/2022 (mm/dd/yyyy) **Survey Biologist:** CHATHAM (Last name) CELIA (first name)
Survey Biologist: SCHWAN (Last name) JOAN (first name)

Site Location: Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Watershed
Brief description of proposed action: Rehabilitation Project

Type of Survey (circle one): **DAY** (**NIGHT**) **BREEDING** (**NON-BREEDING**)

Survey number (circle one): 1 2 3 4 5 6 7 (8)

Begin Time: 9:45 pm **End Time:** 11:45 pm

Cloud cover: 0% **Precipitation:** None

Air Temperature: 58°F **Water Temperature:** 62°F

Wind Speed: Slight breeze < 3mph **Visibility Conditions:** Good / 10 mile

Moon phase: Quarter moon 52%. **Humidity:** 70-80%

Description of weather conditions: clear and relatively humid, fog visible to the west, Slight Southerly breeze

Brand name and model of light used to conduct surveys: BERCOL-XPH970

Were binoculars used for the surveys (circle one)? (**YES**) **NO**
Brand, model, and power of binoculars: Atlas Optics Intrepid ED 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Sierran treefrog	2	O	Juvenile	~ 3/4"	yes
Western toad	~30	O	Tadpoles (many w/ legs)	~ 3/4"	yes
western toad	3	O	Juvenile	1/2" - 3/4"	yes
Western toad	1	O	Adult	~ 4"	yes
American bullfrog	5	O, H		3-4"	yes

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: 5 bullfrogs observed in the pool below the dam

Other notes, observations, comments, *etc.*

See Report

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

7/20/2022

Appendix B: Surveyor Qualifications

PRUNUSKE CHATHAM, INC.

Jennifer Michaud
Senior Wildlife Biologist/Project Manager (Former PCI employee)

Jennifer Michaud is a senior wildlife biologist with nearly 20 years in experience in wildlife and fisheries research and management in California with a strong focus on local riparian communities and endangered species issues. At PCI, Jennifer oversees all aspects of wildlife-related work. She holds federal and state permits for select special-status species and has received repeated approvals to serve as a qualified biologist for project specific relocations for listed salmonids and a number of wildlife species. Jennifer is also trained in U.S. Army Corps of Engineers jurisdictional wetland delineations.

Permits/Special Trainings

- U.S. Fish and Wildlife Service (FWS) Recovery Permit 10(a)(1)(A) for California tiger salamander, California red-legged frog, and California freshwater shrimp.
- California Department of Fish and Wildlife Scientific Collecting Permit with amendments for California tiger salamander, California red-legged frog, and California freshwater shrimp.
- Wetland Delineator Training and Certification Program, San Francisco State University, Romberg Tiburon Center, April 2006.
- Advanced Wetland Delineation Training, San Francisco State University, Romberg Tiburon Center, November 2019.

Selected Professional Experience

Biological Services, *Prunuske Chatham, Inc.*

- Surveys and regulatory compliance for birds. Work has included wintering, migratory, and breeding bird surveys including nest searches and monitoring, point count census, nocturnal owl surveys including federally threatened northern spotted owl, site assessments, Migratory Bird Treaty Act compliance, and habitat enhancement recommendations.
- Surveys and regulatory compliance for amphibian, reptiles, and mammals. Work has included general inventories and habitat assessments, protocol level surveys for listed California tiger salamander, foothill yellow-legged frog, California red-legged frog, Sonoma tree vole, and American badger, construction monitoring, training, and relocation, line-trap and pit-fall trap installation and monitoring, impact assessments and recommendations, and habitat enhancement recommendations.
- Surveys and regulatory compliance for fish. Work has included backpack and boat electrofishing, rotary screw trap monitoring, surveys with hand-held seine, underwater snorkel and spawning surveys, site assessments, species protection, relocation, and regulatory compliance. Experiences with in-hand identification of freshwater and estuarine fishes.
- Lead on-site biologist for dewatering and aquatic species relocation activities (e.g., salmonids and other native fish, frogs, California freshwater shrimp, pond turtles, etc.).

- Essential Fish Habitat and Biological Assessments for National Marine Fisheries Service and FWS consultations for salmonids and California red-legged frog, California freshwater shrimp, tidewater goby, western snowy plover, and California brown pelican, respectively.
- On-site biological resources assessments and reporting for resource management plans, ecological restoration projects, state park coastal projects, private residences, and small-scale developments. Assessments include evaluation of aquatic biological resources, terrestrial wildlife (e.g., amphibians, reptiles, and birds), special-status species, and sensitive terrestrial and aquatic communities including wetlands and other waters.
- Endangered species regulation and protection, cultural resource protection, preparation of CEQA documentation, and federal, State, and local permit applications for habitat enhancement, stream bank repairs, erosion control, and wetland mitigation projects.
- Surveys and regulatory compliance for California freshwater shrimp. Work has included general inventories and habitat assessments, FWS consultation, focused surveys, construction monitoring, training, relocation, and habitat enhancement recommendations.
- Preconstruction training and surveys and biological construction monitoring for special-status species protection.

Recent Select Projects, *Prunuske Chatham, Inc.*

- **Open Space Preserve Biological Surveys and Management of Mowing Contract for Sonoma County Agricultural Preservation and Open Space District (Ag + Open Space).** Lead biologist for resource protection surveys and project management and coordination for open space mowing. Sites surveyed include Young Armos, Hartoutunian South and North, Oken, Paulin Creek, Dogbane, Calabazas, Carrington, Saddle Mountain, and Cresta I and II. 2016 to 2019.
- **Open Space Preserve Management Plans for Sonoma County Agricultural Preservation and Open Space District (Ag + Open Space)**. Lead wildlife biologist and project manager for development of multiple management plans for properties including Taylor Mountain, Wright Hill Ranch, North Slope Sonoma Mountain, and Healdsburg Ridge. Each of these entails identifying natural resources present, determining recreational uses compatible with resource protection, and providing guidance for ongoing maintenance and restoration needs.
- **Pine Gulch Creek Watershed Enhancement Project for Marin Resource Conservation District.** Lead biologist for regulatory compliance and oversight for construction and monitoring of off-channel ponds in Pine Gulch Creek, Bolinas, Marin County. Work includes relocations and on-going monitoring of California red-legged frog and other wildlife species. 2015 to 2018.
- **Green Gulch Farm Riparian Restoration Project.** Lead Recovery Permit 10(a)(1)(A) qualified biologist for California red-legged frog and special-status fish pre-construction

surveys, relocations, construction monitoring, training, and long-term monitoring. Species relocation included capturing and handling of California red-legged frog and on-site relocation. Ongoing monitoring of fish utilization (spawning and snorkel surveys). 2011 to present.

- **Mill Creek Fish Passage Restoration Project.** Lead qualified biologist for special-status fisheries pre-construction surveys, relocations, construction monitoring, and training. Species relocation included capturing and handling of steelhead, coho salmon, and other wildlife species working closely with CDFW. 2015 to 2016.
- **Northern Napa River Tributary Streams Surveys for City of St. Helena.** Project manager and field biologist for project. Primary purpose of the project was to complete CDFG habitat inventory protocols and reconnaissance surveys in 8 watersheds to determine the current fisheries habitat conditions and provide recommendations for enhancement. Project included working closely with the City of St. Helena, NOAA Fisheries, and Napa County RCD. 2011 to 2012.
- **Mendocino County Department of Transportation Reeves Canyon Road Bridge at Mill Creek Project.** Lead biologist for aquatic and terrestrial species relocation and dewatering, and completion of biological resources assessment for CEQA compliance. Species relocation included capturing and handling steelhead, western pond turtle, foothill yellow-legged frog, western toad, Sierran treefrog, and other aquatic species. 2011 to 2012.
- **Willow Creek Second Bridge Replacement Project.** Lead Recovery Permit 10(a)(1)(A) qualified biologist for California red-legged frog pre-construction surveys, relocations, construction monitoring, training, and long-term monitoring. Species relocation included capturing and handling California red-legged frog, coho salmon, and steelhead and observations of all species during snorkel and spawning surveys. Long-term monitoring included snorkel and spawning surveys in the watershed. 2011 to 2014.
- **Coho Salmon Salmon Creek Monitoring Program.** Assist Michael Fawcett and Gold Ridge Resource Conservation District with coho salmon snorkel and spawning surveys in mainsteam Salmon Creek and tributaries. 2011 to 2012.
- **Salmon Creek Estuary Enhancement Plan.** Water quality and biological monitoring of steelhead, tidewater goby, California freshwater shrimp, and other aquatic species for the Salmon Creek Estuary Enhancement Plan, Bodega Bay. Assist with resource agency consultation and permitting. Oversee in-stream habitat construction installation and post-implementation monitoring. 2004 to 2011.

Education and Honors

- M.A., Biology, Sonoma State University. Thesis completed in 2001 and published in 2004 in Wilson's Bulletin. *Nest predation and brood parasitism in riparian breeding Wilson's warblers*.
- B.A., Biology (zoology), Sonoma State University, *magna cum laude*
- A.S., Santa Rosa Junior College

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Celia Chatham
Ecologist II

Celia Chatham has nine years of experience working as an ecologist in a range of habitats including the Sonoran desert, estuaries along the Gulf of California, and northern California settings from the coast to the Sierra. Her expertise spans both plant and wildlife realms. Before she came to PCI, Celia monitored seabird and estuarine bird populations and behavior in northern Mexico. Her work at PCI focuses on surveys for fish and wildlife, monitoring of wildland habitat restoration, vegetation mapping, biological resource assessment, wetland delineation, construction monitoring and assistance with aquatic species rescue.

Selected Professional Experience

Ecologist, *Prunuske Chatham, Inc., 2013 to present*

- Fish, amphibian, and other aquatic species surveys, dewatering, relocations, and construction monitoring, including:
  - Matanzas Creek Dam Watershed Rehabilitation Project, Sonoma Water and AECOM. Conduct protocol-level California red-legged frog amphibian night surveys with lead project biologist. 2022.
  - Oken Conservation Easement stream restoration, Sonoma Ag + Open Space. Conduct construction oversight for California tiger salamander protection. 2021.
  - Mainstem Ten Mile River Habitat Enhancement Project, The Nature Conservancy. Assist TNC biologist team in relocation of juvenile coho salmon, steelhead, northern red-legged frogs, and other aquatic species for river dewatering prior to construction. 2018.
  - Furlong Culvert Replacement Project, private owner. Assist lead qualified biologist with relocation of California freshwater shrimp and other aquatic species. 2018.
  - Pine Gulch Creek Watershed Enhancement Project, Marin Resource Conservation District. Assist senior wildlife biologist with construction oversight and relocations of California red-legged frog, northwestern pond turtles and other aquatic species. 2015-2018.
  - Mill Creek Fish Passage Restoration Project. Assist lead qualified biologist with aquatic species relocations and construction monitoring. Species relocation included capturing and handling of steelhead, coho salmon, and other wildlife species working closely with CDFW. 2015-2016.
  - Stuart Creek Fish Passage Project, Sonoma Land Trust. Assist senior wildlife biologist with relocation of aquatic species prior to fish passage construction. 2014.
- Breeding bird, bat, and other surveys, including:
  - Sonoma Ag + Open Space. American badger, nesting bird, bat roost, and botanical surveys for mowing and shaded fuel break projects. 2016-present.
  - Sonoma County Regional Parks breeding bird surveys for fuel reduction projects. 2021-present.
- Revegetation monitoring and reporting, including:
  - PG&E native vegetation restoration projects. Plant layout, monitoring, data analysis, and reporting for projects in Sonoma, San Benito, Fresno, and Shasta counties. Assessing plant health and maintenance or remedial needs. Settings include oak woodland, riparian, and coniferous forest. 2013-present.
  - URJ Camp Newman Dam Removal and Stream Reconstruction. Development of vegetation monitoring plan and vegetation monitoring and reporting of reconstructed riparian upland habitat. 2015-2018.
  - Bambury Riparian Restoration Project, project manager; revegetation monitoring and reporting of reconstructed riparian habitat in Sonoma. 2018-present.
- Biological resources assessments and wetland delineation, including:
  - Wetland delineation and biological resources assessment, Petaluma River Park. 2022.
  - Baseline and current conditions assessment and reporting for Sonoma Ag + Open Space easements and properties. Conduct field surveys, mapping and report preparation for conservation properties. 2018- present.

- Vegetation mapping, Sonoma County Vegetation Mapping Program, Sonoma Ag + Open Space. Ecologist and GIS technician for team led by Tukman Geospatial to develop county-wide vegetation classification and detailed vegetation mapping. 2015-2016.

Conservation Fellow, *Prescott College Kino Bay Center for Cultural and Ecological Studies, 2013-2014*

- Waterbird Monitoring Program. Conducted bird field surveys, data analysis and reporting for four negative estuaries and one island as part of an ongoing waterbird, seabird and shorebird monitoring effort in the region. Bahia de Kino, Sonora, Mexico.

Education

- B.S., Natural History and Ecology, Prescott College, 2013
- B.F.A., Studio Art, Prescott College, 2013

Selected Professional Training

- California Tiger Salamander Workshop. Elkhorn Slough Coastal Training Program. April 2015. Included in-classroom handling of adults and seine sampling larvae in nearby ponds with permitted instructors.
- California Red-legged Frog Workshop. Elkhorn Slough Coastal Training Program. May 2015. Included in-classroom handling of adults and positive night-time eye shine observations.
- Wildlife Biologist Construction Awareness Training (WildC.A.T.). The Wildlife Society Western Section Annual Meeting. February 2018
- Wetland Delineation Training. Wetland Science and Coastal Training Program, SF Bay National Estuarine Research Reserve. March 2018.
- Identifying and Appreciating the Native and Naturalized Grasses of California. California Native Grassland Association. May 2018.

Appendix C: California Red- Legged Frog Site Assessment

California Red-legged Frog Site Assessment
Matanzas Creek Dam Watershed Rehabilitation Project
Santa Rosa, Sonoma County
April 2021

Prepared for:
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612

Prepared by:
Prunuske Chatham, Inc.
400 Morris Street, Suite G
Sebastopol, CA 95472

PRUNUSKE CHATHAM, INC.

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1 Introduction

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) is completing a dam assessment in the Matanzas Creek watershed in Sonoma County, California. The Matanzas Creek dam has been identified as a high hazard dam (NRCS 2020), based on the size of the reservoir and the potential to cause loss of life downstream in the event of dam failure. The dam was constructed in 1964 to control flooding in the City of Santa Rosa and reduce sedimentation in the creek downstream (City of Santa Rosa 2006). The site is owned and managed by Sonoma Water. NRCS, in collaboration with Sonoma Water, is evaluating potential changes to the dam to ensure it meets NRCS design criteria. Project alternatives are currently being developed.

As part of project planning, AECOM, under contract with Jones & DeMille Engineering, requested Prunuske Chatham, Inc. (PCI) complete a California red-legged frog (CRF, *Rana draytonii*) site assessment for the project site to assist U.S. Fish and Wildlife Service (USFWS) in determining whether or not focused surveys for California red-legged frog are warranted. As outlined in USFWS *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog*, the site assessment must address three elements – determine if the project site is within the current or historic range of CRF; document known records of CRL at the site and within a 1-mile radius, and describe the habitats within the project site and within a 1-mile radius (USFWS 2005). This report provides an overview of the California red-legged frog, summary of field surveys and background review, and addresses the three elements noted above.

2 Species Account

Listing Status

The California red-legged frog was listed as threatened on May 23, 1996, by USFWS (61 FR 25813; USFWS 1996). Critical habitat was designated for this species on April 13, 2006 (71 FR 19244; USFWS 2006) and subsequently revised and republished on March 17, 2010 (USFWS 2010). A Recovery Plan was approved on September 12, 2002 (USFWS 2002).

General Description

The California red-legged frog is the largest native frog in the western U.S. with females reaching up to 5¼ inches in length and males being slightly smaller. They are most common in marshes, streams, lakes, reservoirs, ponds, and other water sources with plant cover. Breeding occurs in deep, slow-moving waters with dense shrubby or emergent vegetation from late November through April. Successful breeding sites typically remain inundated, without rapid water fluctuations, from December through September (optimal) to allow for tadpole survival and metamorphosis. Tadpoles require 3½ to 7 months to attain metamorphosis. Breeding sites typically include open water areas and vegetated cover. Floating egg masses are attached to emergent vegetation (e.g., *Typha* sp. or *Scirpus* sp.) near the water's surface. If breeding sites are free of non-

native predators or have enough vegetated cover to avoid predation, CRF can successfully breed in wetlands with depths of 4 to 24 inches. They can survive in ponds with a wide range of water quality conditions. During the non-breeding season, California red-legged frogs can remain at the breeding site (in the presence or absence of water) or move into surrounding non-breeding habitats. Upland refuge habitat needs to provide adequate moisture and vegetative cover to allow survival and predator avoidance. Radio tracking of frogs in Marin County by Fellers and Kleeman (2007) noted the dispersal of frogs at a median distance of 500 feet from breeding sites (range of 100 to 4,600 feet). They also noted year-round, small-scale (<100-foot) movements around breeding sites. These results indicate the importance of uplands for non-breeding season and migratory corridor habitat. After their first winter, juveniles disperse widely over the landscape. Grasslands and savannahs are the primary terrestrial habitat used. Habitats with tall, dense herbaceous vegetation may slow dispersal. Adults eat invertebrates and small vertebrates. Larvae are thought to be algal grazers.

Overall Threats to the Species

The California red-legged frog is threatened by human activities and natural disasters (USFWS 2002). Factors contributing to declining populations include degradation and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, impoundments, water diversions, degraded water quality, use of pesticides, and introduced predators. Predation by introduced species has been a significant factor in their decline, especially non-native American bullfrog, crayfish, and fish (USFWS 2002).

3 Methods

Site Assessment

A USFWS site assessment for California red-legged frog was completed within the project site[1]. The survey followed protocols outlined in the *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (USFWS 2005). The site assessment was conducted on February 18 and 23, 2021 by Jennifer Michaud, Sr. Wildlife Biologist with PCI. The primary purposes of the site assessment were to characterize biological communities and habitat conditions within the project site and to assist USFWS in determining whether or not focused surveys for California red-legged frog are warranted.

The assessment evaluated all areas of potentially suitable habitat within the project site. This included recording general habitat characteristics of all aquatic habitats (e.g., size, depth, vegetation composition) and a general characterization of suitable uplands; see *California Red-legged Frog Habitat Site Assessment Data Sheets*. Prior to the assessment,

[1] The project site includes the Matanzas Reservoir and the surrounding environs within the lands owned and managed by Sonoma Water; see Figure 1.

mapped wetland and stream channel features within the project site were reviewed to focus the location of the site assessment. The survey consisted of evaluating all mapped aquatic habitat features by walking meandering transects through the project site to provide adequate coverage across the area. The assessment was completed during winter when vegetation was less dense and aquatic habitats were partially inundated; however, the site assessment was completed during drier than normal rainfall conditions. From October 2020 through January 2021, the region was experiencing moderate drought conditions (NOAA 2021).

The assessment was completed with assistance of binoculars and a hand-held Trimble TDC 150 GPS unit to denote survey boundaries and points of interest. During the assessment, care was taken to minimize disturbance to the vegetation to prevent the accidental disturbance to any potential CRF. No aquatic sampling was completed as part of the assessment. In addition to assessing habitats, a survey for CRF was completed simultaneously; see *California Red-legged Frog Survey Data Sheets*. On February 18, site conditions were cool and overcast with 80% cloud cover and light wind. Air temperatures ranged from 52°F at 10:00 a.m. to 58°F at 4:00 p.m. Visibility was excellent, approximately 10 miles, and humidity was low, 30%. On February 23, site conditions were clear and sunny with no cloud cover or wind. Air temperatures ranged from 62°F at 9:00 a.m. to 68°F at 1:00 p.m. Visibility was excellent, approximately 10 miles, and humidity was low, 20%.

Background Review

A background literature and database search was conducted to help determine the potential for CRF to occur on or adjacent to the project site. The search focused on reported occurrences for the Santa Rosa 7 ½' USGS quadrangle where the project site is located. It also included occurrences within a 1-mile radius around the project site and other nearby occurrences. The California Natural Diversity Database (CNDDB[2]; CDFW 2021) and background CRF documents were reviewed (USFWS 2002). California red-legged frog reports completed by the Sonoma Water were also reviewed (SCWA 2008, 2010, 2017).

Figures

Figure 1 shows the project location and regional context. Figures 2 illustrates the reported occurrences of California red-legged frogs (CDFW 2021). Figures 3 and 4 show the habitats within the project site. Figure 5 shows the mapped aquatic habitats within 1-mile of the

[2] The California Natural Diversity Data Base (CNDDB), maintained by the California Department of Fish and Wildlife (CDFW), is a repository of information on sightings and collections of rare, threatened, or endangered plant and animal species within California. CNDDB reports occurrences of special-status species that have been entered into the database and does not generally include inventories of more common animals or plants. The absence of a species from the database does not necessarily mean that they do not occur in the area, only that no sightings have been reported. In addition, sightings are subject to observer judgment and may not be entirely reliable as a result.

project site. Representative photographs taken during the site assessment are provided at the end of the representative sections.

4 Setting

Matanzas Reservoir is the result of construction of an on-channel dam constructed on Matanzas Creek in Bennett Valley, Sonoma County. The site is located 0.7 miles south of Santa Rosa city limits and directly west of Bennett Valley Road. The project site includes the reservoir upstream of the dam (Matanzas Reservoir; with the reach of Matanzas Creek within the reservoir footprint); principal spillway outlet, stilling basin, and outlet channel (downstream reach of Matanzas Creek); auxiliary spillway; dam; and surrounding lands owned and maintained by Sonoma Water. It comprises 118 acres and five assessor parcels (APNs 049-130-006; 049-150-009 and 010; 049-060-009 and 054). It is mapped on Santa Rosa USGS 7.5' quadrangle (38.405872°N and 122.653254°W at dam) at approximately 375 to 425' in elevation. Matanzas Creek is an 11.4-mile-long stream originating on the northern slopes of Sonoma Mountain. The stream flows north through Bennett Valley and joins Santa Creek near the Luther Burbank Home and Gardens in downtown Santa Rosa. From there, Santa Rosa Creek joins the Laguna de Santa Rosa, Mark West Creek, and the Russian River before reaching the Pacific Ocean. Land uses surrounding the project site include natural open space, rural residential properties, and vineyards.

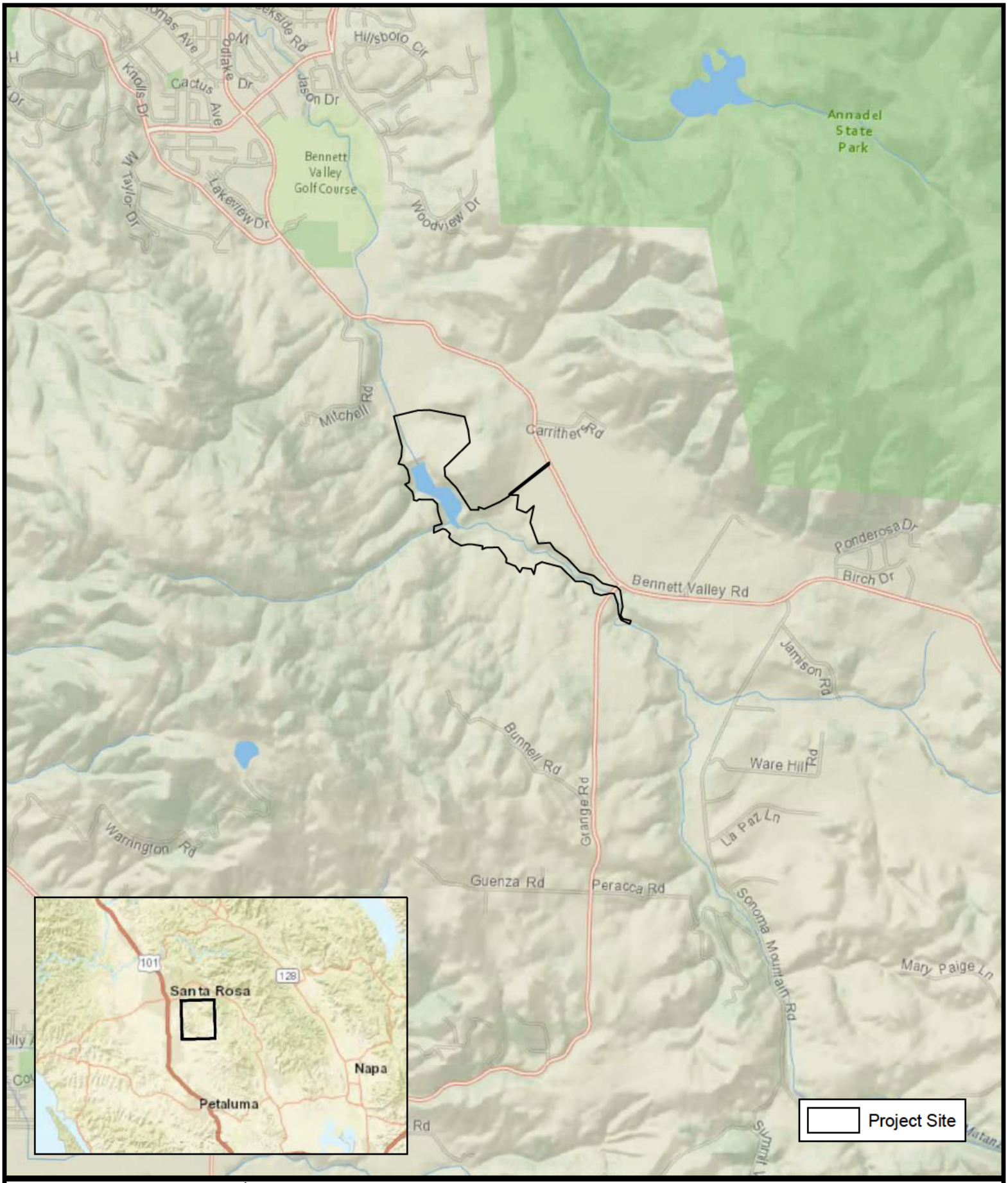

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Figure 1. Project Location
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

0 0.125 0.25 0.5 Miles

April 2021
Topo: ESRI

5 Results

The following provides an evaluation of the three elements required for a CRF assessment per USFWS (2005).

Element 1. Is the project site within the current or historic range of CRF?

The project site is located within the current range of the California red-legged frog. This species is endemic to California. Historically, it was described as occurring from the vicinity of Elk in Mendocino County along the coast inland to the vicinity of Redding in Shasta County, and southward to northwestern Baja California, Mexico (USFWS 2014 citing Fellers 2005, Jennings and Hayes 1985, Hayes and Krempels 1986). The original listing described a zone of integration with the northern red-legged frog extending from Walker Creek in Marin County north to southern Mendocino County. Recent research on the genetics of red-legged frogs shows the expansion of the California red-legged frogs range 60 miles further to the north than previously known. The intergrade zone between the two species is now defined as a narrow band between Big River and Mills Creek in Mendocino County (Nafis 2021).

Historically, this species was documented in 46 counties in California, but is now confined to 23 counties, in 238 documented streams or drainages. This represents a loss of 70 percent of its former range. The California red-legged frog is now known only from isolated localities in the Sierra Nevada, northern Coast, and northern Transverse Ranges. It is believed to be nearly extirpated from the southern Transverse and Peninsular ranges. This species is still common in the San Francisco Bay area and along the central coast. It is still present in Baja California, Mexico. (USFWS 2002).

In Sonoma County, California red-legged frogs occur in many drainages, ponds, and man-made stock ponds (CDFW 2021). They have been documented in coastal drainages (e.g., Salmon Creek, Scotty Creek), lower Russian River drainages (e.g., Willow Creek, Sheephouse Creek), Estero Americano, near Stony Point Road and Mechman Road near the central landfill, western Petaluma, and Lakeville Highway. There are numerous occurrences on Sonoma Mountain, including Fairfield Osborne Preserve, North Sonoma Mountain Regional Park and Open Space Preserve, and Sonoma Mountain Ranch. There is a large breeding population at Ledson Marsh in Annadel State Park and an additional breeding pond is located near Bennett Mountain on private property. Taylor Mountain Park and Open Space Preserve supports a small breeding pond and frogs have recently been observed throughout the park. Frogs are also known to occur at a private pond to the east of Taylor Mountain. The project site is located between the Taylor Mountain and Annadel State Park populations and north of the Sonoma Mountain populations.

USFWS designed final critical habitat for the California red-legged frog (USFWS 2010). Critical habitat is specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special

management and protection. Critical habitat Unit SON-1 is located directly 0.55 miles to the east and Unit SON-2 is located 3.75 miles to the south of the project site; the project site itself is located outside of designated critical habitat (see Figure 2). Unit SON-1 encompasses approximately 1,564 acres in Annadel State Park and private land. It contains "aquatic habitat for breeding and nonbreeding activities and upland habitat for foraging and dispersal activities" (USFWS 2010). Critical habitat Unit SON-2 is comprised of approximately 4,932 acres of land on Sonoma Mountain. It contains "permanent and ephemeral breeding and nonbreeding aquatic habitats consisting of natural and manmade ponds surrounded by emergent vegetation and marshland with appropriate upland areas for dispersal, shelter, and foraging" (USFWS 2010). Both of these units provide high quality habitat connectivity between populations further north and south in the North Bay.

Element 2. Are there known records of CRL at the site or within a 1-mile radius of the site?

According to the CNDDB, there is one reported occurrence of California red-legged frog within 1-mile of the project site (CDFW 2021; Table 1, Occurrence Number 1575). Frogs have been reported at a pond on private property on the eastern flank of Taylor Mountain. The pond is 0.4 miles west of Matanzas Creek and 0.7 miles northwest of the project site.

The project site is located in an area where additional populations of California red-legged frog are reported just outside of the 1-mile radius. Given the location of the project site relative to nearby populations, surrounding land use and potential habitat connectivity, and documented mobility distance for CRF, these regional occurrences are included for background. As outlined in Table 1, California red-legged frogs have been reported at a private pond in Bennett Valley, Annadel State Park, Taylor Mountain Park and Open Space Preserve, and Sonoma Mountain. The private pond sighting is 1.1 miles east of the project site; adults were observed at the perennial pond in 2004 (Occurrence Number 757). Further to the east, there is a well-documented population at Ledson Marsh in Annadel State Park (Occurrence Number 40). Ledson Marsh is a 27-acre pond with seasonal marsh habitat. This population was first reported to the CNDDB in 1990 and has been routinely monitored since then. Ledson Marsh is 2 miles east of the project site and 0.8 miles east of Occurrence Number 757.

In 2010, a population of California red-legged frog was first documented at Taylor Mountain Park and Open Space Preserve, a 1,100-acre park managed by Sonoma County Regional Parks (Occurrence Number 1464). The park supports a small, 0.2-acre breeding pond. The pond is located just south of the Taylor Mountain summit in the central portion of the park. Sonoma Water has completed annual California red-legged frog monitoring to document population trends and habitat conditions at the pond site since 2014. PCI

and Sonoma County Regional Park staff have also observed California red-legged frogs in seasonal drainages and wetlands away from the breeding site in January 2021 (PCI personal observation). Sonoma Water (2017) reports an anecdotal observation of a California red-legged frog 0.6 miles north of the breeding pond in oak woodland/grassland habitat in the upper watershed of Colgan Creek, a tributary to the Laguna de Santa Rosa. There are numerous potential breeding ponds surrounding the Taylor Mountain Park and Open Space Preserve with potential to support this species, but occupancy is unknown.

To the southeast of the project site, there are numerous sightings of California red-legged frog reported for Sonoma Mountain. Frogs have been reported in ponds and stream channels on Fairfield Osborne Preserve, North Sonoma Mountain Open Space Preserve, and Sonoma Mountain Preserve. The nearest sighting is 3.6 miles to the southeast of the project site. The populations on Sonoma Mountain are located in the headwater and tributary streams of the Matanzas Creek watershed. Sonoma Mountain populations are mostly likely isolated from those populations occurring to the north, but worth mentioning based on the hydrologic connectivity to other regional populations.

Table 1. Reported Occurrences of California Red-legged Frog within 1-mile of the Project Site and Additional Regional Occurrences

Occurrence Number	Location/Habitat	Life Stage/Date of Observation	Distance to Project Site	Movement to Project Site
Within 1-mile of the project site				
1575	Breeding pond on eastern flank of Taylor Mountain, 0.25-acres, max depth 5 feet, surrounded by rural residential	One adult and 25 metamorphs observed in pond in July 2017	Pond is 0.7 miles to northwest (from downstream end of project site)	No development or road barriers between pond and project site; movement overland and/or via stream channels
Additional Regional Occurrences				
757	Perennial pond, 0.5 miles northeast of intersection of Bennet Valley Road and Sonoma Mountain Road	Three adults observed in September 2004	Pond is 1.1 miles to east (from upstream end of project site)	Tributary/headwater stream to Matanzas Creek; hydrologic connectivity; overland movement would require crossing Bennett Valley Road
1464	Taylor Mountain Park and Open Space Preserve – 0.2-acre breeding pond, seasonal drainages, and wetlands with perennial springs	The population was first documented on May 13, 2010. Long-term pond monitoring since 2014 with repeat observations. Observed elsewhere on the park in 2017 (Sonoma Water) and 2021 (PCI and Sonoma County Regional Parks; see Figure 2).	Breeding pond is 1.7 miles to west; nearest adult sighting is 1.36 miles (from downstream end of project site)	No development or road barriers between Taylor Mountain population and project site; movement overland required, no hydrologic connectivity
40	Annadel State Park – 27-acre breeding pond/seasonal freshwater marsh, does not completely dry in some years, dominated by cattails, bulrush, smartweed and spikerush	The population was first documented in 1990. Long-term pond monitoring since mid-1990s with repeat observations.	Breeding pond is 2 miles to east (occurrence 757 between Ledson Marsh and project site)	Tributary to Sonoma Creek; overland movement would require crossing Bennett Valley Road
Various (not mapped)	Sonoma Mountain, including Fairfield Osborne Preserve, North Sonoma Mountain Open	Multiple sightings of tadpoles, metamorphs, and adults	Nearest sighting is 3.6 miles to southeast (from	Within Petaluma River and Sonoma Creek watersheds; overland movement

Occurrence Number	Location/Habitat	Life Stage/Date of Observation	Distance to Project Site	Movement to Project Site
	Space Preserve, and Sonoma Mountain Ranch - ponds and stream channels		upstream end of project site)	would require road crossings and movement through rural residential and agricultural development

Sonoma Water California Red-legged Frog Site Assessment and Surveys

Sonoma Water is responsible for channel maintenance activities on approximately 180 miles of creek within Sonoma County for the purposes flood control. In 2006, a California red-legged frog site assessment was completed for Sonoma Water's Stream Maintenance Program (SMP) including portions of the project site (Sonoma Water 2008). In the assessment, Sonoma Water evaluated Matanzas Reservoir (near the dam inlet) and Matanzas Creek at Grange Road. At the time of the assessment, Sonoma Water was managing Matanzas Creek Reservoir so that water was impounded forming an approximately 10-acre reservoir. Sonoma Water (2008) determined Matanzas Reservoir and Matanzas Creek at Grange Road were unsuitable habitat for CRF. They noted the reservoir supported aquatic habitat and escape cover; however, they identified the site as degraded. Sonoma Water (2008) notes focused surveys of the reservoir were completed in 2000 and 2001, and findings indicate bullfrogs were present but no CRF. Matanzas Creek at Grange Road did not support aquatic habitat or escape cover. Exotic predators were noted in the reservoir but not in the creek. Water quality was noted as "ok" at both sites. The sites were reported as disconnected from other aquatic sites (e.g., more than 1-mile from known CRF site).

Focused surveys for Sonoma Water's stream maintenance projects were completed in 2010 (Sonoma Water 2010). Sonoma Water (2010) noted the management of the reservoir changed to an "open valve" system where the creek is allowed to continuously flow through an inlet structure and the reservoir is no longer present. In 2010, focused CRF surveys of the reservoir were completed on May 3 (day), 26 (night), June 15 (night), 22 (day and night), 28 (night), and July 6 (day and night). American bullfrog, Sierran treefrog, California roach, and fathead minnow were observed, but not CRF. The site conditions at the time of the focused surveys included a *"dry mud flat with sparse herbaceous plants and woody debris at the inlet. Maximum water depths were less than 4 inches and there was no emergent vegetation. The creek was dry in late June"*. Sonoma Water (2017) notes the reservoir provided unsuitable habitat based on the previous findings, site conditions which include mudflats with no wetland habitat, and completion of reconnaissance surveys in 2013-2016.

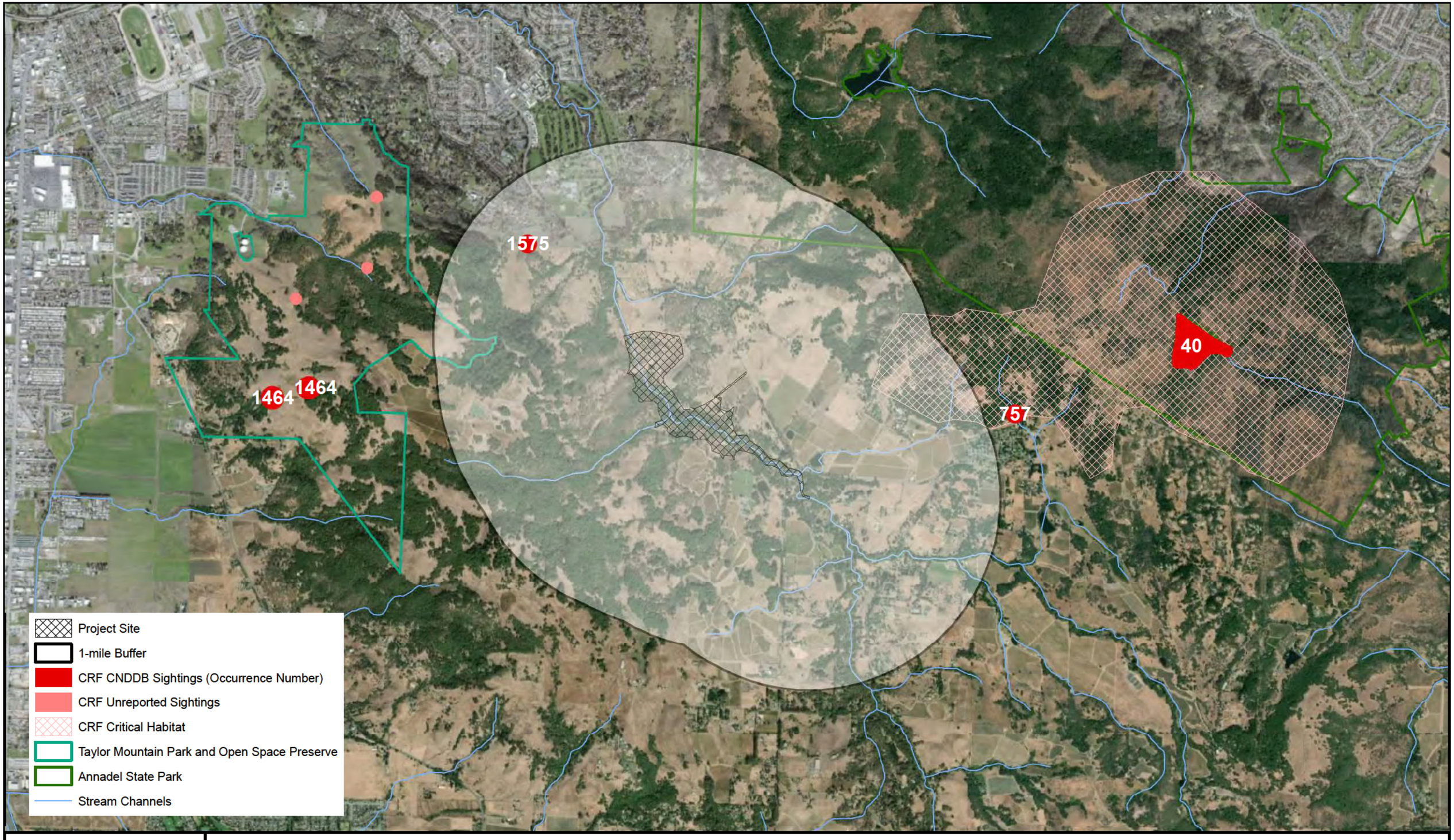

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Figure 2. California Red-legged Frog Sightings
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

April 2021
Aerial: ESRI 2019
CNDDB: CDFW 2021

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Element 3. What are the habitats within the project site and within 1-mile of the project boundary?

As noted above and shown on Figures 3 and 4, the project site includes the reservoir upstream of the dam (Matanzas Reservoir; with the reach of Matanzas Creek within the reservoir footprint); principal spillway outlet, stilling basin, and outlet channel (downstream reach of Matanzas Creek); auxiliary spillway; dam; and surrounding lands owned and maintained by Sonoma Water. The site supports native upland and aquatic communities, but has experienced significant habitat alteration from anthropogenic activities. The on-channel dam on Matanzas Creek was constructed in 1964, but it continues to be maintained as an active flood control feature. Dominant upland habitats within the project site include annual grassland and oak woodland, intermixed with small patches of coyote brush scrub and evergreen woodland. Riparian oak woodland and scrub occurs along the creek and drainages. Aquatic habitats within the project site include Matanzas Creek, a small pond and herbaceous wetland habitat within the reservoir, seasonal wetlands and ponded depressions along the edge of access roads and within the auxiliary spillway, and small seasonal watercourses draining into Matanzas Creek. The following section describes aquatic and upland habitats within the project site and habitats within 1-mile of the project site. Representative photos of each habitat type are included.

Aquatic Habitats within the Project Site

Matanzas Reservoir – Pond and Seasonal Wetlands Immediately Upstream of the Dam.

The Matanzas Reservoir encompasses the project site upstream of the dam. Herbaceous wetlands, a seasonal pond, Matanzas Creek, and willow and riparian woodlands currently occupy the reservoir. The reservoir has been subject to changing management and routine maintenance including sediment removal and regrading. As noted above, Sonoma Water previously managed the site as a perennial reservoir; see *Matanzas Reservoir Google Earth Time Lapse*. Google Earth images from 1993-2005 show a perennial reservoir extending from 500-1,500 feet upstream of the dam. Sometime after 2006, Sonoma Water changed the management of the reservoir to an "open valve" system where the creek is allowed to continuously flow through an inlet structure underneath the dam. Google Earth images show the reservoir was graded in 2018 and 2019. Since this time, a pond has developed along the western edge of the reservoir and Matanzas Creek (described below) restricted to the eastern edge. Wetland vegetation has also established in the areas that were previously inundated. According to the Sonoma Veg Map (2021), the reservoir is mapped as freshwater herbaceous wetland.

As noted, the aquatic habitat conditions upstream of the dam have changed over time based on stream flows and management activities. Currently, there is a seasonal pond established immediately upstream of the dam; see Figure 3, Sample Point 3. Based on a review of Google Earth images, the pond was not in existence in 2017; at the time the

creek channel was located along the western edge of the reservoir, flowing through the current pond location. The pond appears to have developed after the site was graded in 2019; it is visible in the fall 2020 aerial see *Matanzas Reservoir Google Earth Time Lapse*. The pond sits on an elevated bench above the main channel. It is dominated by emergent wetland plants including cattail (*Typha* sp.) and water plantain (*Alisma* sp.). The substrate consists of mud. The pond drains to Matanzas Creek via a narrow, 12-inch-wide channel at the base of the dam. Water flows under the berm that separates the channel and the pond. In February 2021, the pond had a water surface area of approximately 2,700 square feet, maximum depth of 18 inches, and 48°F water. A single frog was observed in the pond; however, it could not be identified to species as it retreated quickly and never resurfaced. The frog measured between 2-3 inches. No fish or aquatic predators were observed in the pond by PCI. Sonoma Water (2010) previously observed American bullfrog and fish in the reservoir. The pond was completely dry in January (Stead 2021).

Seasonal wetland habitat occurs around the perimeter of the pond and throughout the lower reservoir. Willow thickets occur on the periphery of the wetlands and further upstream they form a dense wooded thicket. The wetland habitat is dominated tall cyperus (*Cyperus eragrostis*), cocklebur (*Xanthium strumarium*), annual beard grass (*Polypogon monspeliensis*), and dock (*Rumex* sp.). There was no standing water in the wetlands during the February site visit. Sierran treefrogs were heard in the wetlands.

The pond within the reservoir appears to support a seasonal water source with emergent vegetation (e.g., cattails and water plantain). Water depths in February were 18 inches deep. However, the site assessment was completed during moderate drought conditions, so the pond was not evaluated during a normal rainfall year (NOAA 2021). If water is retained into late summer and aquatic predators are absent, the pond may support CRF breeding habitat, although it is unlikely due to the following reasons. There are no reports of CRF within the reservoir and, in the past, the site supported aquatic predators (American bullfrog and fish). The pond is also a recently developed habitat feature; any CRF use of the site would be a very recent colonization. The open valve operation of the reservoir results in large (greater than 20 feet) fluctuations in water levels during normal winter storm events, then decreases to baseline flows between storms (Sonoma Water 2021). These fluctuations likely preclude successful CRF breeding as these flow events coincide with the reported breeding season for this species. During flood events in which the entire reservoir is inundated, egg masses would mostly likely be dislodged during high flow events and larvae would be washed downstream. Stable pond and marsh habitat is only available during spring and summer, which is outside of the breeding period. During this time period, the pond provides shelter, forage, and predator avoidance. Adjacent wetlands provide some foraging opportunities but limited cover and predator avoidance. The adjacent willow thickets provide shelter, forage, and predator avoidance and dispersal habitat.

Looking upstream at eastern edge of the lower reservoir from the dam (Matanzas Creek visible on left)

Looking upstream at western edge of the lower reservoir from the dam (pond is located at circle of lighter plants, no standing water visible)

Pond within the reservoir immediately upstream of the dam
(mostly concealed by emergent vegetation)

Wetlands in reservoir and outlet of pond in background

Matanzas Creek – Upstream of the Dam. Matanzas Creek, an intermittent stream, flows from upstream of Grange Road through the reservoir, into the principal spillway inlet structure, through the dam via the principal spillway outlet and stilling basin to the outlet channel at the downstream limits of the project site; see *Matanzas Creek – Downstream of the Dam* below. Riparian woodlands occur as a continuous swath from the south side of the dam to the upstream end of the project site and as a narrow band below the dam outlet. Riparian vegetation is dominated by a canopy of willow (*Salix* sp.) with additional cover provided by coast live oak (*Quercus agrifolia*), California bay (*Umbellularia californica*) and deciduous riparian trees. Representative understory species include native poison oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), California mugwort (*Artemisia douglasiana*), stinging nettle (*Urtica dioica*), California bee plant (*Scrophularia californica*), cocklebur, and non-native Himalayan blackberry (*Rubus armeniacus*), fennel (*Foeniculum vulgare*), and other non-natives. Channel margins and gravels bars support rushes (*Juncus* sp.), pennyroyal (*Mentha pulegium*), and tall cyperus.

Aquatic habitat features were assessed at multiple locations along Matanzas Creek to determine the suitability for CRF – downstream of the dam (see below section), immediately upstream of the dam, middle reach, and at Grange Road. Immediately upstream of the dam, Matanzas Creek is confined between artificial berms and flows along the eastern edge of the reservoir; see Figure 3, Sample Point 4. The channel is dominated by riffles with no pools. Canopy coverage is limited just upstream of the dam, but there is a dense band of willows along the upper berms further upstream. The substrate consists of coarse and fine gravels and sand. In February, the wetted channel was 2.5 feet wide with an average water depth of 3 inches.

In the middle reach of Matanzas Creek, the channel supports a complex of glides, riffles, and pools; see Figure 4, Sample Point 5. There is a large gravel bar on the right bank where the access road along Matanzas Creek terminates. The left bank is fairly steep and adjacent to private property. There are areas along the creek with small debris jams and overhanging willow branches with good cover. Canopy coverage ranges from 20-60%. In the middle reach, the channel is dominated by sand and fine gravel. In February, the wetted channel was 2.5 feet wide and 2 inches deep at a narrow riffle and 4-6 feet wide and 1-foot-deep at representative pools.

At the upstream end of the project site, Matanzas Creek flows to the northwest under Grange Road; see Figure 4, Sample Point 6. Upstream of the bridge, the channel supports a long glide between two floodplain benches. As it flows downstream, the channel constricts under the bridge with rock riprap along both banks. The channel bifurcates at the downstream end of the bridge into the main channel and a secondary channel along the left bank. Short riffles and a long pool make up the channel downstream of the bridge. Canopy coverage ranges from 40-80%. Above the bridge, the channel is dominated by fine gravel and sand and cobble and coarse gravel below. In February, the wetted channel was

20 feet wide and 14 inches deep in the upstream glide and 6 feet wide and 6 inches deep in a lower pool.

Within the reservoir, no fish or aquatic predators were observed. Sierran treefrogs were heard at multiple locations along the creek upstream of the dam. Water temperatures ranged from 52-54°F. AECOM noted the channel in the reservoir was completely dry in January 2021 (Stead 2021). They also noted that pools were present in the middle reach and at the Grange Road crossing, but disconnected with no flowing water.

Suitable breeding habitat is not present within Matanzas Creek upstream of the dam. There are no deep open water areas with emergent vegetation suitable for egg laying. There are areas of cover (e.g., willow roots, undercut banks), but the channel lacks submerged and emergent vegetation. Frogs could use the channel as a movement corridor and adjacent riparian woodlands provide shelter, forage, and predator avoidance. The creek and adjacent woodlands may provide dispersal habitat. There are no barriers to movement upstream of the dam, some of the stream banks may be steep but are not an impediment to movement.

Matanzas Creek immediately upstream of the dam

Channelized creek between berms

Middle reach of Matanzas Creek

Matanzas Creek upstream of Grange Road

Matanzas Creek downstream of Grange Road

Matanzas Creek – Downstream of the Dam. From the reservoir, Matanzas Creek flows into the principal spillway inlet pipe, through the dam and out the principal spillway outlet and stilling basin to the outlet channel at the downstream limits of the project site. At the base of the spillway, there is a fairly deep pool (3-4 feet deep; stilling basin) with emergent vegetation (e.g., cattail and water plantain) and rock riprap along the banks; see Figure 3, Sample Point 2. The pool transitions into an approximate 300-foot long channelized pool before the creek takes on a more natural configuration at the downstream end of the project site. Below the outlet, the channel is fairly open with limited tree canopy (≈20%). In February, the wetted channel was 20 feet wide and 6 inches deep below the pool. The channel is dominated by fines and coarse gravel. A small fish of unknown species was observed in this reach. No other aquatic predators were observed. AECOM noted a small pool at the outlet in January 2021 (Stead 2021).

The pool (stilling basin) at the base of the principal spillway outlet is deep and perennial, and supports emergent vegetation (e.g., cattails and water plantain). California red-legged frog could potentially breed in the pool, but it is unlikely that breeding could be maintained in this area with fluctuating storm flows at the outlet of the dam. Egg masses would most likely be dislodged during high flow events and larvae would be washed downstream. In channel, high flow refuge habitat is also lacking as the pool has a relative uniform bed and no bank complexity. Aquatic predators (primarily fish) are also present, but not confirmed. Frogs could use the channel as a movement corridor and adjacent woodlands provide shelter, forage, and predator avoidance. The creek and downstream woodlands may provide dispersal habitat. Movement upstream would require moving over or around the dam with limited vegetative cover.

Looking downstream at principal spillway and pool (stilling basin) at outlet

Looking upstream at principal spillway and pool (stilling basin) at outlet

Channelized creek below principal spillway

Seasonal Drainages, Wetlands, and Ponded Depressions. The remainder of the project site supports a number of seasonal drainages, wetlands, and ponded depressions. As noted on Figures 3 and 4, there are several mapped drainages flowing into Matanzas Creek, two on the east side of the creek and a second, larger drainage on the west side; this area was not assessed due to access constraints. There is also a narrow incised channel flowing from an upslope wetland in the auxiliary spillway. The drainage within the auxiliary spillway supports intermittent pools (6-10 inches deep) interspersed with wetlands dominated by Iris leaved rush (*Juncus xiphioides*). Near the entrance to the project site, the larger drainage on the west side of the creek originates in the upslope vineyard and flows through an oak savannah; this channel supported several pools with at least 2 feet of water. Wetland habitat dominated by sedge (*Carex* sp.) occurs in the lower floodplain at the base of this drainage.

Within the auxiliary spillway, there are several seasonally ponded depressions and a large seasonal wetland; see Figure 4, Sample Point 1. The ponded depressions occur in shallow areas within open grassland habitat. In February, the smaller features measured several hundred square feet, were mostly disconnected, and shallow (approximately 2-3 inches deep). Two larger depressions measured 500-750 square feet with depths ranging from 8-10 inches. Under normal rainfall years, these wetlands are mostly likely connected; much of this area supported moist soil conditions indicating wetland hydrology. The seasonal depressions were dominated by annual grasses, tall cyperus, pennyroyal, and Iris leaved rush. The larger depressions also supported potential vernal pool plants, possibly Lobb's aquatic buttercup (*Ranunculus lobbii*) and semaphore grass (*Pleuropogon californicus*); but positive plant confirmation is needed. Two small depressions are also present directly adjacent to the access road at the dam; primarily dominated by annual grasses, but supporting 3 inches of water.

A large freshwater herbaceous wetland occurs just downslope of the seasonal depressions. This wetland originates from an upslope seep and covers approximately 0.5 acres. In February, maximum water depth was 4 inches. The wetland is dominated by clumping rushes and Iris leaved rush, pennyroyal, tall cyperus, small patches of cattails, and surrounded by patches of Himalayan blackberry and grasses [possibly Harding grass (*Phalaris aquatic*)]. There is also small wetland seep along the access road to Matanzas Reservoir; it was dry in February and dominated by rush and Himalayan blackberry. With the exception of this roadside wetland, most of the seasonal wetlands and depressions supported treefrogs (egg masses and/or tadpoles) and flatworms.

The seasonal drainages, wetlands, and depressions do not support suitable breeding habitat; these features are seasonal and are unlikely to support water depths for the duration needed to support successful egg laying and transformation of tadpoles. Wetlands and drainages could provide foraging habitat as these areas support seasonal water. The more densely vegetated areas (e.g., sedge beds and clumping rushes) provide

forage, shelter, and predator avoidance. Frogs could use the drainages as movement corridors from the creek to upland habitats. Although long distances from known CRF sites reduces the probability of this occurring.

Seasonal drainage with small pool at base of the auxiliary spillway

Seasonally ponded depressions within the auxiliary spillway

Large herbaceous wetland within the auxiliary spillway

Seasonal drainage (above) with sedge bed and pool at downstream end (below); near entrance to project site

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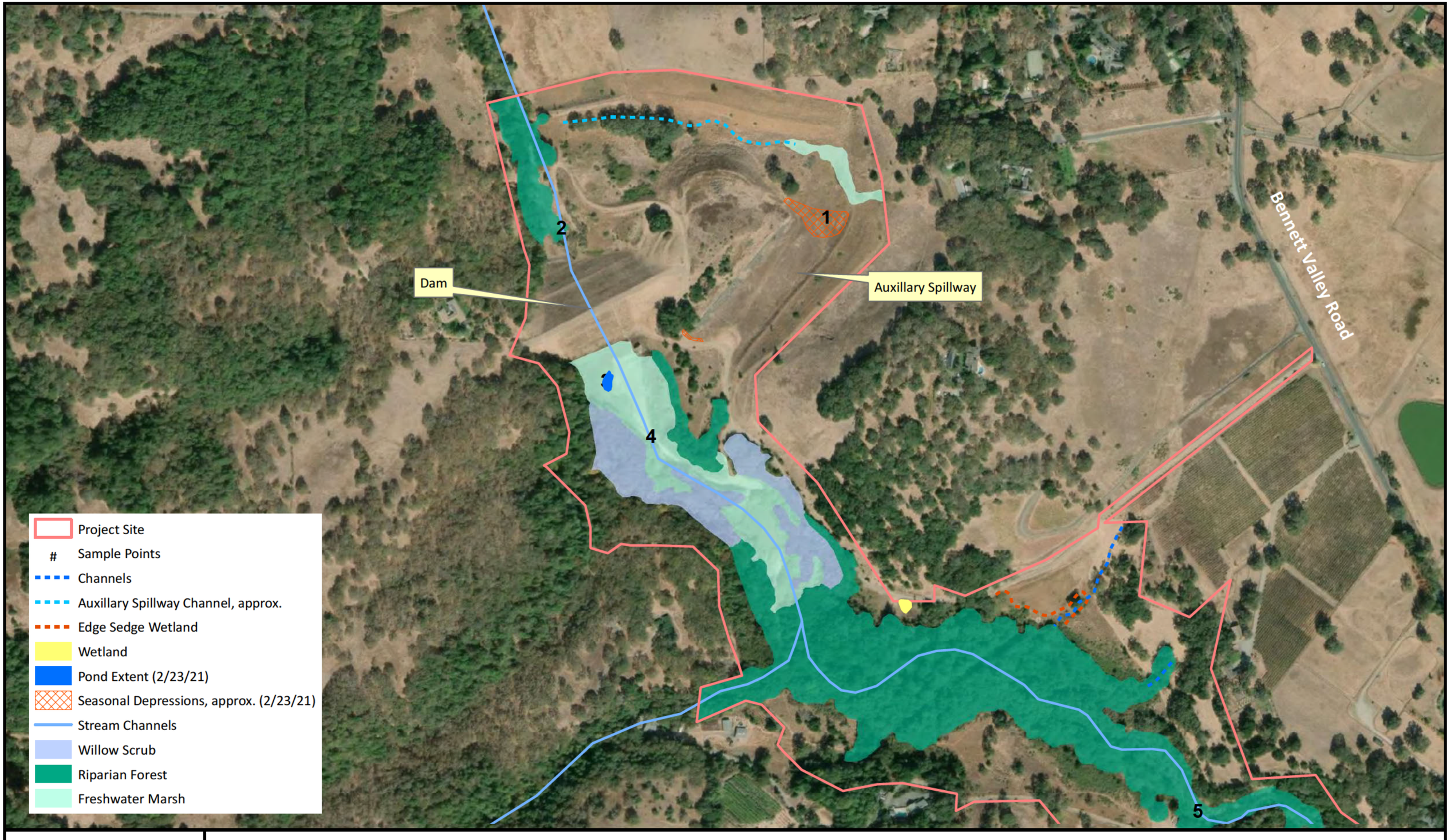

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Figure 3. Aquatic Habitats within the Project Site - Downstream
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

April 2021
Aerial: ESRI 2019
Aquatic Habitats: Sonoma Veg Map 2021

0 280 560 1,120 Feet

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Figure 4. Aquatic Habitat Conditions within the Project Site - Upstream
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

April 2021
Aerial: ESRI 2019
Aquatic Habitats: Sonoma Veg Map 2021

Upland Habitats within the Project Site

Within the project site, upland areas support a mixture of plant communities. The dam and auxiliary spillway appears to be routinely mown and supports primarily annual grassland with some disturbance adapted species also present [e.g., poison hemlock (*Conium maculatum*)]. Patches of non-native shrubs (e.g., broom) and Himalayan blackberry are present downslope of the dam. Non-riparian woodlands are dominated by oak trees [e.g., coast live coast live oak and valley oak (*Q. lobata*)]. Coyote brush (*Baccharis pilularis*) scrub occurs in narrow bands along the riparian woodlands.

Upland areas with native cover and adjacent to aquatic habitats provide potential shelter, forage, and predator avoidance for CRF. Upland habitats between Matanzas Creek and Bennett Valley road and habitats on the south side of the creek, provide potential movement corridors, and these locations do not contain barriers (e.g., heavily traveled road without bridges or culverts) to dispersal. California red-legged frogs will move through a variety of habitat types; grasslands and savannahs are used most frequently (Ford et al. 2013).

View of coyote brush, grassland, and oak woodland habitat within the project site

Habitats within 1-mile of the Project Site

The project site is located in rural Bennett Valley with low density development. Land uses surrounding the project site include natural open space, rural residential properties, and vineyards. Bennett Valley Road traverses the valley and is located directly to the east; Grange Road also crosses over the downstream end of the project site. Both of these roads are highly traveled and serve as impediments to CRF overland movement. At the edge of the 1-mile radius and within the Santa Rosa city limits, there is dense residential subdivision development and a golf course. The remaining surrounding development is mostly rural residential homes and vineyards. Upland habitats are dominated by annual grassland, oak woodland [e.g., coast live oak, valley oak, blue oak (*Q. douglasii*)], with small stands of California bay and Douglas fir (*Pseudotsuga menziesii*). Riparian woodlands occur along Matanzas Creek and its drainages.

Aquatic habitats within a 1-mile radius of the project site includes up- and downstream reaches of Matanzas Creek, drainages to Matanzas Creek, small seasonal wetlands, and ponds; see Figure 5 below. These aquatic habitats are located entirely on private property and were not accessible as part of this site assessment. Aquatic habitats were delineated based on the Sonoma Veg Map (2021) data, USFWS National Wetlands Inventory (USFWS 2021), and field review from accessible public roads.

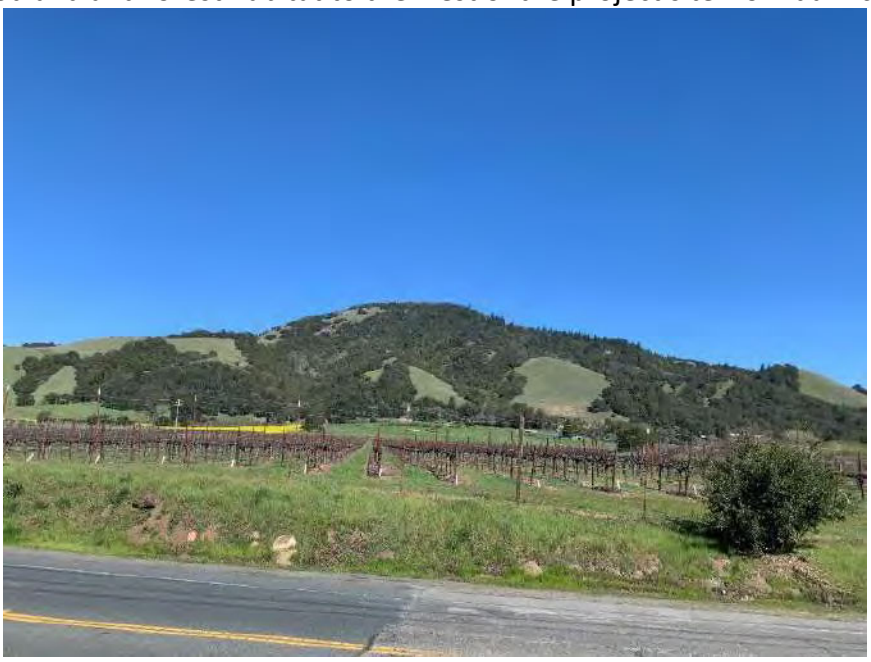
Mainstem Matanzas Creek flows both up- and downstream of the project site within the 1-mile radius and there are also several miles of tributary streams mapped. Habitat conditions within the streams were not assessed, but stream conditions are likely similar to conditions observed within the project site. Riparian corridors are mapped along the channels (Sonoma Veg Map 2021). Small isolated wetlands are mapped in annual grasslands habitats to the east and west of Matanzas Creek; most of these wetlands appear to be 0.25 acres or smaller in size. The habitat composition is unknown.

Within the 1-mile radius, there are numerous ponds that appear to be primarily associated within vineyard development or grazing operations; see Figure 5. Habitat conditions within these ponds are not known. These include:

- Pond located 435 feet to the south, no impassable barriers between the project site and pond, overland movement;
- Pond located 700 feet to the north, before Bennett Valley Road, no impassable barriers between the project site and pond, overland movement;
- Two ponds 0.75 and 1 mile to the west, requires overland movement and movement down drainage to connect project site and ponds;
- Pond located 0.7 miles to northwest, this is the location of CRF occurrence 1575; see above; no impassible barriers between project site and pond, movement overland and/or via stream channel;

- Pond located 500 feet to the east at corner of Grange Road and Bennett Valley Road on east side of road; movement under culverts to upstream end of project site; and
- Four ponds located to the east of Bennett Valley Road; movement overland and under Bennett Valley Road required.

Woodland and forest habitat to the west of the project site from dam crest



Vineyard development, annual grassland, and oak woodland habitats to the east of the project site

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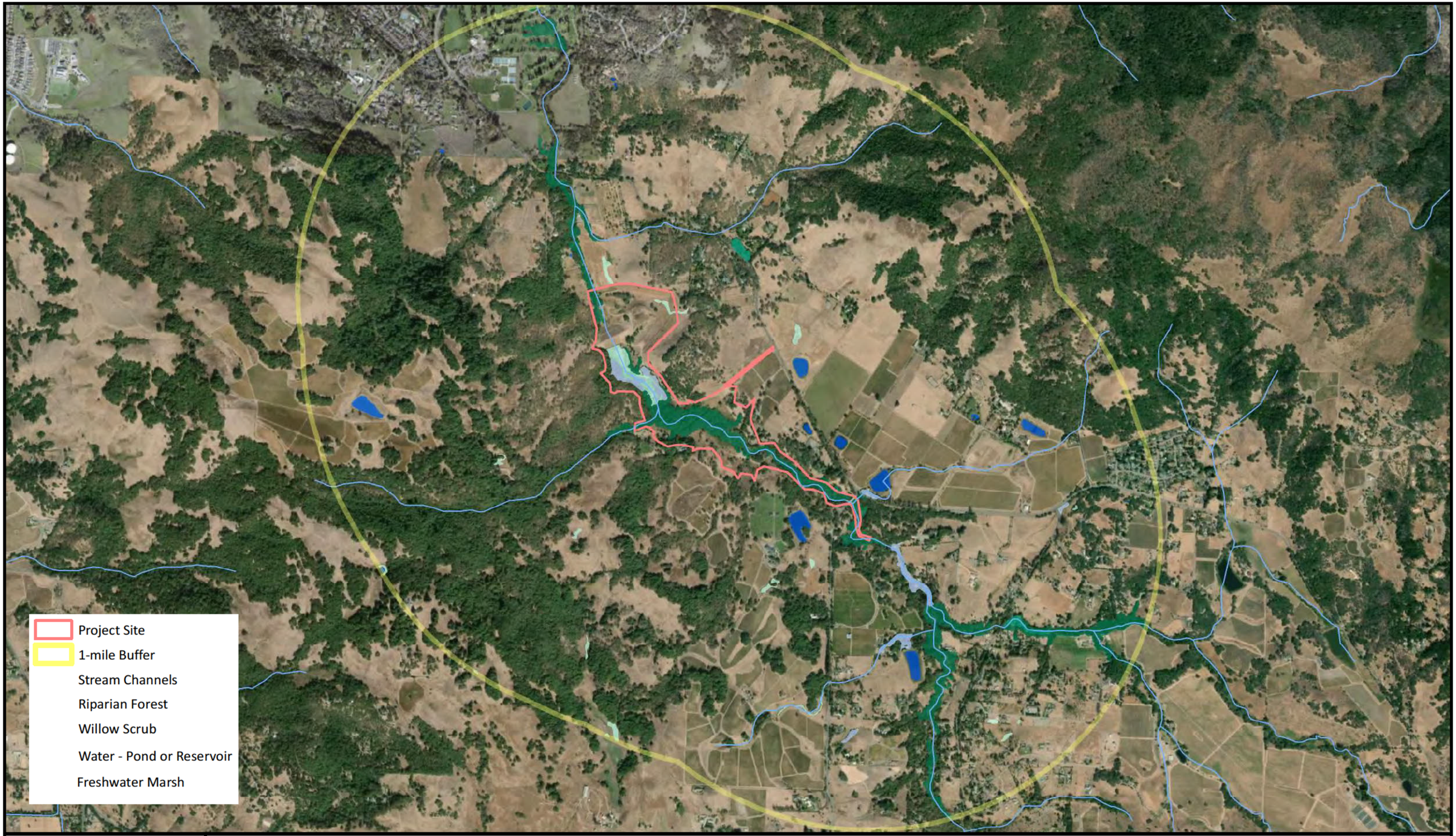

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Figure 5. Aquatic Habitats within 1-mile of the Project Site
Natural Resources Conservation Service
Matanzas Creek Dam Watershed Rehabilitation Project

April 2021
Aerial: ESRI 2019
Aquatic Habitats: Sonoma Veg Map 2021

0 0.175 0.35 0.7 Miles

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6 Summary of Findings

The following is a summary of the California red-legged frog site assessment findings for the Matanzas Creek Dam Watershed Rehabilitation Project:

- Matanzas Reservoir is a flow-through flood detention reservoir located on Matanzas Creek in Bennett Valley, Sonoma County.
- The project site includes the reservoir upstream of the dam (Matanzas Reservoir; with the reach of Matanzas Creek within the reservoir footprint); principal spillway outlet, stilling basin, and outlet channel (downstream reach of Matanzas Creek); auxiliary spillway; dam; and surrounding lands owned and maintained by Sonoma Water
- The project site is located within the current range of the California red-legged frog.
- There is one reported occurrence of California red-legged frog within 1-mile of the project site. Frogs have been reported at a pond on private property on the eastern flank of Taylor Mountain. The pond is 0.4 miles west of Matanzas Creek and 0.7 miles northwest of the project site. There are additional sighting reported at a private pond within 1.1. miles, Taylor Mountain Park and Open Space Preserve within 1.7 miles, and Annadel State Park within 2 miles, and additional sighting on Sonoma Mountain.
- Numerous CRF site assessment/surveys have been completed in recent history. Sonoma Water completed a CRF site assessment in 2006, focused surveys of portions of the project site (2000, 2001, 2010), and reconnaissance surveys in 2013-2016. No CRF have been documented in the areas surveyed by Sonoma Water.
- No CRF were observed within the project site by PCI February 18 and 23, 2021. Treefrogs were observed throughout the project site aquatic habitats. A single frog was observed in the pond within the reservoir; it could not be identified to species as it retreated quickly and never resurfaced. The frog measured between 2-3 inches.
- The project site supports native upland and aquatic communities but has experienced significant habitat alteration from anthropogenic activities. The on-channel dam on Matanzas Creek was constructed in 1964, but it continues to be maintained as an active flood control feature. Dominant upland habitats within the project site include annual grassland and oak woodland, intermixed with small patches of coyote brush scrub and evergreen woodland. Riparian oak woodland and scrub occurs along the creek and drainages. Aquatic habitats within the project site include Matanzas Creek, a small pond and herbaceous wetland habitat within the reservoir, seasonal wetlands and ponded depressions along the edge of access roads and within the auxiliary spillway, and small seasonal watercourses draining into Matanzas Creek.

- The project site is located in rural Bennett Valley with low density development. Land uses surrounding the project site include natural open space, rural residential properties, and vineyards. Aquatic habitats within a 1-mile radius of the project site includes up- and downstream reaches of Matanzas Creek, drainages to Matanzas Creek, small seasonal wetlands, and ponds.
- There are two habitat features within the project site that appear to meet the depth requirements for suitable CRF breeding habitat; however, breeding is unlikely due to the pulsed high flow velocities through the project reach during winter storms. These features include a recently formed pond with a seasonal water source immediately upstream of the dam. The water depth in February was 18 inches. There is also a perennial pool (stilling basin) at the outlet of the principal spillway.
- The project site supports non-breeding aquatic habitat. Wetlands and wetted riparian habitats provide shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs.
- Riparian woodlands and upland habitats also provide frogs shelter, forage, and predator avoidance. Frogs could use the channel and surrounding habitat for dispersal and movement.

7 References

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8 Matanzas Reservoir Google Earth Time Lapse

October 2020 – Matanzas Creek, wetlands and pond in current location

August 2019 – reservior appears to have been partially graded in summer 2019

September 2018 – reservoir graded in fall 2018

May 2017 – creek flowing through reservior, no pond visible

November 2011 – site conditions after management changes

Decemeber 2005 – perennial reservoir

July 1993 – perennial reservoir

9 California Red-legged Frog Site Assessment Data Sheets

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by	(FWS Field Office)	(date)	(biologist)

Date of Site Assessment: 2/23/24
(mm/dd/yyyy)

Site Assessment Biologists: Michaud, Jennifer
(Last name) (first name) (Last name) (first name)

(Last name) (first name) (Last name) (first name)

Site Location: Sonoma County, Matanzas Creek Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Dam Watershed Fabric Project
Brief description of proposed action:

Evaluation of dam for safety

1) Is this site within the current or historic range of the CRF (circle one)? YES NO

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? YES NO
If yes, attach a list of all known CRF records with a map showing all locations.

#1

GENERAL AQUATIC HABITAT CHARACTERIZATION

(if multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

Seasonal depressions and wetlands

POND:
Size: smaller 500-700 sq ft vernal pools
0.5 seasonal wetland

Maximum depth: smaller depressions 2-3" vernal pools 8-10" wetland 4"

Vegetation: emergent, overhanging, dominant species:
vernal pool plants (Buttercup Sonophore grass)
rosher, tall cyperus, pennyroyal, annual grasses

Substrate: soft bottom

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: ?

#2

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

STREAM:

Bank full width: 35'
Depth at bank full: ≈ 3'
Stream gradient: 5%

pool + downstream spillway
active channel 20' wide
2/~~[illegible]~~/21
23

Pool for outlet

Are there pools (circle one)? YES NO
If yes,
Size of stream pools: 300' ; 20x20'
Maximum depth of stream pools: 3-4' deeper pool

Characterize non-pool habitat: run, riffle, glide, other: deep pool at its end of spillway transitions to long pool (300') before constricts to riffle and dense woodland

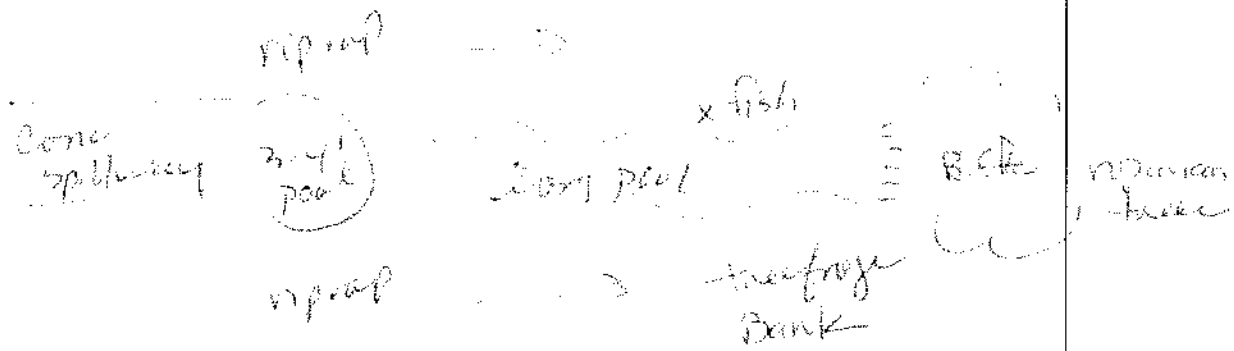
Vegetation: emergent, overhanging, dominant species: cattails + water plantain along edges + shallow water submerged plant unk?

Substrate: fines + coarse gravel

Bank description: rock rip rap, weedy species

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: perennial (Aecom)

Other aquatic habitat characteristics, species observations, drawings, or comments:



Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species location

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by_____
(FWS Field Office) (date) (biologist)

Date of Site Assessment: 02/23/21
(mm/dd/yyyy)

Site Assessment Biologists: Wickham, Jennifer
(Last name) (first name) (Last name) (first name)

(Last name) (first name) (Last name) (first name)

Site Location: Sonoma County Matanzas Ck Reservoir
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: M.C. Dam Watershed Rehab Project
Brief description of proposed action:

Evaluation of dam for safety

1) Is this site within the current or historic range of the CRF (circle one)? YES NO

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? (YES) NO
If yes, attach a list of all known CRF records with a map showing all locations.

#3

GENERAL AQUATIC HABITAT CHARACTERIZATION

(if multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND:
Size: 2,700 sq ft 2/23/21 Maximum depth: 18" 2/23/21

Vegetation: emergent, overhanging, dominant species: cattails, water primrose, Plantain, cocklebur, nut sedge, rumex

Substrate: soft bottom

water temp @ 1130 am 45.4°F

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unknown

Creek @ US end of Reservoir

Appendix D.

California Red-legged Frog Habitat Site Assessment Data Sheet

#4

STREAM:

Bank full width: 25' Between berms — OHWM 15'

Depth at bank full: 4' — active channel 2/23/21

Stream gradient: 5% — 2.5' 3" deep

Are there pools (circle one)? YES (NO)

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: riffle habitat Confined between berms within reservoir

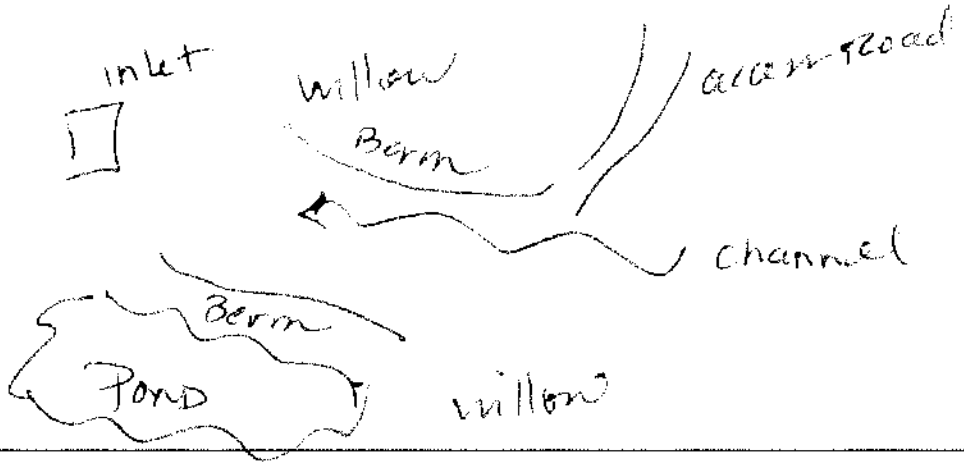
Vegetation: emergent, overhanging, dominant species: along edge of water cocklebur, rumex, mecicago, Brassicaop. Berms and upper flood plain willow dominate

Substrate: _____

Bank description: steep berm on right bank, more gradual sloping berm on left bank

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: perennial? in wet years

Other aquatic habitat characteristics, species observations, drawings, or comments:



Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species location

water temp 52.9

Appendix D.

California Red-legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Site Assessment: 02/23/21
(mm/dd/yyyy)

Site Assessment Biologists: Mahmud, Jennifer _____
(Last name) (first name) (Last name) (first name)

_____ _____
(Last name) (first name) (Last name) (first name)

Site Location: Sonoma County, Matanzas Creek
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Watershed Rehab Project
Brief description of proposed action:

Elevation for dam safety

1) Is this site within the current or historic range of the CRF (circle one)? YES NO

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? YES NO
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(if multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND:

Size: _____ Maximum depth: _____

Vegetation: emergent, overhanging, dominant species: _____

_____

_____

Substrate: _____

_____

Perennial or Ephemeral *(circle one).* If ephemeral, date it goes dry: _____

middle Reach

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

STREAM:

Bank full width: 20' OHWM 6'
Depth at bank full: wetted channel 2-23-21 2.5' wide, 2" deep (@ riffle
Stream gradient: 5%

Are there pools (circle one)? (YES) (NO)
If yes,
Size of stream pools: 8' x 4' x 1' ; 25' x 6' x 1'
Maximum depth of stream pools: _____

pool 25' upstream & 40' upstream

2nd pool 4-6' wide 1' deep

Characterize non-pool habitat: run, riffle, glide, other: riffle @ sample point w/ glide downstream

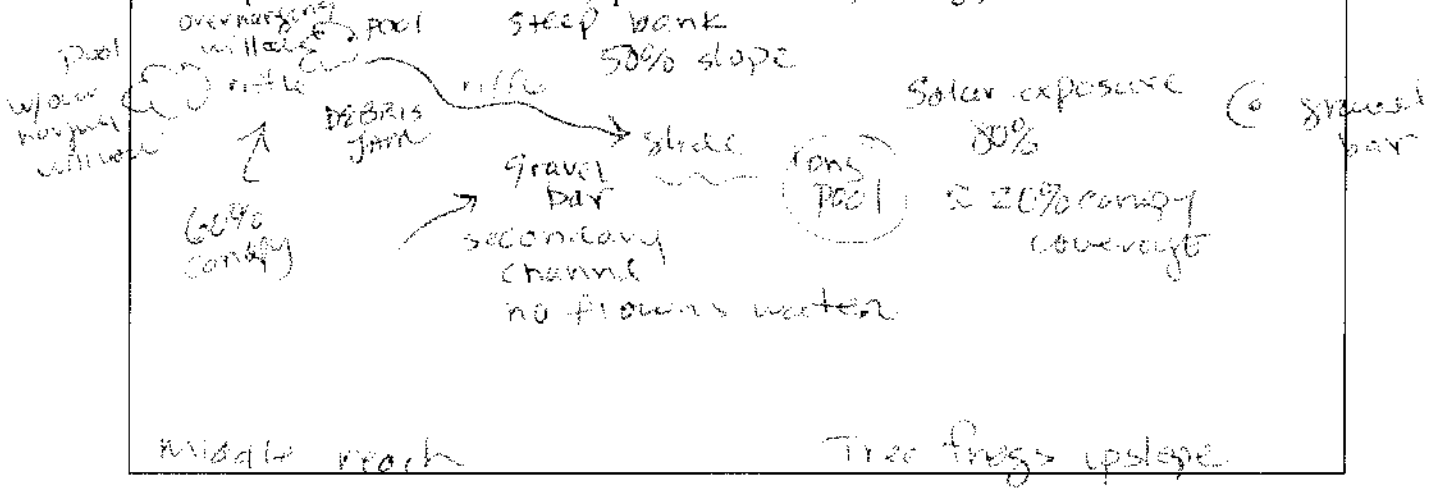
Vegetation: emergent, overhanging, dominant species: willows dominant species, few deciduous riparian trees + oaks on left bank; min. blackberry

Substrate: sand and gravel (fine)

Bank description: steeper side slopes (1-4')

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:



middle reach
Tree frogs upslope

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species location

(2)

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Site Assessment: 02/23/21
(mm/dd/yyyy)

Site Assessment Biologists: Michaud, Jennifer _____
(Last name) (first name) (Last name) (first name)

_____ _____
(Last name) (first name) (Last name) (first name)

Site Location: Sonoma County, Matanzas Creek
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Watershed Rehab Project
Brief description of proposed action:

Evaluation for dam safety

1) Is this site within the current or historic range of the CRF (circle one)? (YES) NO

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? (YES) NO
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(if multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND:

Size: _____ Maximum depth: _____

NA

Vegetation: emergent, overhanging, dominant species: _____
_____
_____

Substrate: _____
_____

Perennial or Ephemeral *(circle one).* If ephemeral, date it goes dry: _____

Grange Road

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

STREAM:

#6

Bank full width: 30'
Depth at bank full: 5'
Stream gradient: 10%

20' active 14" deep up of Bridge
downstream end
Bankfull 40'
OHWM 12'
6" deep
d/s active pool channel 6'
deep 6"
water temp 52°F

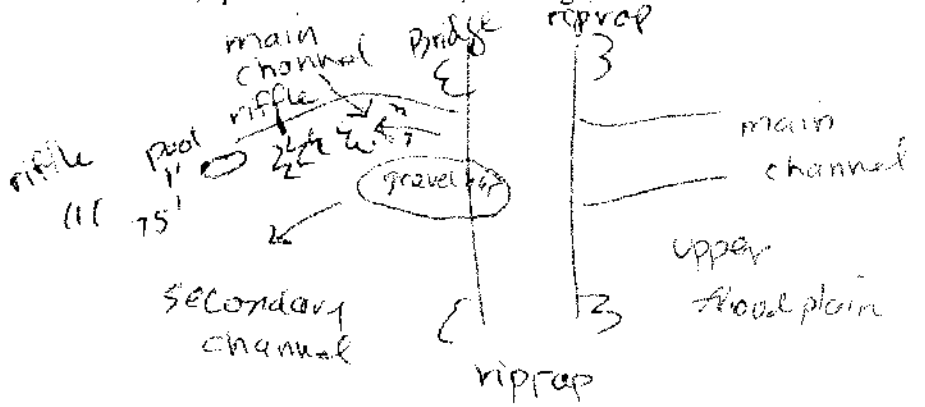
Are there pools (circle one)? YES NO
If yes,
Size of stream pools: variable, long pool 75'
Maximum depth of stream pools: 12"

Characterize non-pool habitat: run, riffle, glide, other: glide upstream, riffle under bridge then long pool

Vegetation: emergent, overhanging, dominant species: Primarily willow deciduous riparian trees, coast live oak, poison oak, blackberry, bee plant, poison hemlock, stinging nettle
Substrate: fine gravel + sand u/s, 2-24" cobble + coarse d/s, nutsedge along edge of water
Bank description: mostly steep, eroding or bermed

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: Perennial ?

Other aquatic habitat characteristics, species observations, drawings, or comments:



Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species location

10 California Red-legged Frog Survey Data Sheets

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 02/18/21 (mm/dd/yyyy) **Survey Biologist:** Michaud, Jennifer (Last name) (first name)

Survey Biologist: _____ (Last name) (first name)

Site Location: Sonoma County - 38.405872N 122.653254W
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Watershed Rehab Project
Brief description of proposed action:

Evaluation of dam safety

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

Begin Time: 10:00 **End Time:** 4:00

Cloud cover: 80% **Precipitation:** Ø

Air Temperature: 52 - 58 **Water Temperature:** 48 - 54°F

Wind Speed: light; less than 5 mph **Visibility Conditions:** Excellent 10 miles

Moon phase: Waxing Crescent 41% **Humidity:** 30%

Description of weather conditions: Cool, overcast with light wind m/d temp

Brand name and model of light used to conduct surveys: NA

Were binoculars used for the surveys (circle one)? **YES** **NO**
Brand, model, and power of binoculars: Swarovski 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
unknown	1	O	Adult	2-3	? Retreated Before + ID
Sierran treefrog	5	H	Adult	calling in rip ? reservoir	Y
Sierran treefrog	100	O	tadpole	seasonal wetlands	Y
Sierran treefrog	10	O	egg mass		Y

POND

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: one fish, small, downstream of reservoir

Other notes, observations, comments, *etc.*

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 02/23/21 (mm/dd/yyyy)

Survey Biologist: Michaud, Jennifer (Last name) (first name)

Survey Biologist: _____ (Last name) (first name)

Site Location: Sonoma County 38.405872 N -122.6532.54 W
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Matanzas Creek Watershed Rehem Project
Brief description of proposed action:

Evaluation of dam safety

Type of Survey (circle one): **DAY NIGHT** **BREEDING NON-BREEDING**

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 9:00 **End Time:** 1:00

Cloud cover: Ø **Precipitation:** Ø

Air Temperature: 62-68F **Water Temperature:** 52-54°F

Wind Speed: Ø **Visibility Conditions:** excellent, visibility

Moon phase: Waxing 9, Illuss 85.8% **Humidity:** 20%

Description of weather conditions: clear, sunny, no cloud cover or wind

Brand name and model of light used to conduct surveys: NA

Were binoculars used for the surveys (circle one)? **YES NO**
Brand, model, and power of binoculars: Swarovski 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Sierran tree frog	8	H	adult		Y
Sierran tree frog	30	O	tadpole		Y
Sierran tree frog	5	O	egg mass		

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: ____

Other notes, observations, comments, *etc.*

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

USDA

United States Department of Agriculture

March 19, 2023

Ryan Olah, Coast Bay Division Supervisor
U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

RE: Initiation of Informal Consultation, Project Code: 2023-0028269

To the U.S. Fish and Wildlife Service:

The Natural Resources Conservation Service (NRCS) has a grant application from Sonoma County Water Agency for rehabilitation of the Matanzas Creek Dam located southeast of the city of Santa Rosa. The NRCS is the lead federal agency for this action.

The Matanzas Creek Dam is located in Bennett Valley, approximately 2 miles southeast of the city of Santa Rosa in Sonoma County. The dam is an earthen embankment dam that was designed and built in 1964 and currently provides flood protection for the City of Santa Rosa and adjacent unincorporated areas in Sonoma County, California. Based on recent assessments, the dam no longer meets NRCS or California Division of Safety of Dams standards. Sonoma County Water Agency and the NRCS propose the Matanzas Creek Dam Rehabilitation Project (Proposed Action), which would fully rehabilitate the dam by raising the dam crest by 7.4 feet, raising the auxiliary spillway crest by 11.4 feet, grading the spillway to a uniform 200-foot width, removing accumulated sediment from the inundation area, installing embankment stability buttresses, and extending the primary spillway to accommodate the new buttresses. The service life of the dam would be extended for a minimum of 50 additional years.

The applicant, Sonoma County Water Agency, hired AECOM to develop a Biological Assessment (BA), identify possible issues, impacts, focusing on the Preferred Alternative in the draft Supplemental Watershed Plan - Environmental Assessment. Protocol level surveys for CA Red-legged Frog completed as a component of the biological evaluation. We are requesting initiation of the ESA Section 7 process for the following species:

Red-legged Frog *(Rana draytonii)*	***May affect, not likely to adversely affect***

Natural Resources Conservation Service
430 G St., #4164, Davis, CA 95616-5475
Voice: (530) 792-5600
USDA is an Equal Opportunity Provider, Employer and Lender.

We have attached a copy of the BA and we are requesting concurrence on a *May Affect, Not Likely to Adversely Affect* for implementation the Preferred Alternative (Alternative A).

If you have questions, need additional information, please contact the NRCS at the address listed above, care of Jennifer Cavanaugh, NEPA Lead. I can be reached at 530-792-5632, jennifer.cavanaugh@usda.gov.

Respectfully,

Jennifer Cavanaugh
Environmental Compliance Coordinator, NRCS California

Cc:

Jenna Jorgensen, Jones and DeMille Engineering, Richfield, UT
Ernesto De La Riva, State Watershed Engineer, NRCS, Davis, CA

Jenna Jorgensen

From: Colby, Liz - FPAC-NRCS, CA <liz.colby@usda.gov>
Sent: Thursday, July 27, 2023 4:17 PM
To: Jenna Jorgensen
Cc: Darin Robinson; Aaron Fulton
Subject: FW: [EXTERNAL] 2023-0028269 NRCS Matanzas Dam Consultation
Attachments: 2023-0028269 Request for Consultation USFWS-Matanzas.pdf; Matanzas_USFWS.BA_2023.03.09.pdf

Jenna,
Information for ESA consultation on Matanzas. Let me know if you need anything else.

Liz

Liz Colby, P.E.
State Hydrologic & Hydraulic Engineer
USDA, Natural Resources Conservation Service (NRCS)

530.902.0244 – mobile
530.792.5613 – office

From: Colby, Liz - FPAC-NRCS, CA
Sent: Thursday, April 27, 2023 4:15 PM
To: De La Riva, Ernesto - FPAC-NRCS, CA <ernesto.delariva@usda.gov>
Subject: FW: [EXTERNAL] 2023-0028269 NRCS Matanzas Dam Consultation

FYI 😊

Liz Colby, P.E.
State Hydrologic & Hydraulic Engineer
USDA, Natural Resources Conservation Service (NRCS)

530.902.0244 – mobile
530.792.5613 – office

From: Cavanaugh, Jennifer - FPAC-NRCS, CA <jennifer.cavanaugh@usda.gov>
Sent: Thursday, April 27, 2023 10:58 AM
To: Colby, Liz - FPAC-NRCS, CA <liz.colby@usda.gov>; Sullivan, Lauren - FPAC-NRCS, CA <Lauren.Sullivan2@usda.gov>
Subject: FW: [EXTERNAL] 2023-0028269 NRCS Matanzas Dam Consultation

Liz,

Per the email below, ESA consultation on Matanzas Dam watershed project is complete.

Lauren,
FWS has asked us to append this project to the 4-county programmatic. When you get to the point of submitting the 2023 report Liz will be able to provide you with any information you need.

Jennifer

From: Hanni, Jason <jason_hanni@fws.gov>
Sent: Wednesday, April 26, 2023 6:16 AM
To: Cavanaugh, Jennifer - FPAC-NRCS, CA <jennifer.cavanaugh@usda.gov>
Cc: Olah, Ryan <ryan_olah@fws.gov>
Subject: Fw: [EXTERNAL] 2023-0028269 NRCS Matanzas Dam Consultation

Hi Jennifer- The Service has reviewed the Matanzas Creek Dam Project and has determined that the project falls within the effects analyzed in the Service's 4-County Programmatic biological opinion with NRCS. Please include this project in your 2023 annual report for the May 3, 2018, *Programmatic Formal Consultation on the Natural Resources Conservation Service's Conservation Practices in Four Bay Area Counties (Napa, Sonoma, Solano, and Marin Counties), California.*

Best,

Jason Hanni
Fish and Wildlife Biologist
Coast Bay Division
2800 Cottage Way, Room W-2605
Sacramento, California 95825
(916) 414-6656 (phone)
(916) 414-6712 (fax)

"working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people"

From: Cavanaugh, Jennifer - FPAC-NRCS, CA <jennifer.cavanaugh@usda.gov>
Sent: Sunday, March 19, 2023 9:04 PM
To: Olah, Ryan <ryan_olah@fws.gov>
Cc: Colby, Liz - FPAC-NRCS, CA <liz.colby@usda.gov>
Subject: [EXTERNAL] 2023-0028269 NRCS Matanzas Dam Consultation

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Dear Mr. Olah,

Please find attached a request for consultation under Section 7 of the Endangered Species Act.

Respectfully,

Jennifer

~~~~~~

Jennifer Cavanaugh | Environmental Compliance Coordinator - California
Ecological Sciences Section | USDA Natural Resources Conservation Service
Jennifer.cavanaugh@usda.gov | 530-792-5632
NRCS - California "Helping People Help the Land"

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United States Department of the Interior

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In Reply Refer to:
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2018-F-1383

MAY - 3 2018

Jennifer Cavanaugh
Environmental Compliance Coordinator
Natural Resource Conservation District
430 G. Street, #4164
Davis, California 95616-5475

Subject: Programmatic Formal Consultation on the Natural Resources Conservation Service's Conservation Practices in Four Bay Area Counties (Napa, Sonoma, Solano, and Marin Counties), California

Dear Ms. Cavanaugh:

This letter is in response to the Natural Resources Conservation Service's (NRCS) March 21, 2017, request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the NRCS' proposed Conservation Practices in Napa, Sonoma, Solano, and Marin Counties, California. Your request was received by the Service on March 21, 2017. At issue are the proposed project's effects on the species listed in table 1. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

The federal action we are consulting on is the NRCS' Farm Bill funding assistance to private land owners and managers to implement projects that aim to result in habitat improvements, vegetation management, erosion and/or drainage control, and improve water quality and conservation in Napa, Sonoma, Solano, and Marin Counties. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is likely to adversely affect the California red-legged frog, Central California tiger salamander, Sonoma California tiger salamander, and California freshwater shrimp and is not likely to adversely affect California red-legged frog Critical Habitat, Central California tiger salamander Critical Habitat, Sonoma California tiger salamander Critical Habitat, northern spotted owl or its Critical Habitat, vernal pool fairy shrimp or its Critical Habitat, vernal pool tadpole shrimp or its Critical Habitat, and conservancy fairy shrimp or its Critical Habitat.

In considering your request, we based our evaluation on the following: 1) your March 21, 2017, initiation letter and accompanying *Programmatic Biological Assessment For NRCS-Assisted Conservation Projects in the Northern San Francisco Bay Counties of Marin, Sonoma, Napa, and Solano, California* [(Biological Assessment) NRCS 2017]; and, (2) additional information available to the Service.

Table 1: Species List

Species	Listed Status
Amphibians	
California red-legged frog (*Rana draytonii*)	Federally Threatened
California red-legged frog Critical Habitat	
California tiger salamander (*Ambystoma californiense*) Central California distinct population segment (Central California tiger salamander)	Federally Threatened
Central California tiger salamander Critical Habitat	
California Tiger Salamander Sonoma County Distinct Population Segment (Sonoma California tiger salamander)	Federally Endangered
Sonoma California tiger salamander Critical Habitat	
Birds	
Northern Spotted Owl (*Strix occidentalis caurina*)	Federally Threatened
Northern Spotted Owl Critical Habitat	
Invertebrates	
California freshwater shrimp (*Syncaris pacifica*)	Federally Endangered
Vernal pool fairy shrimp (*Branchinecta lynchi*)	Federally Threatened
Vernal pool tadpole shrimp (*Lepiduras packardi*)	Federally Endangered
Conservancy fairy shrimp (*Branchinecta conservation*)	Federally Endangered
Reptiles	
Giant garter snake (*Thamnophis gigas*)	Federally Threatened

This list is not intended to be a comprehensive consultation of all Federally Endangered and Threatened species throughout Napa, Sonoma, Solano and Marin Counties, but to streamline consultations on the most commonly occurring species. Those species would require their own consultation.

The Service concurs that the proposed project may affect, but is not likely to adversely affect California red-legged frog Critical Habitat, California Tiger Salamander Sonoma County distinct population segment (DPS) Critical Habitat, or California Tiger Salamander Central California DPS Critical Habitat. Based on the temporary nature of most project effects, and the implementation of the proposed Conservation Measures, effects of the project on the Critical Habitat's primary constituent elements (PCEs) for these species will be insignificant in the short term and, in many cases, are likely to enhance the conservation value of one or more primary constituent elements (PCE's) in the long term.

The Service concurs that the proposed project may affect, but is not likely to adversely affect northern spotted owl or its Critical Habitat. Based on the temporary nature of most project effects, the implementation of the proposed Conservation Measures and the small amount of habitat in the Action Area, the effects of the project on the Critical Habitat's PCEs for these species will be insignificant.

The Service concurs that the proposed project may affect, but is not likely to adversely affect vernal pool fairy shrimp or its Critical Habitat, vernal pool tadpole shrimp or its Critical Habitat, and Conservancy fairy shrimp or its Critical Habitat. The avoidance and minimization measures will help ensure that adverse effects to the species from project activities are likely to be insignificant.

The Service concurs that the proposed project may affect, but is not likely to adversely affect giant garter snake. The avoidance and minimization measures will help ensure that adverse effects to the species from project activities are likely to be insignificant.

The remainder of this document provides our programmatic biological opinion on the effects of the proposed action on California red-legged frog, Central California tiger salamander, Sonoma California tiger salamander and California freshwater shrimp.

Consultation History

March 24, 2016: Received a draft programmatic Biological Assessment from NRCS.

September 27, 2016: Met with NRCS and provided comments to the draft Biological Assessment.

March 24, 2017: Received a final programmatic Biological Assessment from NRCS.

November 30, 2017: The Service provided NRCS with a draft project description.

December 1, 2017: The NRCS confirmed the accuracy of the project description.

BIOLOGICAL OPINION

Description of the Action

The NRCS is involved in many collaborative partnerships with private and public landowners and land managers, other government agencies, and non-governmental organizations to achieve conservation of natural resources. These conservation practices are planned, designed and implemented on working farms, ranches and non-industrial forestlands and properties with NRCS controlled easements. The NRCS works with land managers to develop a plan that is designed to benefit the soil, water, air, plants, and animals (SWAPA) on their property. The land manager can then apply for financial assistance to implement the plan through a variety of NRCS programs. Projects funded by the NRCS are often neutral in terms of potential impacts to federally-listed species, with neither a positive or negative effect, but they do always have a benefit to natural resource conservation which is always positive for habitat. In some cases the NRCS works with the land manager to plan projects that will specifically benefit federally-listed species.

Activities covered under this Programmatic Biological Opinion are not restricted to any specific Farm Bill program. Farm Bill programs remain consistent in general, but are adapted to address needs depending on the status of the SWAPA resources from year to year. These Farm Bill programs are used to implement conservation practices that include results in habitat improvements, vegetation management, erosion and/or drainage control, and water quality/conservation. The term of this Programmatic Biological Opinion is for 5 years.

Implementation of the Biological Opinion

This consultation covers NRCS activities in Marin, Sonoma, Napa, and Solano Counties as described in this Biological Assessment. Planned conservation practices will include general and species specific avoidance measures, to minimize potential effects to federally listed species and designated Critical Habitat. The following process will be used when reviewing proposed projects for inclusion in this consultation:

1. The NRCS will submit a letter to the Service requesting that a project is eligible for this programmatic consultation. This verification is to ensure that indirect effects are not greater than may be anticipated and/or to ensure that minimization measures included are feasible and allow alternative measures. The measures set forth are not exhaustive, and in cases may be counterproductive.
2. This letter will include a location map, project plan map showing location and extent of NRCS conservation practices, project description, species and Critical Habitat in project area, California Natural Diversity Database (CNDDB) map, and a statement why the project is appropriate to be appended to the programmatic biological opinion. If dewatering or similar activities are planned, the letter will also include locations for potential relocation of listed species. All relocations sites must be as close to the project location as possible. Projects will be submitted in batches to the extent possible.

3. The Service will review the proposed project to determine if the proposed project is eligible to be included in this programmatic biological opinion or if the proposed project should undergo a separate section 7 consultation and provide the rational within 30 days. These projects are those that are determined to have take that would exceed the amount allowed, or that may affect species not covered under this Programmatic Biological Opinion.

4. For projects that NRCS determines are emergency actions, the Service should be notified and any take of federally endangered and threatened species will be reported to the Service within 14 days.

5. NRCS will submit an annual report to the Service by January 31st each year. This report will detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting Conservation Measures; (iii) an explanation of failure to meet such measures, if any; (iv) quantified actual ground disturbance with photographs (v) known project effects on listed species, if any; (vi) occurrences of incidental take of listed species, if any; (vii) documentation of employee environmental education; and (viii) other pertinent information.

Covered Activities

A description of conservation actions, hereafter referred to as "covered activities" in this Programmatic Biological Opinion, implemented by the NRCS that will be covered in this programmatic biological opinion follows. These descriptions are not specific to a particular Farm Bill program as many of these activities could occur under a variety of NRCS programs. NRCS supported activities covered under this programmatic biological opinion fall into four general categories: Habitat improvements, erosion and/or drainage control, water quality and conservation, and general vegetation management. All technical and design requirements used by NRCS are hosted at https://efotg.sc.egov.usda.gov/efotg_locator.aspx. These designs are included by reference for Napa, Sonoma, Solano, and Marin Counties.

Habitat Improvements

Streams/Riparian: Stream restoration activities would involve the repair, maintenance and restoration of aquatic and riparian corridor habitat. These activities are designed to provide erosion control measures, reduce sedimentation, improve water quality and restore and improve the overall quality of riparian habitat. Stream restoration activities include one or more of the following:

- Native Riparian Habitat Restoration – These activities involve planting, maintenance and establishment of native vegetation along riparian corridors to enhance and improve habitat. Invasive and nonnative plant are/will be removed in riparian areas, including but not limited to *Arundo donax,* Himalayan blackberry, English ivy and other non-native, invasive plant species. Removal of non-native plant species may require herbicide application which will occur by hand. Most riparian enhancement and restoration involves reestablishing native trees, shrubs, and herbaceous cover in the riparian zone appropriate to achieve the conservation objective. Riparian restoration and protection in rangeland or pastureland may require additional practices to reduce or prevent livestock impacts. In some cases, installation or improvements to access roads, stream crossings, fences, or animal trails/walkways will be needed to manage the riparian areas, livestock, or wildlife on the property. Implementation of these types of projects may require the use of heavy equipment (*e.g.*, excavators, backhoes, graders), where necessary.

- In-Stream Structures - These activities involve installation of suitable structures to stabilize stream channels that are undergoing damaging aggradation (filling in of) or degradation that cannot be controlled by upstream practices, and installation of suitable structures to stabilize and protect streambanks from erosion such as rock, concrete, vegetative or large woody structures. This activity may also include the removal of accumulated sand or sediment. Techniques for instream habitat improvements will follow the most current *California Department of Fish and Wildlife California Salmonid Stream Habitat Restoration Manual (CDFW Stream Manual*), and the *Stream Corridor Restoration Principles, Processes, and Practices manual.*

- Instream barrier modification – The objective of these projects is to improve fish passage and increase access to currently inaccessible or less accessible habitat. Techniques for improving fish passage will be consistent with the *CDFW Stream Manual*, and the *Stream Corridor Restoration Principles, Processes, and Practices manual.* These projects may include modifying landslides, fords, or culverts. Installation of fish passage structures, such as ladders or rock weirs, may be proposed if needed. Fish-passage structure will be designed according to known swimming and leaping capabilities of the fish species and life history stages present. Fish passage projects will be coordinated with NRCS and NOAA Fisheries fish passage specialists during field reviews and designs. Projects addressing stream-road crossings will also be implemented consistent with the *CDFW Stream Manual*, and the *Stream Corridor Restoration Principles, Processes, and Practices manual.*

- Vegetation removal/planting – These projects will establish and maintain permanent vegetative cover to provide food and shelter for desired species. This may include brush removal or planting of vegetation such as trees, shrubs, vines, grasses or legumes. In heavily wooded areas, tree and shrub removal may be required to promote a healthy stand.

- Supporting activities – These activities include the removal of concrete rubble, rip-rap, rock, wood, cars, old tires, refuse (such as household trash) and other debris from the stream or stream crossings constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles.

Wetlands: NRCS promotes protection, restoration, and enhancement of wetlands to benefit migratory birds and other wetland dependent species. NRCS targets agricultural land that is subject to flooding, saturation and inundation, and that has a high likelihood of restoring wetland functions and values. Wetland restoration activities may include one or more of the following:

- Restoration – Some wetland projects will require very minimal ground disturbance, while others may involve substantial recontouring of the land to reintroduce swales, microtopography, slopes, islands, and/or channels. Most often restoration requires small dikes and berms to impound or slow water to restore wetland hydrology. Implementation of these types of projects may require the use of heavy equipment (*e.g.*, excavators, backhoes, graders).

- Habitat structures – These projects involve creating, restoring, maintaining or enhancing areas for food, cover, and water for wildlife species which use wetland habitat for a portion of their life cycle. A variety of habitat structures such as nest boxes, rock or wood brush piles, and basking structures are added to the landscape to address any limiting habitat elements.

- Vegetation removal/planting – These projects will establish and maintain permanent vegetative cover to provide food and shelter for desired species. This may include brush removal and planting of vegetation such as trees, shrubs, grasses, and aquatic vegetation.

- Supporting structures – These water control structures as part of a water management system that conveys water, controls the direction or rate of flow, or maintains a desired water surface elevation. This could include water catchment and storage structures as well as pumping units. Creation of temporary travel-ways may be necessary for equipment and vehicle access.

Uplands: Upland habitat improvements include a number of practices that enhance or restore conditions for pollinators, wildlife, grazing operations and forestland. Upland habitat activities may include one or more of the following:

- Restoration – Upland restoration of cropland, rangeland, or forestland primarily consists of vegetation planting or removal, but may require some ground disturbance. In some cases the restoration effort may be applied to the soil via mulch or other plant residues that are not produced on site in order to enhance vegetative growth.

- Structures – A variety of habitat structures such as nest boxes, owl burrows, rock or brush piles, large wood snags, are added to the landscape in such a way that they enhance wildlife habitat or corridors.

- Vegetation – Most habitat enhancement projects include removal of invasive species and planting native vegetation to improve vegetation resilience and provide necessary habitat for targeted species. Planting is typically used to stabilize highly eroding areas, manage early plant succession to benefit desired wildlife or natural communities, provide a windbreak or pollinator hedgerow, or establishing permanent vegetation to improve soil and water resources. In some cases this will be a stripe of permanent vegetation established at the edge or around the perimeter of a field or area of herbaceous vegetation situated between cropland, grazing land, forestland, and environmentally sensitive areas.

- Supporting Structures – Trails, walkways, and access roads may be rerouted or designed to reduce human and livestock accessibility to sensitive areas, or act as fuel brakes for wildfire. Improvements may include installation of pumps, pipelines, water tanks/troughs, and wildlife friendly spring developments that help evenly distribute livestock around the area for

the least amount of impact or improvement to wildlife habitat elements such as food, water and shelter. These structures are relatively flexible with regard to location and can be placed in areas that avoid habitat of listed species.

Erosion and/or Drainage Control

The objective of erosion or drainage control projects is to enhance or restore channel stability and upland runoff to minimize flood damage, erosion, or sedimentation. These projects include revegetating banks or berms, removing obstructions from channels to facilitate floodwater conveyance, installation of structures or bioengineering to address head cutting, or in some cases where appropriate, installation of dams to retard floodwater. Aside from revegetation activities, the use of heavy equipment is likely to be involved in many of these projects. Erosion and drainage control activities may include one or more of the following:

- Structures – Includes treatment(s) using concrete, sand, gravel, and/or vegetation to stabilize and protect bed or bottom of channels, banks of streams, lakes, reservoirs, estuaries, and meadows against scour and erosion as well as improvement of stream crossings to prevent channel or bank erosion. Measures are intended influence scour and deposition patterns, working with stream power in order to influence stream planform and grade. Instream obstructions may be removed and artificial barriers created. Upland activities may require land shaping or grading or constructing terraces, basins and grassed diversions to trap sediment. Roads and trails may be modified to reduce sediment runoff or prevent erosion.

- Vegetation – Planting for erosion control is designed to manage the distribution of flows and sediment on sloping lands or sensitive areas to minimize erosion or sedimentation in downslope drainages. Some activities may involve only revegetation while other areas may require barriers or basins to address the erosion cause. On croplands activities include vegetative borders, crop rotation, and cover cropping.

Water Quality and Conservation

These projects include replacing or retrofitting irrigation systems, providing clean water for livestock and wildlife, and improving the quality of water runoff from agricultural operations. Water quality and conservation activities may include one or more of the following:

- Structures – Constructing shallow water basins designed to simulate natural wetlands as a form of water treatment or tail water recovery for recycling or treatment. Water impoundments or pits/ponds may be needed to serve as a cleaner source of livestock water or draw livestock from sensitive habitat areas (riparian, stream). Improvements to irrigation systems may include altering water control structures such as furrows, corrugations, graded and level borders and basins, contour levees, or contour ditches to facilitate proper volume, frequency, and application rate efficiently. Waste storage, separation, transfer, and treatment requires constructing earthen or concrete impoundments or pad to temporarily store manure and other agricultural bi-products before proper disposal or utilization. Modification or removal of instream water diversions may be done to improve water conservation.

- Vegetation – A strip of permanent vegetation established at the edge or around the perimeter of an agricultural area to trap pathogens, nutrients, and sediment from runoff waters. Planting cover crops in orchards, vineyards, or cropland may be done to improve soil infiltration and health and increase water conservation.

- Supporting Activities – Nutrient management plans may assist in managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendments to properly utilize manure or organic by-products as a plant nutrient source, to minimize agricultural nonpoint source pollution of surface and ground water resources, and/or to protect air quality by reducing particle and nitrogen emissions. Water impoundments may require constructing a collection apron to collect rain water to divert by gravity to an impervious storage container, or a pipeline to take water to a suitable outlet. Ponds holding agricultural waste products may require sealing or lining to prevent seepage into nearby waterways, and pumps may be installed to transfer water for the conservation need.

Vegetation Management

Vegetation management may be accomplished using mechanical means, hand clearing, managed animal grazing, or application of herbicides. Some projects may include combinations of these methods. Vegetation management is used to renovate existing stands of vegetation, reduce fuels for wildfire, improve human health and safety, control growth of undesirable species, or enhance the conditions of an area for specific wildlife or vegetative communities. This may include broadcast seeding, plug or container planting, or removal/reduction of undesirable species. Mechanical removal would use heavy equipment that can uproot, crush, pulverize, or cut the trees and brush to be removed. Hand removal would involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Vegetation downed as a result of mechanical or hand removal would be used as habitat structures whenever possible. Excess vegetation will be piled and burned on site, chipped and spread on site, or loaded and hauled from the site.

Enhancement of forest stands involves removing crooked, dead or dying, diseased and injured trees in the landscape. Healthy, full crowned, well-formed trees are generally left. Slash will be properly disposed, either by lopping and scattering, chipping, piling and burning, or by controlled burns. Some hollow trees and snags will be retained for wildlife dens or nests, unless they are a hazard to either animals or people or a severe fire hazard. Fuels reduction may involve the construction, expansion, and/or maintenance of fuel breaks or the removing of excess fuel loads in the landscape. Fuel breaks can be compacted or graded for use as fire access roads.

If chemical treatment is necessary, only registered chemicals will be used to control the growth of undesired vegetation and only chemicals approved for aquatic use will be used near aquatic environments. A registered applicator will apply all such chemicals that require an applicator's license. After treatment, some areas may be re-vegetated with locally occurring, native vegetation. Herbicidal treatment of vegetation may follow the removal of targeted exotic invasive species within specific areas (*e.g. toe, bank, overbank)* by mechanical removal, hand removal, herbivory, and/or prescribed fires. Herbicides are then used for prevention of growth and re-sprouting of undesirable vegetation (*e.g. Arundo donax, Himalayan blackberry, etc.*) once an area has been cleared of undesirable vegetation.

Minimization Measures

General Minimization Measures for All Projects

1. At least 15 days prior to the onset of any construction-related activities, NRCS will submit to the Service, for approval, the name(s) and credentials of individuals it wishes to conduct/ implement the following conservation measures. Information included in a request for

authorization should include, at a minimum: (1) relevant education; (2) relevant training on species identification, survey techniques, handling individuals of different age classes, and handling of different life stages by a permitted biologist or recognized species expert authorized for such activities by the Service; (3) a summary of field experience conducting requested activities (to include project/research information); (4) a summary of biological opinions under which they were authorized to work with the listed species and at what level (such as construction monitoring versus handling), this should also include the amount of work experience on the actual project; (5) A list of Federal Recovery Permits [10(a)1(A)] held or under which are authorized to work with the species (to include permit #, authorized activities, and name of permit holder); (6) any relevant professional references with contact information. No project construction will begin until NRCS has received written Service approval for individuals to conduct specified activities.

2. Prior to construction, an education program will be conducted for the cooperator and/or all construction employee(s) in reference to potential listed species on site. At minimum, the program will consist of a brief presentation by the Service-approved individual (see measure 1). The program will include: a description of the species and their habitat needs; any reports of occurrences in the project area; an explanation of the status of each listed species and their protection under the Act; and a list of measures being taken to reduce effects to the species during construction and implementation. Fact sheets conveying this information and color photographs of all listed species in the work area(s) will be available for distribution to the above-mentioned people and anyone else who may enter the project area. A list of education program attendees will be maintained by the NRCS client to be made available for review by the Service upon request.

3. A preconstruction survey for potential listed species on site will be performed immediately prior but not more than 7 days prior to groundbreaking activities. If at any point, construction activities cease for more than five consecutive days, an additional preconstruction survey will be conducted prior to the resumption of these actions.

4. Only Service-approved individuals will conduct surveys and move listed species. The Service-approved individuals will remain onsite during critical periods of construction such as initial groundbreaking and earth movement, and any in-stream activities. The cooperator/monitor that was educated and trained in item 2 above will remain onsite at all times and will report daily to the service-approved individual as necessary to discuss project activities. The cooperator/monitor will stop work and contact the Service approved individual immediately if listed species are being affected by project activities.

5. To prevent the accidental entrapment of listed species during construction, all excavated holes or trenches deeper than 6 inches will be covered at the end of each work day with plywood or similar materials. Foundation trenches or larger excavations that cannot easily be covered will be ramped at the end of the work day to allow trapped animals an escape method. Trenches and holes will be checked every morning prior to construction activity. In the event of a trapped animal is observed, construction will cease until the individual has been relocated.

6. All construction pipes, culverts, or similar structures that are stored in the project area for one or more overnight periods will be securely capped prior to storage or thoroughly inspected for animals if the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a listed species is present in the structure construction will cease until

the individual has been relocated to an appropriate location.

7. All trash and debris within the work area will be placed in containers with secure lids before the end of each work day in order to reduce the likelihood of predators being attracted to the site by discarded food wrappers and other rubbish that may be left on-site. Containers will be emptied as necessary to prevent trash overflow onto the site and all rubbish will be disposed of at an appropriate off-site location.

8. Grading and construction activities will be limited to April 1- November 15. Tree clearing is generally excluded from this window to allow tree removal outside of the nesting season. NRCS may authorize such activities, should the applicant demonstrate a need to conduct activities outside this period, after obtaining NRCS biologist and the Service's approval.

9. Ground disturbing activities will occur only during daylight hours.

10. NRCS projects will be designed to minimize off-site stormwater runoff that might otherwise impact surrounding aquatic habitat. When soil disturbance is necessary all appropriate minimization measures from this Biological Opinion or other permits will be incorporated into construction designs, plans, specifications, and required of contractors during construction.

11. NRCS will ensure that the spread or introduction of invasive exotic plant species will be minimized by ensuring all vehicles and equipment are cleaned prior to being brought to the site. When practicable, invasive exotic plants in the project areas will be removed.

12. No plastic mono-filament erosion control matting will be used for erosion control within the entire project site. Acceptable materials include natural fibers such as jute, coconut, twine, tackified hydroseeding compounds, or other similar materials.

13. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters. Pump intakes will be placed in perforated intake basins to allow water to be drawn into the pump while protecting aquatic organisms. Both the outside of the intake basin and the pump intake itself will be screened to ensure that aquatic organisms are not pulled into the pump. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

14. Staging areas for construction equipment will be located so that spills of oil, grease or other petroleum by-products will not be discharged into any watercourse or sensitive habitat. No refueling, storage, servicing, or maintenance of equipment will take place within 50 feet of aquatic features. All machinery will be properly maintained and cleaned to prevent spills and leaks. Any spills or leaks from the equipment will be reported and cleaned up in accordance with applicable local, state and/or Federal regulations.

15. Movement of heavy equipment to and from the proposed project site will be restricted to established roadways and designated routes in order to minimize both habitat disturbance

and soil compaction.

16. Work is not allowed within 50 feet of vernal pools to avoid take of vernal pool species unless otherwise approved by the Service.

17. The Service-approved individual will have the authority to halt any action due to noncompliance of these minimization measures. If work is stopped, the Service-approved individual will immediately notify NRCS and the Service.

18. A Service-approved individual will notify the Service within one (1) working day of the finding of any injured listed species or any unanticipated damage to its habitat associated with the proposed project. Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved individual. Notification must include the date, time, and precise location of the individual/incident clearly indicated on a U.S. Geological Survey 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site. The Service contact persons is the Coast Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6623.

Conservation Measures for California Red-Legged Frog and California Tiger Salamander

1. Restoration activities at ponds occupied by California red-legged frogs and/or California tiger salamanders will take place between August 31-November 15 (or the first rainfall of the season depositing more than 0.25 inch) when larval development of red-legged frogs and tiger salamanders is likely to be complete and ponds have less water present, unless restoration activities do not impact pond vegetation or water.

2. A Service-approved individual will survey the work site immediately prior to construction activities. If California red-legged frogs or California tiger salamander larvae, or eggs are found work will not start until the breeding season has concluded. If adults are found the Service-approved individual will determine moving adult individuals is necessary.

    a. If work is to be completed in less than a day then the individuals may be held until work is completed in buckets with water and cover. The Service-approved individual will be allowed sufficient time to move red-legged frogs or California tiger salamander from the work site before work activities begin.

    b. Bare hands will be used to capture California red-legged frogs and/or California tiger salamander. Service-approved individuals will not use soaps, oils, creams, lotions, repellents, or solvents of any sort on their hands within two hours before and during periods when they are capturing and relocating individuals. To avoid transferring disease or pathogens of handling of the amphibians, Service-approved individuals will follow the Declining Amphibian Populations Task Force's "Code of Practice."

    c. Only Service-approved individuals will capture, handle, and relocate California red-legged frogs and California tiger salamanders. Prior to the onset of any project

activities, a Service-approved individual will identify appropriate areas to receive translocated individuals. These areas will be in close proximity to the capture site but outside any area likely to be adversely impacted by project activities. The relocation area will consist of a nearby area exhibiting similar characteristics (e.g., burrows, riparian vegetation, etc.) to the area in which the individual was found. These areas will also be free of exotic predatory species (e.g., bullfrogs (*Rana catesbeiana*), crayfish (Procambarus sp.), etc.) to the best of the Service-approved individual's knowledge.

3. Areas with high concentrations of burrows within 1.2 miles of potential California tiger salamander breeding habitat will be flagged to avoid vehicle traffic over those sites and potential burrow collapse.

4. Construction dredge material or sediment removed during pond and/or stream restoration activities will not be placed where it can enter into red-legged frog or tiger salamander breeding pools nor will it be placed where it may destroy any upland burrow systems.

Conservation Measures for California Freshwater Shrimp

1. Project activities in suitable shrimp habitat will be restricted to the period between July 1 and November 15.

2. A California freshwater shrimp relocation plan will be in place prior to work in any potential habitat identifying location(s) to relocate individuals that may be encountered. This plan is to identify any logistical concerns, as well as relocation sites to reduce the amount of time individuals are held as number of mortalities.

    a. Grantees will notify NRCS will be notified at least one week in advance of the date on which work will start in the stream, so that a service-approved individual can monitor activities at the work site.

    b. A Service-approved individual will survey potential habitat for shrimp before allowing work to proceed. All overhanging vegetation, undercut banks, and tree roots will be surveyed with a butterfly net or fish net.

    c. Prior to the onset of work at a work site that may contain shrimp, the Service-approved individual will conduct a training session for all construction personnel. At a minimum the training will include a description of the shrimp and its habitat, the importance of the shrimp and its habitat, the general measures that are being implemented to conserve the shrimp as they relate to the work site, and the work site boundaries where construction may occur.

    d. Only Service-approved individuals will participate in the capture, handling, and monitoring of shrimp. NRCS will report annually on the number of capture, release and injuries/mortality and agrees to modify capture/release strategy with Service staff as needed to prevent adverse effects.

3. If in the opinion of the Service-approved individual, adverse effects to shrimp would be further minimized by moving shrimp away from the project site, the following procedure will be used:

a. A second survey will be conducted within 24 hours of any construction activity and shrimp will be relocated to the nearest suitable habitat. Shrimp will be moved while in the net, or placed in buckets containing stream water. Stress and temperature monitoring of shrimp will be performed by the Service-approved biologist. Numbers of shrimp and any mortalities or injuries will be identified and recorded. Shrimp habitat is defined as reaches in low elevation (less than 116 m) and low gradient (less than one percent) streams where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris or overhanging vegetation.

b. A Service-approved individual will be present at the work site until such time as all removal of shrimp and instruction of workers have been completed. The cooperator/monitor trained in "General Minimization Measure" #2 will be onsite during all habitat disturbances.

4. In site locations where shrimp are present, NRCS will require the cooperator to implement the measures listed below:

a. Work will be performed only in riffle, shallow run, or dry habitats, avoiding low velocity pool and run habitats occupied by shrimp, unless shrimp are relocated according to the protocol described below. "Shallow" run habitat is defined as a run with a maximum water depth, at any point, less than 12 inches, and without undercut banks or vegetation overhanging into the water.

b. Hand placement of logs or rocks will be permitted in pool or run habitat in stream reaches where shrimp are known to be present (only if the placement will not adversely affect shrimp or their habitat.)

c. Care will be taken during placement or movement of materials in the stream to prevent any damage to undercut stream banks and to minimize damage to any streamside vegetation. Streamside vegetation overhanging into pools or runs will not be removed, trimmed, or otherwise modified.

d. No log or rock weirs (including vortex rock weirs), or check dams will be constructed that would span the full width of the low flow stream channel. Vegetation will be incorporated with any structures involving rocks or logs to enhance potential habitat development for shrimp.

e. No dumping of dead trees, yard waste or brush will occur in shrimp streams, which may result in oxygen depletion of aquatic systems.

5. If a work site is temporarily dewatered by pumping, intakes will be completely screened with wire mesh no larger than 5 mm to prevent shrimp from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow with the least disturbance to the substrate.

6. A Service-approved biologist will permanently remove from within the project work site, any individuals of exotic species such as bullfrogs, centrarchid fishes, and non-native crayfish, to the maximum extent possible. The grantee will have the responsibility that such removals are done in compliance with California Department of Fish and Wildlife regulations.

7. Invasive non-native vegetation that provides shrimp habitat and is removed as a result of Program activities will be replaced with native vegetation that provides comparable habitat for the shrimp. Re-vegetated sites will be irrigated as necessary until vegetation is established. Re-vegetated sites will be monitored until shading and cover achieves 80% of pre-project shading and cover and for a minimum of 5 years.

Conservation Measures for Vernal Pool Crustaceans (Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, and Vernal Pool Tadpole Shrimp)

1. Qualified Service-approved individuals, or individuals approved by the NRCS state wetland compliance lead, will clearly delineate vernal pool habitats on plan drawings prior to construction activities. Vernal pools will be flagged; contractors and work activities will be entirely restricted from these areas.

2. Boundaries of the excavation area will be clearly marked to prevent vehicles or personnel from straying onto vernal pool habitat.

Conservation Measures for Giant Garter Snake

1. All excavation activities within giant garter snake habitat will be conducted between May 1 and October 15. Direct mortality can be decreased during this time as they exhibit an active ability to respond to environmental conditions; and thus, are expected to migrate away from the project activities. Construction (especially excavation) poses more danger to giant garter snakes during their inactive period when they occupy underground burrows or crevices. If necessary, excavation activities may extend beyond October 15 if a Service-approved biologist determines that giant garter snakes will not be adversely affected.

2. Any dewatered areas will remain dry for at least 5 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.

3. The Service-approved individual will assess whether giant garter snake habitat is present within or immediately adjacent to the project area, and will mark habitat locations as Environmentally Sensitive Areas to be avoided by all construction personnel.

4. If a giant garter snake is found within the project area while heavy equipment is in use, the Service-approved individual (or the designee) will suspend construction work until the giant garter snake has left the area. Giant garter snakes should be allowed to escape on their own, and preferably without handling.

Conservation Measures for Northern Spotted Owl

1. No conifers, hardwoods, or brush greater than 8 inches in diameter-at-breast-height (dbh) will be removed in suitable nesting and roosting habitat in areas where Northern spotted owls are known to occur. Suitable nesting and roosting habitat is characterized by high canopy closure (60-90 percent); multi-species canopies of several tree species of varying size and age and large overstory trees; large standing and fallen dead trees; high incidence of large trees with various deformities; and sufficient open space among the lower branches to allow flight under the canopy.

2. Canopy closure will be maintained at 60 percent or greater.

3. No active nest trees will be removed. No trees providing canopy to or around active nest trees will be removed.

4. Snags 20" dbh and greater in size; and down logs 20" dbh and greater in size and at least 10 feet long will be maintained at 80 to 100 percent of the average numbers found on mature and old-growth stands.

5. No treatments will occur in a nest grove (70-acre core area) of a known northern spotted owl activity center, unless surveys determine the site to be unoccupied or that the area is currently unsuitable habitat.

6. All burn piles will be located to minimize damage to potential nest trees and other residual vegetation.

7. No noise generating activities will occur in or within 500 feet of occupied or unsurveyed habitat from February 1 through July 9, unless surveys determine the site to be unoccupied or the owls to be non-nesting. Noise generating activities may occur during the late breeding season (July 10 through July 31); however, this is after the period when the majority of young owls have fledged from the nest.

8. No burning will occur within 0.25 miles (1400 feet) of unsurveyed habitat with a high probability of owl occupancy or in occupied habitat from February 1 through September 15, unless surveys determine the site to be unoccupied.

9. No understory burning may occur from February 1 - September 15 in occupied habitat unless surveys determine the site to be unoccupied upon Service approval.

10. No understory burning may occur from February 1 through July 9 in habitat with a moderate to low probability of owl occupancy and no known occurrences, unless surveys determine the site to be unoccupied upon Service approval.

11. Habitat modification in unsurveyed habitat with a high probability of occupancy will be limited to removal of understory brush and trees less than 8 inches dbh and may not occur from May 15 through July 9, and activities are limited to handpiling of downed material. This restriction is intended to avoid the period when the majority of young owls are freshly out of the nest, least mobile, and most likely to be on the ground.

Minimization Measures for Projects Occurring in Critical Habitat

During initial site assessments, the NRCS will determine if the project area is located within the Critical Habitat units designated for federally listed species. If work is performed within areas designated as Critical Habitat for any of the species named in this Programmatic Biological Opinion the following measures will be implemented to minimize adverse effects on it:

1. The NRCS will determine if any of the primary constituent elements, as defined in the Critical Habitat rule for each species, exist in the proposed project area.

2. The NRCS will not implement any practices in Critical Habitat that would cause permanent adverse impacts to the primary constituent elements (PCEs) of any Critical Habitat for listed plant species; however, the NRCS may implement practices (e.g., grade control structures, restoration and management of sensitive habitats) that have permanent positive impacts to Critical Habitat.

3. Staging areas will be confined to the smallest area possible as described above under the General Conservation Measures Section.

4. Whenever possible and feasible, project activities will include removal of non-native species from the project area.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses all of Napa, Sonoma, Solano, and Marin Counties.

Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed Federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

Status of the Species

California Red-Legged Frog

Listing Status

The California red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Critical habitat was designated for this species on April 13, 2006 (Service 2006), with revisions to the critical habitat designation published on March 17, 2010 (Service 2010). At that time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer et al. 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003); dorsolateral folds are prominent on the back. The California red-legged frog is sexually dimorphic; the females are larger than the males (Dodd 2013a, b). California red-legged frog tadpoles range from 0.6 inch to 3.1 inches in length and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Current Status and Distribution

The historical range of the California red-legged frog extended from central Mendocino County and western Tehama County south in the California Coast Range to northern Baja California, Mexico, and in the Sierra Nevada/Cascade Ranges from Shasta County south to Madera County (Jennings and Hayes 1994). The species historically occurred from sea level to elevations of about 5,200 feet in 46 counties; however, currently the taxon is extant in 238 streams or drainages within only 22 counties, representing a loss of 70 percent of its former range (Service 2002). Currently, the California red-legged frog is widespread in the San Francisco Bay nine-county area (CDFW 2017). They are still locally abundant within the California coastal counties from Mendocino County to Los Angeles County, excluding Orange and San Diego Counties (CDFW 2017; Gordon, R. and J. Bennett, pers. comm., 2017). Isolated populations persist in several Sierra Nevada foothill locales and in Riverside County (Barry and Fellers 2013; Backlin et al. 2017; CDFW 2017). Baja California represents the southernmost edge of the species' current range (Peralta-García et al. 2016).

Barry and Fellers (2013) conducted a comprehensive study to determine the current range of the California red-legged frog in the Sierra Nevada, concluding that it differs little from its historical range; however, the current Sierra Nevada populations appear to be small and tend to fluctuate. Since 1991, eleven California red-legged frog populations have been discovered or confirmed, including eight probable breeding populations (Barry and Fellers 2013; J. Mabe, pers. comm., 2017). Microsatellite and mitochondrial DNA analysis by Richmond et al. (2014) confirmed the Sierra Nevada populations of the California red-legged frog are genetically distinct from each other, as well as from other populations throughout the range of this species.

Habitat and Life History

The California red-legged frog generally breeds in still or slow-moving water associated with emergent vegetation, such as cattails, tules (hardstem bulrush), or overhanging willows (Storer 1925; Fellers 2005). Aquatic breeding habitat predominantly includes permanent water sources such as streams, marshes, and natural and manmade ponds in valley bottoms and foothills (Jennings and Hayes 1994; Bulger et al. 2003; Stebbins 2003). Since the 1850's, manmade ponds may actually supplement stream pool breeding habit and can be capable of supporting large populations of this species. Breeding sites may hold water only seasonally, but sufficient water must persist at the beginning of the breeding season and into late summer or early fall for tadpoles to successfully complete metamorphosis. Breeding habitat does not include deep lacustrine water habitat (e.g., deep lakes and reservoirs 50 acres or larger in size) (Service 2010). Aquatic breeding habitat does not need to be available every year, but it must be available at least once within the frog's lifespan for breeding to occur (Service 2010).

Non-breeding aquatic habitat consists of shallow (non-lacustrine) freshwater features not suitable as breeding habitat, such as seasonal streams, small seeps, springs, and ponds that dry too quickly to support breeding. Non-breeding aquatic and riparian habitat is essential for providing the space, food, and cover necessary to sustain the California red-legged frog. Riparian habitat consists of vegetation growing nearby, but not typically in, a body of water on which it depends, and usually extends from the bank of a pond or stream to the margins of the associated floodplain (Service 2010).

Cover and refugia are important habitat characteristic preferences for the species (Halstead and Kleeman 2017). Refugia may include vegetation, organic debris, animal burrows, boulders or rocks, industrial debris, or any other object that provides cover. Agricultural features such as watering troughs, spring boxes, abandoned sheds, or haystacks may also be utilized by the species. Incised stream channels with portions narrower and depths greater than 18 inches may also provide important summer sheltering habitat. During periods of high water flow, California red-legged frogs are rarely observed; individuals may seek refuge from high flows in pockets or small mammal burrows beneath banks stabilized by shrubby riparian growth (Jennings and Hayes 1994). Accessibility to cover habitat is essential for the survival of California red-legged frogs within a watershed and can be a factor limiting frog population numbers and survival.

The California red-legged frog typically breeds between November and April; however, breeding may occur later in the Sierra Nevada Range (Barry 2002). Females deposit their egg masses on emergent vegetation, floating on or near the surface of the water. The California red-legged frog is often a prolific breeder, laying eggs during or shortly after large rainfall events in late winter and early spring. Egg masses containing 300-4,000 eggs hatch after six to fourteen days (Storer 1925; Jennings and Hayes 1994; Fellers 2005). Historically, the California red-legged frog in the Sierra Nevada likely bred within stream pools, which tend to be small with limited forage, constraining the size and number of populations (Barry and Fellers 2013).

California red-legged frog tadpoles undergo metamorphosis three to seven months following hatching. Most males reach sexual maturity in two years, while it takes approximately three years for females (Jennings and Hayes 1985; Fellers 2005). Under favorable conditions, California red-legged frogs may live eight to ten years (Jennings et al. 1992). Of the various life stages, tadpoles likely experience the highest mortality rates; only one percent of each egg mass completes metamorphosis (Jennings et al. 1992).
The California red-legged frog has a variable diet that changes with each of its life history stages. The feeding habits of the early stages are likely similar to other ranids, whose tadpoles feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005). Hayes and Tennant (1985) found invertebrates to be the most common food items of adult California red-legged frogs collected in southern California; however, they speculated that this was opportunistic and varied based on prey availability. Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger frogs, although invertebrates were the most numerous food items. Feeding typically occurs along the shoreline and on the surface of the water; juveniles appear to forage during both daytime and nighttime, whereas adults appear to feed at night (Hayes and Tennant 1985).

California red-legged frogs do not have a distinct breeding migration (Fellers 2005), rather they may move seasonally from non-breeding pools or refugia to breeding pools. Some individuals remain at breeding sites year-round while others disperse to neighboring water features or moist upland sites when breeding is complete and/or when breeding pools dry (Service 2002; Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Studies in the several San Francisco

Bay counties showed movements are typically along riparian corridors (Fellers and Kleeman 2007; Tatarian 2008). Although, some individuals, especially on rainy nights and in more mesic areas, travel without apparent regard to topography, vegetation type, or riparian corridors, and can move directly from one site to another through normally inhospitable habitats such as heavily grazed pastures or oak-grassland savannas (Bulger et al 2003).

California red-legged frogs show high site fidelity (Tatarian and Tatarian 2008) and typically do not move significant distances from breeding sites (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). When traveling between aquatic sites, California red-legged frogs typically travel less than 0.31 miles (Fellers and Kleeman 2007; Tatarian and Tatarian 2008), although they have been documented to move more than two miles in Santa Cruz County (Bulger et al. 2003). Various studies have found that the frogs typically do not make terrestrial forays further than 200 feet from aquatic habitat (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Upland movements are typically associated with precipitation events and usually last for one to four days (Tatarian 2008).

Threats

Factors associated with declining populations of the California red-legged frog throughout its range include degradation and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, impoundments, water diversions, degraded water quality, use of pesticides, and introduced predators (Service 2002). Urbanization often leaves isolated habitat fragments and creates barriers to frog dispersal.

Non-native species pose a major threat to the recovery of California red-legged frogs. Several researchers have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Shaffer 1996). The decline of the California red-legged frog due to these non-native species has been attributed to predation, competition, and reproduction interference (Twedt 1993; Bury and Whelan 1984; Storer 1933; Emlen 1977; Kruse and Francis 1977; Jennings and Hays 1990; Jennings 1993).

Chytridiomycosis, an infectious disease caused by the chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*), has been found to adversely affect amphibians globally (Davidson et al. 2003; Lips et al. 2006). While *Bd* prevalence in wild amphibian populations in California is unknown (Fellers et al. 2011), chytrid is expected to be widespread throughout much of the California red-legged frog's range. The chytrid fungus has been documented within the California red-legged frog populations at Point Reyes National Seashore, two properties in Santa Clara County, Yosemite National Park, Hughes Pond, Sailor Flat, Big Gun Diggings, and Spivey Pond (Padgett-Flohr and Hopkins 2010; Tatarian and Tatarian 2010; Fellers et al. 2011; Barry and Fellers 2013). However, no chytrid-related mortality has been reported in these populations, suggesting that California red-legged frogs are less vulnerable to the pathogenic effects of chytrid infection than other amphibian species (Tatarian and Tatarian 2010; Barry and Fellers 2013; Fellers et al. 2017). While chytrid infection may not directly lead to mortality in California red-legged frogs, Padgett-Flohr (2008) states that this infection may reduce overall fitness and could lead to long-term effects. Therefore, it is difficult to estimate the full extent and risk of chytridiomycosis to the California red-legged frog populations.

Recovery Plan

The Recovery Plan for the California red-legged frog identifies eight recovery units (Service 2002). Based on various regional areas of the species' range, the establishments of these recovery units are essential to its survival and recovery. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, delineated core areas, designed to protect metapopulations, represent contiguous areas of moderate to high California red-legged frog densities. The management strategy identified within this Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

Central California Tiger Salamander

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander* (*Ambystoma californiense*) (Service 2017).

Sonoma California Tiger Salamander

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Sonoma Distinct Population Segment of the California Tiger Salamander* (*Ambystoma californiense*) (Service 2017).

California Freshwater Shrimp

Refer to the *California freshwater shrimp (Syncaris pacifica) 5-Year Review: Summary and Evaluation* (Service 2011) for the current Status of the Species.

Environmental Baseline

The action area in this Biological Assessment is privately or eligible federally owned agricultural property managed and/or operated by an applicant who is eligible for NRCS financial assistance in the Counties of Marin, Sonoma, Napa, and Solano, California.

Marin County: Of the four North Bay counties, Marin County is the smallest and is west and south of Sonoma County. Marin County has a peninsula shape with the San Francisco Bay on the east and the Pacific Ocean on the west. Marin County contains 520.31 square miles, approximately 332,998 acres, of land. Marin County has about 160,000 acres of land zoned "Agricultural." Of this, virtually 99.5% is used for seasonal grazing of dairy, cattle and sheep. The production value report for the 2009 Agricultural Commissioner lists 87% of the total reported value to be in dairy, livestock, hay and silage, with 6% in aquaculture, 5% in fruit and vegetable crops, and the remaining 2% in nursery crops(UC 2010). The average size of a farm in Marin is 588 acres. Permanent agricultural conservation easements are held on 41,800 acres across 61 family farms.

Marin's topography is one of rolling hills, coastal bluffs and flat interior valleys separated by hills. Most of the county's population resides on the eastern side, with a string of communities running along San Francisco Bay, from Sausalito to Novato. Eight small and primarily urbanized watersheds are on the east side of Marin County and drain southeast into Richardson and San Pablo Bays. The interior contains large areas of agricultural and open space. West Marin, through which State Route

1 runs alongside the California coast, contains many small, unincorporated communities whose economies depend on agriculture and coastal tourism.

West draining coastal watersheds from north to south are the Estero Americano, Stemple Creek, Tomales Bay, Point Reyes National Seashore (PRNS), Bolinas Lagoon, and Southern Coastal Creeks—which are primarily State and National Parkland across from the Golden Gate Bridge. In the northern part of the area, the topography is characterized by the relatively low hills of the Estero Americano, Stemple Creek, and northern Walker Creek watersheds. Moving south, the landscape becomes more rugged as Walker Creek and Lagunitas Creek (and its major tributary, Olema Creek) wind through narrow, steep sided canyons (2010 PCI).

Marin County is in the California Floristic Province, a zone of extremely high biodiversity and endemism. The Marin Chapter of the California Native Plant Society describes twelve plant communities in the province: Dunes and beaches, coastal grassland or prairie, valley grassland, vernal pool, salt marsh, freshwater marsh and fen, streambank riparian woodland, coast redwood forest, mixed ever green forest, Bishop pine/closed pine forest (in PRNS only), hard chaparral, and northern coastal scrub (2015 MCCNPS). Marin's coastal agriculture is known for its quality grasslands, due to foggy, moist conditions that keep the grasses green much of the year and make them well suited for grazing dairy, beef cattle and sheep. (2011 UCCE). Livestock production is the second largest agriculture industry in the county, with 159 beef cattle, cow/calf, and sheep grazing operations producing livestock, replacement heifers for dairies and breeding stock. There are approximately 30 dairies in Marin. NRCS projects in Marin County are predominantly located in grasslands however many ranches are located such that they contain a mosaic of various plant communities. Practices may transit through more than one type of plant community as a consequence of the spatial pattern of the distribution of grassland areas as well as in relation to access and water sources.

The hilly topography, prevalence of nonprime soils and lack of reliable water supplies do not support intensive agriculture such as row crops in much of Marin. However, some areas that have abundant alluvial soils support diverse vegetable and specialty crops. A growing number of organic operations (56) produce organic fruits, vegetables, and pasture on 18,945 acres (2011 UCCE). Ranchers are experimenting with growing cool weather wine grapes. Fifteen commercial grape growers produced 246.4 tons on 193 acres in 2009 (2011 UCCE).

Sonoma County: Sonoma County encompasses over one million acres of diverse landscape along the Pacific coastline about forty miles north of San Francisco, north and east of Marin County. The 2012 AgCensus reports Sonoma County as having 3,579 farms, totaling 589,771.00 acres, with about 15% of these farms being over 180 acres in size, and 40% being under nine acres in size. Land use in farms consists of pastureland (41.4%), woodland (25.3%), cropland (22.1%), and 'other' (11.1%). Conservation easements, agricultural and open space combined, through the Sonoma County Agricultural Preservation and Open Space District (SCAPOSD, 2015) and Sonoma Land Trust (SLT, 2015) extends across about 154,000.00 acres of Sonoma County. Other state and federal easements and lands contribute additional acres to the total acreage of lands managed for agricultural or open-space values.

The Russian River is the predominant watershed in Sonoma County collecting runoff from 921 square miles within the county and draining west into the Pacific Ocean. Other watersheds in Sonoma are: Sonoma Creek, 170 square miles, and the Petaluma River, 112 square miles, which both run south out of the county into San Pablo Bay. The Gualala River, draining 269 square miles, runs north from the upper northwest corner of Sonoma County into Mendocino County. Numerous

small tributaries run west into the Pacific Ocean out of the Coast Range foothills and 49 square miles of these drainages are grouped together in the General Plan as the "North Coast" watershed. The remaining four watersheds are: Estero Americano (50 sq. mi.), Stemple Creek (22 sq. mi.), Salmon Creek (37 sq. mi.) and South Coast (9 sq. mi.) which all drain west into the Pacific Ocean in the proximity of Tomales Bay.

Sonoma County's over 1,500.00 square miles begin at the marine environments of the coastal zone that include coastal beach dune, coastal bluff, northern coastal scrub, chaparral, coastal salt marsh, and brackish marsh habitats. The western side of the county, within the climatic influence of the Pacific Ocean, includes the redwood and mixed conifer forests of the Mendocino Highlands in the north and the coast range foothills and mountains with dairylands on rolling oak savannahs and coastal prairies in the south. In the north, the Mayacamas Range and Mendocino Highlands enclose the farming regions of Alexander and Dry Creek Valleys. In the far northeast, the remote interior of the Mayacamas Range contains the Geysers geothermal steam field. In the northwest and in the Mayacamas and Sonoma Mountains to the northeast and east, the forest mosaic includes mixed evergreen forests, oak woodlands and savanna woodland, native and non-native grasslands, grassland, and chaparral. The Santa Rosa Plain, which lies between the Sonoma Mountains on the east and low coastal hills on the west, contains the cities of Santa Rosa, Rohnert Park, and Cotati with extensive agricultural and urban development on the valley floor.

Wetlands in the county include: (1) Marine and estuarine systems, lagoons and salt and brackish water marsh of the Pacific Ocean, San Pablo and Tomales bays. (2) Riverine and lacustrine systems of major creeks and channels. (3) The palustrine system comprising freshwater marsh, riparian habitat along creeks, streams, and scattered stock ponds. (4) Vernal pools and swales of the Santa Rosa Plain and freshwater seeps and springs.

The wetlands associated with the Santa Rosa Plain are of particular significance because of the complexity of the habitat and the presence of a high number of special-status plant and animal species. The wetlands consist of perennial, intermittent, and seasonal features including: the Laguna de Santa Rosa, Mark West Creek, Santa Rosa Creek, tributary drainages, marshes, permanent ponds, vernal pools, and vernal swales.

Urban development occupies much of the valley floors through the central portion of the county along US 101 and Highways 116 and 12, with cities separated and generally surrounded by grazing lands and agricultural uses, primarily vineyards, dryland crops, and irrigated pasture.

Because of the geographic configuration and topography of the North Bay area, transportation linkages from Sonoma County to adjacent counties are limited to a few routes. The U.S. Highway 101 Freeway is the major north/south route, connecting Sonoma County to San Francisco and Marin to the south and to Mendocino on the north.

Napa County: Napa County is located between Sonoma County and Solano County, south of Lake County. Napa County's 788.2 square miles, 504,450 acres contains roughly: 79,198.65 acres of farmland, 179,584.2 acres of grazing land, 21,186.9 acres of built-up/urban lands, with the remaining acreage being classified as water/other. Of the farmland, 43,591 acres were wine grape bearing in 2014. In 2005, the top five crops by value were fruit and nuts, nursery crops, livestock, poultry and animal, and field crops. An agricultural preserve of more than 30,000 acres (121.4 km2) exists on the floor of the valley in unincorporated areas between Napa and Calistoga. The Land Trust of Napa County covers (202.3 km2) 55,000 acres 10% of Napa in conservation easements.

Ten general land cover types have been identified in Napa County: grassland, chaparral/scrub, oak woodland, riparian woodland and forest, coniferous forest, wetlands, open water, rock outcrop, agricultural cropland, and developed lands. The California Department of Fish and Wildlife (CDFW) recognize 21 sensitive biotic communities in the County, many of these communities are subtypes of the general biotic communities described above. Six communities of limited distribution, thus less amenable to disturbance, have been identified on a countywide scale: redwood forest, wet meadows, mudflats, Brewer willow scrub, ponderosa pine forest, and tanbark oak forest. Of these six communities, redwood forest is also recognized by CDFW as potentially sensitive.

Many biotic communities are also considered important to protect because of their relatively limited extent in the County and their importance to a large number of special-status plant and/or wildlife species. These communities are native grassland, riparian forest, cypress woodland, freshwater wetlands, salt marsh, serpentine grassland and chaparral, and streams, which are critical for the County's special-status plant and wildlife species. Rock outcrops are Critical Habitat features used by special-status plants and wildlife (Napa Watersheds, 2015).

Three major, regional north-south wildlife movement routes have been identified in Napa County: the Western Mountains, the Napa River, and the Blue Ridge-Berryessa Natural Area. Constraints to east-west movement, the importance of riparian corridors, and the potential for zoning buildout to constrain wildlife movement in particular parts of the County are ongoing concerns. Maintenance of wildlife movement areas is important to conserve the diversity of wildlife and plants within Napa County.

There are three major watersheds in the county, the Napa River Watershed, the Putah Creek Watershed, and the Suisun Creek Watershed. The Napa River Watershed is almost entirely within Napa County (a small portion is also in Solano County). It is defined by Mt. St. Helena to the north, the Mayacamas Mountains to the west, Howell Mountain, Atlas Peak, and Mt. George to the east, and the Napa-Sonoma Marsh to the south. The Napa River runs through the center of the watershed on the valley floor, draining numerous tributaries along a 55 mile run from the headwaters of Mt. St. Helena to the San Pablo Bay. The Napa River winds through many types of landscapes: forested mountain slopes, vineyards, urban areas, open pasture, grasslands, industrial zones, and marshes. The Napa River Watershed is home to most of the residents and developed areas in the county. It is estimated that 95% or more of the entire population of Napa County live in the Napa River Watershed.

The Putah Creek Watershed lies in four counties: Napa County, Lake County, Solano County and Yolo County. Putah Creek begins in Lake County, and empties into the Sacramento River. This watershed is bounded by Howell Mountain and Atlas Peak to the west and the Blue Ridge and Vaca Mountains to the east. The dominant feature in the watershed is Lake Berryessa, formed when Monticello Dam was built on Putah Creek in 1957. Major land uses in the watershed are recreation and rangeland. The watershed supports a unique assemblage of natural communities including serpentine chaparral, grasslands, oak savanna, oak and mixed oak/coniferous woodlands, riparian, freshwater lake, and cliff habitats.

The Suisun Creek watershed falls within Solano and Napa Counties. Separated from the Napa Valley by Mt. George in the west and bounded by the Vaca Mountains in the east, the watershed contains the upper reaches of Suisun Creek (which eventually empties into Suisun Marsh and Suisun Bay) and several of its tributaries including Wooden Valley and Gordon Valley Creeks. Farms, ranches, and vineyards are found in this watershed, along with oak woodlands and grassland habitats.

No major interstate highways traverse Napa County and this is reflected in the development patterns. However, wine grapes continue to be a major economic factor and expand into former grassland and rangeland areas when other agricultural commodities cease to be economically viable.

Solano County: Solano County covers 909.4 square miles, including 84.2 square miles of water area and 675.4 square miles of rural land area. Of these 59,591 acres are built-up or urban. There are approximately 470 full-time farms and the average farm size is 403 acres. Agriculture is diversified with over 80 different commodities including fruits, nuts, vegetables, grains, seed, nursery stock and livestock. The amount of acres in each of these crops is as follows: Field crops--305,004 acres with 175,785 acres in range and 33,410 acres in irrigated pasture; fruit and nuts crops, 18,000.00 acres; nursery, 1,250acres; seed crops, 10,420 acres; and 1,272 acres of vegetable crops. Approximately 74,000 acres of open space lands, categorized as conservation lands, open space lands, individual mitigation projects, conservation banks and mitigation banks; are located within the Solano County HCP area. The Solano Land Trust holds 22,270 of these acres of natural areas and agricultural lands in conservation easements. Urban areas occur throughout Solano County concentrated along I-80, the main transportation artery that runs northeast to southwest.

Solano County can be divided into two drainage regions: San Francisco Bay Province and Sacramento River Province. The San Francisco Bay Province encompasses the southwestern portion of the County and includes the local watersheds that drain into San Francisco Bay through Suisun Bay and San Pablo Bay. These drainages include the Napa River, American Canyon Creek, Green Valley Creek, Suisun Creek, Ledgewood Creek, Laurel Creek, McCoy Creek, Union Creek, and their tributaries. The Sacramento River Province encompasses the local watersheds in the northeast portion of Solano County that drain into the Sacramento Delta. Major drainages in this province include Alamo Creek, Ulatis Creek, Putah Creek and their tributaries.

Solano County can be divided into four general natural communities due to the pattern of its geographical and geological characteristics: (1) Valley Floor Grassland and Vernal Pool; (2) Inner Coast Range; (3) Riparian, Stream and Freshwater Marsh; and (4) Coastal Marsh. Because agriculture is a predominant land use, particularly in the northeastern quarter of the county, and provides important habitat for species such as swainson's hawk and burrowing owl, agriculture is treated as a fifth natural community in the County's HCP. Within the above natural communities, 14 vegetation and cover types were mapped for the County's HCP: (1) agriculture, (2) inner coast range grasslands, (3) valley floor grasslands, (4) vernal pool system grasslands, (5) scrub/chaparral, (6) oak savanna, (7) oak woodland, (8) riparian, (9) marsh, (10) tidal flat, (11) open water, (12) levee, (13) developed, and (14) pre-approved developed.

The northeastern quarter of Solano County contains a region that consists of well drained to poorly drained recent alluvial fans and basin deposits. This region is often referred to as Dixon Ridge and is the heart of agricultural development in the County. Soils are young, lack restrictive horizons, and are amenable to irrigated agricultural development, though drainage or levee systems have been required in certain low-lying locations. Other notable landscapes occur north of Vacaville that consist of a dense subsurface "clay pan" that restricts water penetration and creates seasonally-perched water tables. These landscapes are dominated primarily by grassland habitats and include mixes of Northern Hardpan and Northern Clay Pan Vernal Pool habitat types. Similarly, landscapes that occur primarily north and northwest of the Montezuma Hills and that encompass much of the region from northern Vacaville through the Jepson Prairie to the Potrero Hills and over into Fairfield and Suisun City have an accumulation of dissolved salts. Most of these soils have a clay pan that restricts water movement. Due to the high alkalinity and salinity of these soils and the presence of underlying clay pan, this land is poor for tillage, trees, or vines and has not been intensively

developed for agriculture. However, this region holds important economic value in its use for extensive sheep and cattle grazing; as a result, many of the vernal pool habitats remaining in this region have been preserved.

California Red-legged Frog

There are 238 known occurrences of California red-legged frogs in Marin, Sonoma, Napa, and Solano Counties (CNDDB 2018). Based on the documented presence of California red-legged frogs in the Action Area, and the biology and ecology of these species, the Service has determined that these species are likely to be present in the action area and use this area for breeding, sheltering, foraging, and dispersal.

Central California Tiger Salamander

There are 34 known occurrences of Central California tiger salamander in Solano County (CNDDB 2018). Based on the documented presence of Sonoma California tiger salamander in the Action Area, and the biology and ecology of these species, the Service has determined that these species are likely to be present in the action area and use this area for breeding, sheltering, foraging, and dispersal.

Sonoma California Tiger Salamander

The entirety of the known population of the Sonoma California tiger salamander is within Sonoma County. There are currently 81 known occurrences within the County (CNDDB 2018). Based on the documented presence of Sonoma California tiger salamander in the Action Area, and the biology and ecology of these species, the Service has determined that these species are likely to be present in the action area and use this area for breeding, sheltering, foraging, and dispersal.

California Freshwater Shrimp

The entirety of the known population of the California freshwater shrimp is within Sonoma, Marin, and Napa Counties. There are currently 20 known occurrences in streams and rivers within these counties. Based on the documented presence of California freshwater shrimp in the Action Area, and the biology and ecology of these species, the Service has determined that these species are likely to be present in the action area and use this area for breeding, sheltering, foraging, and dispersal.

Effects of the Action

The Covered Activities proposed are intended to control erosion, reduce sedimentation, restore native vegetation, restore pond habitat, and improve the quality of riparian and upland habitat; these activities are anticipated to result in net environmental benefits to listed species as well as non-listed native species and to benefit listed species and their habitat in the long-term. Improvements to riparian habitats and water quality would benefit listed and non-listed species that utilize riparian corridors for breeding, foraging, or dispersal. Upland species and aquatic species that use upland habitats may benefit from better livestock distribution achieved through spring development and control of overland runoff. However, although the actions proposed by NRCS would result in net environmental benefits to listed species as well as non-listed native species, project implementation could also result in short-term adverse effects to listed species.

Some NRCS activities will improve fish and wildlife habitat through increased stream shading, increased future recruitment of large woody debris, increased bank stability, an increase of the number and diversity of plants, an increase of invertebrate production, and improved water quality. Similar consultations with NRCS in Alameda and Contra Costa Counties in place for three years have resulted in improved standard practices, and no reportable take. It is presumable that this Programmatic Biological Opinion would similarly result in improved practices as well and very little reportable take.

California Red-Legged Frog and Central California Tiger Salamander and Sonoma California Tiger Salamander

Implementation of covered activities will restore or improve breeding habitat for California red-legged frogs and Central California tiger salamanders by: maintaining or repairing stock ponds; stabilizing stream channels; and improving riparian areas by reducing erosion and promoting establishment of native vegetation. Removal of excess sediment and removal of excess aquatic vegetation from ponds will benefit California red-legged frogs and California tiger salamanders by providing more open water habitat and increasing the length of ponding. Covered activities may also improve the condition of upland habitat for these species by promoting more evenly distributed grazing that will maintain vegetation height and structure that is favorable for allowing movement of these species through uplands.

However, individual California red-legged frogs or Central California tiger salamanders may be directly and/or indirectly affected as a result of construction and operation of covered projects. California red-legged frogs or Central California tiger salamanders could be crushed or buried by heavy equipment operating during project activities. Any adults, juveniles, or tadpoles/larvae present in ponds, streams or wetlands that are not successfully removed prior to dewatering activities may be injured or killed by heavy equipment or if they become entrained or trapped in pumps used for dewatering. Work in aquatic habitat can temporarily reduce habitat quality (i.e. increased turbidity and loss of aquatic and emergent vegetation) for the duration of work and potentially beyond the work window. Noise and human activity associated with construction could result in increased disturbance potentially causing individuals in and near construction activities to vacate the area. Displaced California red-legged frogs and California tiger salamanders could be subject to increased potential for predation, desiccation, and their ability to find required resources such as food and shelter will be reduced as they move. Following project construction, continuing maintenance at the project site, such as planting of desirable plants and control of undesirable plants through mechanical or manual removal or herbicide application may injure or kill California red-legged frogs and California tiger salamanders. We anticipate a very low number of individuals will be injured or killed in the manner described; however the risk exists as these animals are cryptic and may not be detected prior to or during earthmoving or other activities that expose them to injury.

Although capturing and holding or relocating individuals will reduce the likelihood of injury caused by these activities, capturing and handling California red-legged frogs or Central California tiger salamanders to remove them from a work area may result in injury, or mortality of individuals. Stress, injury, and mortality may occur as a result of improper handling, containment, and transport of individuals. However, improper handling, containment, or transport of individuals will be reduced or prevented by use of Service-approved individuals for conducting these activities. Other measures that will be implemented to minimize effects to California red-legged frogs and Central California tiger salamanders will include: implementing appropriate erosion control, conducting awareness training for employees, having a Service-approved individual present at work sites to prevent injury to California red-legged frogs and Central California tiger salamanders and move them to a safe

location, and screening pump intakes. Overall we expect that the species specific avoidance and minimization measures will enable NRCS to carry out project activities and minimize, but not eliminate the risk of injury and mortality to individuals.

California Freshwater Shrimp

The shrimp adjacent to project sites may be incidentally taken in the form of harm, harassment injury, or mortality as a result of temporary disturbances from project activities. With implementation of the conservation measures, only low levels of injury or mortality of shrimp are anticipated. While the identification of habitat, net capture and release that will be conducted will result in the low likelihood of injury or mortality to shrimp, it is unreasonable to assume that injury or mortality will never occur. In addition, injury to or mortality of shrimp during a dewatering rescue and relocation is more likely due to their fragile size and requirement for an aquatic environment.

Work in live streams or in floodplains could cause unusually high levels of siltation downstream. Although shrimp are usually able to survive in poor water quality conditions, this siltation could alter the quality of the habitat to the extent that use by individuals of the species is precluded. Siltation also could fill slow-moving pools, reducing the extent or quality of shrimp habitat near the project area. Implementing best management practices for erosion control and reducing the area to be disturbed to the minimum necessary should decrease the amount of sediment that is washed downstream as a result of project activities.

Many activities in this Program will benefit the shrimp. Riparian plantings and cattle exclusion fences will improve habitat quality in shrimp streams and their tributaries. Increased riparian cover will increase habitat complexity and root density on streambanks. Riparian vegetation will allow shrimp to disperse more easily and will stabilize water temperatures in the creeks. Exclusionary fencing will reduce cattle impacts to the creek such as overgrazing, streambank trampling, and soil compaction. Objectives in the shrimp's recovery plan includes protection of existing populations, removal of threats to these populations, and enhancement of habitat for native aquatic species within the shrimp's historic range.

We expect that the species specific minimization measures and specifically the relocation plans, will enable NRCS to carry out project activities and minimize, but not eliminate the risk of injury and mortality to individuals.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Private actions that may occur without consultation with or authorization by the Service and that could negatively impact listed species include disking, ground squirrel control, and agricultural planting. Disking, a common practice on agricultural lands, can result in substantial losses of upland habitat for California red-legged frogs, Central California tiger salamanders, and Sonoma California tiger salamanders. Ground squirrel control on private rangeland can reduce the number of borrows available to California red-legged frog, Central California tiger salamander, and Sonoma California tiger salamanders. Overgrazing on private lands can result in degradation and loss of riparian

vegetation, increased water temperatures, streambank and upland erosion, and decreased water quality in streams.

Conclusion

After reviewing the current status of California red-legged frog, Central California tiger salamander, Sonoma California tiger salamander and California freshwater shrimp, the environmental baseline for the action area, the effects of the proposed NRCS Conservation Practices in Napa, Sonoma, Solano, and Marin Counties, and the cumulative effects, it is the Service's biological opinion that the NRCS Conservation Practices in Napa, Sonoma, Solano, and Marin Counties, as proposed, is not likely to jeopardize the continued existence of these species. The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by NRCS so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The NRCS has a continuing duty to regulate the activity covered by this incidental take statement. If the NRCS (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the NRCS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

<u>California Red-legged Frog</u>

The Service anticipates that incidental take of the California red-legged frog will be difficult to detect because of their life history. Specifically, when California red-legged frogs are not in their breeding ponds, they may be difficult to locate due to their cryptic appearance and behavior; they may be located a distance from the breeding ponds; and the finding of an injured or dead individual is

unlikely because of their relatively small body size. Losses of these species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Therefore, the Service anticipates that all California red-legged frogs inhabiting the individual project footprints totaling no more than 25 acres will be subject to incidental take in the form of non-lethal harm and harassment. In addition, the Service anticipates that no more than three California red-legged frogs will be subject to incidental take in the form of death or injury as a result of construction-related activities within each calendar year and not to exceed fifteen for the five year term of this Programmatic Biological Opinion.

Upon implementation of the following *Reasonable and Prudent Measures*, incidental take of California red-legged frogs associated with the proposed replacement of Project in the form of harm, harassment, pursuit, capture, injury, or mortality will become exempt from the prohibitions described under section 9 of the Act for direct effects.

Central California Tiger Salamander

The Service anticipates that incidental take of the Central California tiger salamanders will be difficult to detect because of their life history. Central California tiger salamanders can be difficult to locate due to their cryptic appearance and finding a dead or injured individual is unlikely due to their relatively small size. Losses of Central California tiger salamanders may also be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Therefore the Service anticipates that all Central California tiger salamander within the individual project footprints totaling no more than 25 acres will be subject to incidental take in the form of non-lethal harm and harassment. In addition, the Service anticipates that no more than three Central California tiger salamanders will be subject to incidental take in the form of death or injury as a result of construction-related activities each calendar year and not to exceed fifteen for the five year term of this Programmatic Biological Opinion.

Upon implementation of the following *Reasonable and Prudent Measures*, incidental take of Central California tiger salamanders associated with the proposed replacement of Project in the form of harm, harassment, pursuit, capture, injury, or mortality will become exempt from the prohibitions described under section 9 of the Act for direct effects.

Sonoma California Tiger Salamander

The Service anticipates that incidental take of the Sonoma California tiger salamanders will be difficult to detect because of their life history. Sonoma California tiger salamanders can be difficult to locate due to their cryptic appearance and finding a dead or injured individual is unlikely due to their relatively small size. Losses of Sonoma California tiger salamanders may also be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Therefore the Service anticipates that all Sonoma California tiger salamander within the individual project footprints totally no more than 25 acres will be subject to incidental take in the form of non-lethal harm and harassment. In addition, the Service anticipates that no more than three Sonoma California tiger salamanders will be subject to incidental take in the form of death or injury as a result of construction-related activities each calendar year and not to exceed fifteen for the five year term of this Programmatic Biological Opinion.

Upon implementation of the following *Reasonable and Prudent Measures*, incidental take of Sonoma California tiger salamanders associated with the proposed replacement of Project in the form of harm, harassment, pursuit, capture, injury, or mortality will become exempt from the prohibitions described under section 9 of the Act for direct effects.

California Freshwater Shrimp

The Service expects that incidental take of the California freshwater will be difficult to detect or quantify. The aquatic nature, cryptic coloration, secretive habits, and small body size of the species make the finding of a dead specimen unlikely; losses may be masked by seasonal fluctuations in numbers or other causes; and the species occurs in habitat that makes them difficult to detect. Therefore the Service anticipates that all California freshwater shrimp within the occupied creeks in and adjacent to individual project footprints will be subject to incidental take in the form of non-lethal harm and harassment totaling no more than 500 lineal feet. The Service anticipates lethal take of two individuals if less than 20 individuals are captured and 5% of all individuals captured if greater than 20 California freshwater shrimp are encountered during dewatering activities as a result of this Project.

Upon implementation of the following *Reasonable and Prudent Measures*, incidental take of shrimp associated with the proposed replacement of Project in the form of harm, harassment, pursuit, capture, injury, or mortality will become exempt from the prohibitions described under section 9 of the Act for direct effects.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

All necessary and appropriate measures to avoid or minimize effects on the Species resulting from implementation of this project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the Species:

1. All conservation measures, as described in the biological assessment and restated here in the Project Description section of this biological opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the NRCS must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The NRCS shall include full implementation and adherence to the conservation measures as a condition of any permit, contract, or grant issued for the project.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or Critical Habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. If a listed species is found on a project site, the Service recommends that NRCS collaborate with the landowner to identify and implement management activities or other measures that may benefit the species and sustain populations on the property.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the Natural Resources Conservation Service's Conservation Practices in Four Bay Area Counties (Napa, Sonoma, Solano, and Marin Counties), California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;

(b) If new information reveals effects of the action that may affect listed species or Critical Habitat in a manner or to an extent not previously considered;

(c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or Critical Habitat that was not considered in the biological opinion; or

(d) If a new species is listed or Critical Habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Leif Goude, Biologist (leif_goude@fws.gov) or Ryan Olah, Coast Bay Division Chief (ryan_olah@fws.gov) at the letterhead address or telephone (916) 414-6659.

Sincerely,

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Jenna Jorgensen

From: Jenna Jorgensen
Sent: Friday, April 11, 2025 9:35 AM
To: Jenna Jorgensen
Subject: FW: Confirmation Email: Policy Waiver Request Western Pond Turtle (Matanzas REHAB)

Jenna Jorgensen
Environmental Coordinator
Jones & DeMille Engineering, Inc.
p: (435) 896-8266 | m: (435) 893-5203
Shaping the Quality of Life

From: Suarez, Carlos - FPAC-NRCS, CA <carlos.suarez2@usda.gov>
Sent: Friday, March 28, 2025 12:57 PM
To: De La Riva, Ernesto - FPAC-NRCS, CA <ernesto.delariva@usda.gov>
Cc: Colby, Liz - FPAC-NRCS, CA <liz.colby@usda.gov>
Subject: RE: PLEASE REPLY: Policy Waiver Request Western Pond Turtle

Ernesto,

As discussed yesterday, I concur with the recommendation.

Thanks,

Carlos

CARLOS SUAREZ
State Conservationist
USDA-NRCS
California

USDA U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service
430 G Street, Davis CA 95616
530-792-5980 Office

From: De La Riva, Ernesto - FPAC-NRCS, CA
Sent: Thursday, March 27, 2025 10:58 AM
To: Suarez, Carlos - FPAC-NRCS, CA <carlos.suarez2@usda.gov>
Cc: Dubay, RaeAnn - FPAC-NRCS, CA <raeann.dubay@usda.gov>; Gustafson, Jon - FPAC-NRCS, CA <jon.gustafson@usda.gov>; Colby, Liz - FPAC-NRCS, CA <liz.colby@usda.gov>
Subject: PLEASE RELY: Policy Waiver Request Western Pond Turtle
Importance: High

Carlos,

This email serves as confirmation for the ECS Team that we waving the NRCS policy to conference on a potentially listed species, such as the Western Pond Turtle. We have 3 active planning projects that are either completed or very close to being complete soon.

Per your guidance we will only conference with the Services if a species gets officially listed. Let me know if you want to speak to me and Jon further on this issue.

Ernesto A. De La Riva, P.E.
State Conservation Engineer
NRCS California | State Office
U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service
430 G St. #4164 Davis, CA 95616-4164
Office Number *(530) 792-5600*
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Appendix D.9. Air Quality Analysis Results

Matanzas Creek Dam Rehab - Alt 1 Custom Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Matanzas Creek Dam Rehab - Alt 1
Construction Start Date	5/4/2029
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.20
Precipitation (days)	15.6
Location	Matanzas Creek Reservoir, California 95404, USA
County	Sonoma-San Francisco
City	Unincorporated
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	977
EDFZ	2
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
City Park	48.2	Acre	48.2	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Unmit.	9.23	6.94	72.4	0.27	2.21	12.2	2.05	4.16
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Unmit.	6.12	4.40	54.2	0.21	1.50	8.73	1.40	3.15
Average Daily (Max)	—	—	—	—	—	—	—	—
Unmit.	2.74	2.03	22.3	0.08	0.66	3.67	0.62	1.28
Annual (Max)	—	—	—	—	—	—	—	—
Unmit.	0.50	0.37	4.07	0.02	0.12	0.67	0.11	0.23
Exceeds (Daily Max)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	54.0	—	82.0	—	54.0	—
Unmit.	No	No	Yes	—	No	—	No	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	54.0	—	82.0	—	54.0	—
Unmit.	No	No	No	—	No	—	No	—
Exceeds (Annual)	—	—	—	—	—	—	—	—
Threshold	100	100	100	100	—	100	—	100
Unmit.	No	No	No	No	—	No	—	No

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Daily - Summer (Max)	—	—	—	—	—	—	—	—
2029	9.23	6.94	72.4	0.27	2.21	12.2	2.05	4.16
2030	6.09	4.58	47.9	0.20	1.39	7.60	1.30	2.80
Daily - Winter (Max)	—	—	—	—	—	—	—	—
2029	6.12	4.40	54.2	0.21	1.50	8.73	1.40	3.15
2030	5.77	4.20	51.3	0.20	1.42	8.67	1.32	3.08
Average Daily	—	—	—	—	—	—	—	—
2029	2.74	2.03	22.3	0.08	0.66	3.67	0.62	1.28
2030	2.26	1.77	17.0	0.07	0.56	2.63	0.52	0.97
Annual	—	—	—	—	—	—	—	—
2029	0.50	0.37	4.07	0.02	0.12	0.67	0.11	0.23
2030	0.41	0.32	3.10	0.01	0.10	0.48	0.09	0.18

3. Construction Emissions Details

3.1. Mobilization (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.17	0.15	0.13	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.18	< 0.005	< 0.005	0.04	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.3. Excavation (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	4.60	3.87	29.9	0.10	1.27	1.27	1.17	1.17
Dust From Material Movement	—	—	—	—	—	3.35	—	0.36
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.95	0.79	6.15	0.02	0.26	0.26	0.24	0.24
Dust From Material Movement	—	—	—	—	—	0.69	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	0.15	1.12	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.13	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.27	0.26	0.16	0.00	0.00	0.63	0.00	0.15
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.50	0.41	25.5	0.13	0.26	5.54	0.26	1.74
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.00	0.00	0.13	0.00	0.03
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.31	0.08	5.42	0.03	0.05	1.13	0.05	0.35

Annual	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	0.02	0.99	0.01	0.01	0.21	0.01	0.06

3.5. Excavation - Aux (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.73	2.27	16.7	0.04	0.68	0.68	0.63	0.63
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.25	1.87	< 0.005	0.08	0.08	0.07	0.07
Dust From Material Movement	—	—	—	—	—	0.05	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.34	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Stripping (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.68	2.23	16.4	0.04	0.67	0.67	0.62	0.62
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.68	2.23	16.4	0.04	0.67	0.67	0.62	0.62

Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.18	1.30	< 0.005	0.05	0.05	0.05	0.05
Dust From Material Movement	—	—	—	—	—	0.03	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.24	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.12	0.11	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Topsoil (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	3.97	3.33	24.8	0.09	1.07	1.07	0.99	0.99
Dust From Material Movement	—	—	—	—	—	2.92	—	0.32
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	0.19	1.43	0.01	0.06	0.06	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.17	—	0.02
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.26	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.03	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Worker	0.13	0.11	0.10	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Reseeding (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.20	0.01	0.06	0.06	0.05	0.05
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.05	0.00	0.00	0.17	0.00	0.04
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Select Backfill (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.32	1.95	14.5	0.05	0.57	0.57	0.53	0.53

Dust From Material Movement	—	—	—	—	—	0.44	—	0.05
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	0.23	1.71	0.01	0.07	0.07	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.05	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.31	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.21	0.19	0.13	0.00	0.00	0.51	0.00	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.81	0.24	14.5	0.08	0.15	3.27	0.15	1.03
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.00	0.00	0.06	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.09	0.03	1.76	0.01	0.02	0.38	0.02	0.12
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.32	< 0.005	< 0.005	0.07	< 0.005	0.02

3.15. Select Fill Stability Berms (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.00	1.68	14.2	0.04	0.60	0.60	0.55	0.55
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	0.19	1.58	< 0.005	0.07	0.07	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.08	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.29	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	0.00	0.00	0.56	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.10	0.29	19.9	0.10	0.19	4.10	0.19	1.29

Average Daily	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.00	0.00	0.06	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.12	0.03	2.18	0.01	0.02	0.45	0.02	0.14
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.40	< 0.005	< 0.005	0.08	< 0.005	0.03

3.17. Select Fill Stability Berms (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.94	1.63	13.4	0.04	0.57	0.57	0.53	0.53
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.47	< 0.005	0.02	0.02	0.02	0.02
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.09	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.23	0.20	0.17	0.00	0.00	0.56	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.00	0.29	19.1	0.10	0.19	4.10	0.19	1.29
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	0.01	0.66	< 0.005	0.01	0.14	0.01	0.05
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.12	< 0.005	< 0.005	0.03	< 0.005	0.01

3.19. Gravel Drain Extension (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.05	1.72	14.0	0.04	0.62	0.62	0.57	0.57
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.05	1.72	14.0	0.04	0.62	0.62	0.57	0.57
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.40	0.34	2.76	0.01	0.12	0.12	0.11	0.11
Dust From Material Movement	—	—	—	—	—	0.12	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.50	< 0.005	0.02	0.02	0.02	0.02
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.17	0.17	0.10	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.24	0.06	4.03	0.02	0.04	0.87	0.04	0.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.17	0.15	0.13	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.23	0.06	4.23	0.02	0.04	0.87	0.04	0.27
Average Daily	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.00	0.00	0.08	0.00	0.02
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.05	0.01	0.82	< 0.005	0.01	0.17	0.01	0.05
Annual	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.15	< 0.005	< 0.005	0.03	< 0.005	0.01

3.21. Gravel Drain Extension (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.97	1.66	13.2	0.04	0.57	0.57	0.53	0.53
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.97	1.66	13.2	0.04	0.57	0.57	0.53	0.53
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	1.19	1.00	7.98	0.03	0.35	0.35	0.32	0.32
Dust From Material Movement	—	—	—	—	—	0.38	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—

Off-Road Equipment	0.22	0.18	1.46	< 0.005	0.06	0.06	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.07	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.16	0.15	0.10	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.22	0.06	3.86	0.02	0.04	0.87	0.04	0.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.16	0.14	0.12	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.21	0.06	4.06	0.02	0.04	0.87	0.04	0.27
Average Daily	—	—	—	—	—	—	—	—
Worker	0.09	0.09	0.07	0.00	0.00	0.24	0.00	0.06
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.13	0.04	2.41	0.01	0.02	0.52	0.02	0.16
Annual	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.00	0.00	0.04	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.44	< 0.005	< 0.005	0.10	< 0.005	0.03

3.23. Concrete - Cutoff Wall (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.06	< 0.005	0.04	0.04	0.04	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.18	< 0.005	< 0.005	0.04	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.25. Concrete - PS Conduit Extension (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	0.21	1.44	< 0.005	0.05	0.05	0.05	0.05
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.08	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.09	< 0.005	< 0.005	0.02	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.27. Principal Spillway Intake Structure (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.28	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.28	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.01	< 0.005	0.25	< 0.005	< 0.005	0.06	< 0.005	0.02
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.26	< 0.005	< 0.005	0.06	< 0.005	0.02
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.29. Principal Spillway Stilling Basin (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.37	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.09	< 0.005	< 0.005	0.02	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.31. Concrete - Aux Spillway (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.34	< 0.005	< 0.005	0.08	< 0.005	0.02
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.00	0.00	0.05	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.08	< 0.005	< 0.005	0.02	< 0.005	0.01
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.33. Concrete - Stilling Basin (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.09	0.73	< 0.005	0.03	0.03	0.03	0.03
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.35. Concrete - Vertical Work, Weir (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	0.22	1.13	0.01	0.04	0.04	0.04	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	0.22	1.13	0.01	0.04	0.04	0.04	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.09	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.37. Concrete - Slab, Weir (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.37	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Mobilization	Site Preparation	2/1/2029	3/6/2029	5.00	24.0	Mobilization
Excavation	Site Preparation	4/15/2029	7/27/2029	5.00	75.0	Sediment
Excavation - Aux	Site Preparation	7/27/2029	9/22/2029	5.00	41.0	Auxillary Spillway
Stripping	Site Preparation	3/6/2029	4/15/2029	5.00	29.0	Overexcavation
Topsoil	Site Preparation	11/17/2030	12/16/2030	5.00	21.0	Topsoil
Reseeding	Site Preparation	12/16/2030	12/25/2030	5.00	8.00	Seeding
Select Backfill	Grading	4/24/2030	6/22/2030	5.00	43.0	Select Backfill
Select Fill Stability Berms	Grading	11/5/2029	1/18/2030	5.00	55.0	Stability Berms
Gravel Drain Extension	Grading	9/22/2029	11/5/2030	5.00	292	Gravel Drain Install

Concrete - Cutoff Wall	Building Construction	1/18/2030	2/12/2030	5.00	18.0	Cutoff Wall
Concrete - PS Conduit Extension	Building Construction	10/6/2029	11/5/2029	5.00	21.0	PS Conduit Ext
Principal Spillway Intake Structure	Building Construction	9/14/2030	10/17/2030	5.00	24.0	Principal Spillway Intake Structure
Principal Spillway Stilling Basin	Building Construction	10/17/2030	11/17/2030	5.00	22.0	Principal Spillway Stilling Basin
Concrete - Aux Spillway	Building Construction	4/24/2030	8/21/2030	5.00	86.0	Auxiliary Spillway Armoring
Concrete - Stilling Basin	Building Construction	8/21/2030	9/14/2030	5.00	18.0	Stilling Basin
Concrete - Vertical Work, Weir	Building Construction	3/14/2030	4/24/2030	5.00	30.0	Vertical Work, Weir
Concrete - Slab, Weir	Building Construction	2/12/2030	3/14/2030	5.00	23.0	Slab, Weir

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Excavation	Scrapers	Diesel	Average	6.00	8.50	367	0.40
Excavation	Crawler Tractors	Diesel	Average	2.00	8.50	84.0	0.37
Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	9.00	84.0	0.37
Excavation	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Excavation	Graders	Diesel	Average	1.00	9.00	148	0.41
Excavation - Aux	Excavators	Diesel	Average	1.00	8.00	367	0.40
Excavation - Aux	Dumpers/Tenders	Diesel	Average	4.00	8.25	84.0	0.37
Excavation - Aux	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Excavation - Aux	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Excavation - Aux	Graders	Diesel	Average	1.00	8.00	148	0.41
Excavation - Aux	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37

Stripping	Excavators	Diesel	Average	1.00	8.00	367	0.40
Stripping	Dumpers/Tenders	Diesel	Average	4.00	8.00	84.0	0.37
Stripping	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Stripping	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Stripping	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Stripping	Graders	Diesel	Average	1.00	8.00	148	0.41
Topsoil	Scrapers	Diesel	Average	6.00	7.50	367	0.40
Topsoil	Crawler Tractors	Diesel	Average	3.00	5.00	84.0	0.37
Topsoil	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Topsoil	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Topsoil	Graders	Diesel	Average	1.00	8.00	148	0.41
Reseeding	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.50	84.0	0.37
Reseeding	Off-Highway Trucks	Diesel	Average	1.00	1.00	376	0.38
Select Backfill	Crawler Tractors	Diesel	Average	1.00	8.00	36.0	0.38
Select Backfill	Off-Highway Trucks	Diesel	Average	1.00	2.00	148	0.41
Select Backfill	Graders	Diesel	Average	1.00	8.00	367	0.40
Select Backfill	Rollers	Diesel	Average	2.00	8.50	423	0.48
Select Fill Stability Berms	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Select Fill Stability Berms	Crawler Tractors	Diesel	Average	2.00	8.50	148	0.41
Select Fill Stability Berms	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.40
Select Fill Stability Berms	Graders	Diesel	Average	1.00	8.00	423	0.48
Select Fill Stability Berms	Rollers	Diesel	Average	2.00	8.50	84.0	0.37
Gravel Drain Extension	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

Gravel Drain Extension	Crawler Tractors	Diesel	Average	2.00	8.00	148	0.41
Gravel Drain Extension	Rollers	Diesel	Average	2.00	8.00	367	0.40
Gravel Drain Extension	Off-Highway Trucks	Diesel	Average	1.00	2.00	423	0.48
Gravel Drain Extension	Graders	Diesel	Average	1.00	8.00	84.0	0.37
Concrete - Cutoff Wall	Off-Highway Trucks	Diesel	Average	1.00	1.00	82.0	0.20
Concrete - Cutoff Wall	Excavators	Diesel	Average	1.00	1.00	36.0	0.38
Concrete - Cutoff Wall	Dumpers/Tenders	Diesel	Average	3.00	5.00	16.0	0.38
Concrete - PS Conduit Extension	Excavators	Diesel	Average	1.00	1.00	367	0.29
Concrete - PS Conduit Extension	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Concrete - PS Conduit Extension	Rollers	Diesel	Average	2.00	5.50	36.0	0.38
Principal Spillway Intake Structure	Excavators	Diesel	Average	1.00	1.00	367	0.29
Principal Spillway Intake Structure	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Principal Spillway Stilling Basin	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.29
Concrete - Aux Spillway	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Concrete - Stilling Basin	Off-Highway Trucks	Diesel	Average	1.00	1.00	367	0.29
Concrete - Stilling Basin	Rollers	Diesel	Average	1.00	7.00	82.0	0.20
Concrete - Vertical Work, Weir	Excavators	Diesel	Average	1.00	8.00	367	0.29
Concrete - Vertical Work, Weir	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Concrete - Slab, Weir	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.29

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Mobilization	—	—	—	—
Mobilization	Worker	48.0	11.7	LDA,LDT1,LDT2
Mobilization	Vendor	—	8.40	HHDT,MHDT
Mobilization	Hauling	2.00	20.0	HHDT
Mobilization	Onsite truck	—	—	HHDT
Excavation	—	—	—	—
Excavation	Worker	76.0	11.7	LDA,LDT1,LDT2
Excavation	Vendor	—	8.40	HHDT,MHDT
Excavation	Hauling	292	20.0	HHDT
Excavation	Onsite truck	—	—	HHDT
Excavation - Aux	—	—	—	—
Excavation - Aux	Worker	37.0	11.7	LDA,LDT1,LDT2
Excavation - Aux	Vendor	—	8.40	HHDT,MHDT
Excavation - Aux	Hauling	0.00	20.0	HHDT
Excavation - Aux	Onsite truck	—	—	HHDT
Stripping	—	—	—	—
Stripping	Worker	38.0	11.7	LDA,LDT1,LDT2
Stripping	Vendor	—	8.40	HHDT,MHDT
Stripping	Hauling	0.00	20.0	HHDT
Stripping	Onsite truck	—	—	HHDT
Topsoil	—	—	—	—
Topsoil	Worker	38.0	11.7	LDA,LDT1,LDT2
Topsoil	Vendor	—	8.40	HHDT,MHDT
Topsoil	Hauling	0.00	20.0	HHDT

Topsoil	Onsite truck	—	—	HHDT
Reseeding	—	—	—	—
Reseeding	Worker	20.0	11.7	LDA,LDT1,LDT2
Reseeding	Vendor	—	8.40	HHDT,MHDT
Reseeding	Hauling	0.00	20.0	HHDT
Reseeding	Onsite truck	—	—	HHDT
Select Backfill	—	—	—	—
Select Backfill	Worker	62.0	11.7	LDA,LDT1,LDT2
Select Backfill	Vendor	—	8.40	HHDT,MHDT
Select Backfill	Hauling	172	20.0	HHDT
Select Backfill	Onsite truck	—	—	HHDT
Select Fill Stability Berms	—	—	—	—
Select Fill Stability Berms	Worker	68.0	11.7	LDA,LDT1,LDT2
Select Fill Stability Berms	Vendor	—	8.40	HHDT,MHDT
Select Fill Stability Berms	Hauling	216	20.0	HHDT
Select Fill Stability Berms	Onsite truck	—	—	HHDT
Gravel Drain Extension	—	—	—	—
Gravel Drain Extension	Worker	48.0	11.7	LDA,LDT1,LDT2
Gravel Drain Extension	Vendor	—	8.40	HHDT,MHDT
Gravel Drain Extension	Hauling	46.0	20.0	HHDT
Gravel Drain Extension	Onsite truck	—	—	HHDT
Concrete - Cutoff Wall	—	—	—	—
Concrete - Cutoff Wall	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - Cutoff Wall	Vendor	0.00	8.40	HHDT,MHDT
Concrete - Cutoff Wall	Hauling	2.00	20.0	HHDT
Concrete - Cutoff Wall	Onsite truck	—	—	HHDT
Concrete - PS Conduit Extension	—	—	—	—
Concrete - PS Conduit Extension	Worker	26.0	11.7	LDA,LDT1,LDT2

Concrete - PS Conduit Extension	Vendor	0.00	8.40	HHDT,MHDT
Concrete - PS Conduit Extension	Hauling	1.00	20.0	HHDT
Concrete - PS Conduit Extension	Onsite truck	—	—	HHDT
Principal Spillway Intake Structure	—	—	—	—
Principal Spillway Intake Structure	Worker	26.0	11.7	LDA,LDT1,LDT2
Principal Spillway Intake Structure	Vendor	0.00	8.40	HHDT,MHDT
Principal Spillway Intake Structure	Hauling	3.00	20.0	HHDT
Principal Spillway Intake Structure	Onsite truck	—	—	HHDT
Principal Spillway Stilling Basin	—	—	—	—
Principal Spillway Stilling Basin	Worker	26.0	11.7	LDA,LDT1,LDT2
Principal Spillway Stilling Basin	Vendor	0.00	8.40	HHDT,MHDT
Principal Spillway Stilling Basin	Hauling	1.00	20.0	HHDT
Principal Spillway Stilling Basin	Onsite truck	—	—	HHDT
Concrete - Aux Spillway	—	—	—	—
Concrete - Aux Spillway	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - Aux Spillway	Vendor	0.00	8.40	HHDT,MHDT
Concrete - Aux Spillway	Hauling	4.00	20.0	HHDT
Concrete - Aux Spillway	Onsite truck	—	—	HHDT
Concrete - Stilling Basin	—	—	—	—
Concrete - Stilling Basin	Worker	0.00	11.7	LDA,LDT1,LDT2
Concrete - Stilling Basin	Vendor	0.00	8.40	HHDT,MHDT
Concrete - Stilling Basin	Hauling	0.00	20.0	HHDT
Concrete - Stilling Basin	Onsite truck	—	—	HHDT
Concrete - Vertical Work, Weir	—	—	—	—
Concrete - Vertical Work, Weir	Worker	0.00	11.7	LDA,LDT1,LDT2
Concrete - Vertical Work, Weir	Vendor	0.00	8.40	HHDT,MHDT
Concrete - Vertical Work, Weir	Hauling	0.00	20.0	HHDT
Concrete - Vertical Work, Weir	Onsite truck	—	—	HHDT

Concrete - Slab, Weir	—	—	—	—
Concrete - Slab, Weir	Worker	0.00	11.7	LDA,LDT1,LDT2
Concrete - Slab, Weir	Vendor	0.00	8.40	HHDT,MHDT
Concrete - Slab, Weir	Hauling	0.00	20.0	HHDT
Concrete - Slab, Weir	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Mobilization	0.00	—	0.00	0.00	—
Excavation	—	175,000	742	0.00	—
Excavation - Aux	—	—	41.0	0.00	—
Stripping	0.00	—	23.0	0.00	—
Topsoil	—	—	148	0.00	—
Reseeding	—	—	0.00	0.00	—
Select Backfill	59,334	—	46.0	0.00	—
Select Fill Stability Berms	95,000	—	114	0.00	—
Gravel Drain Extension	16,491	—	42.0	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
City Park	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2029	0.00	204	0.03	< 0.005
2030	0.00	204	0.03	< 0.005

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Projected schedule
Construction: Dust From Material Movement	Excavation includes substantial material movement.
Construction: Off-Road Equipment	Based on construction estimate for machines and equipment
Construction: Trips and VMT	Based on concrete and gravel installed during relevant phases

Matanzas Creek Dam Rehab - Alt 2 Custom Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Matanzas Creek Dam Rehab - Alt 2
Construction Start Date	5/4/2029
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.20
Precipitation (days)	15.6
Location	Matanzas Creek Reservoir, California 95404, USA
County	Sonoma-San Francisco
City	Unincorporated
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	977
EDFZ	2
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
City Park	48.2	Acre	48.2	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Unmit.	9.30	6.98	73.0	0.27	2.22	12.3	2.06	4.19
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Unmit.	8.07	5.52	76.0	0.31	1.92	13.3	1.80	4.59
Average Daily (Max)	—	—	—	—	—	—	—	—
Unmit.	2.51	1.88	19.8	0.08	0.60	3.32	0.56	1.15
Annual (Max)	—	—	—	—	—	—	—	—
Unmit.	0.46	0.34	3.62	0.01	0.11	0.61	0.10	0.21
Exceeds (Daily Max)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	54.0	—	82.0	—	54.0	—
Unmit.	No	No	Yes	—	No	—	No	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	54.0	—	82.0	—	54.0	—
Unmit.	No	No	No	—	No	—	No	—
Exceeds (Annual)	—	—	—	—	—	—	—	—
Threshold	100	100	100	100	—	100	—	100
Unmit.	No	No	No	No	—	No	—	No

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Daily - Summer (Max)	—	—	—	—	—	—	—	—
2029	9.30	6.98	73.0	0.27	2.22	12.3	2.06	4.19
2030	8.39	6.46	61.6	0.25	2.00	11.7	1.86	3.85
Daily - Winter (Max)	—	—	—	—	—	—	—	—
2029	8.07	5.52	76.0	0.31	1.92	13.3	1.80	4.59
2030	5.20	3.71	46.5	0.19	1.24	8.63	1.16	2.96
Average Daily	—	—	—	—	—	—	—	—
2029	2.51	1.88	19.8	0.08	0.60	3.32	0.56	1.15
2030	2.24	1.69	17.0	0.07	0.53	3.08	0.49	1.07
Annual	—	—	—	—	—	—	—	—
2029	0.46	0.34	3.62	0.01	0.11	0.61	0.10	0.21
2030	0.41	0.31	3.10	0.01	0.10	0.56	0.09	0.19

3. Construction Emissions Details

3.1. Mobilization (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.17	0.15	0.13	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.18	< 0.005	< 0.005	0.04	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.3. Excavation (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	4.60	3.87	29.9	0.10	1.27	1.27	1.17	1.17
Dust From Material Movement	—	—	—	—	—	3.35	—	0.36
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.93	0.78	6.07	0.02	0.26	0.26	0.24	0.24
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	0.14	1.11	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.12	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.27	0.26	0.16	0.00	0.00	0.63	0.00	0.15
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.52	0.42	25.9	0.13	0.26	5.61	0.26	1.76
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.00	0.00	0.13	0.00	0.03
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.31	0.08	5.42	0.03	0.05	1.13	0.05	0.35

Annual	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	0.02	0.99	0.01	0.01	0.21	0.01	0.06

3.5. Excavation - Aux (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.77	2.31	17.0	0.04	0.69	0.69	0.64	0.64
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.77	2.31	17.0	0.04	0.69	0.69	0.64	0.64
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	0.40	2.98	0.01	0.12	0.12	0.11	0.11
Dust From Material Movement	—	—	—	—	—	0.07	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.07	0.54	< 0.005	0.02	0.02	0.02	0.02

Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.11	0.10	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.00	0.00	0.05	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Stripping (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—

Off-Road Equipment	2.58	2.15	15.8	0.04	0.65	0.65	0.60	0.60
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.58	2.15	15.8	0.04	0.65	0.65	0.60	0.60
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.14	0.99	< 0.005	0.04	0.04	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.03	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.18	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.12	0.11	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Topsoil (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	3.97	3.33	24.8	0.09	1.07	1.07	0.99	0.99
Dust From Material Movement	—	—	—	—	—	2.92	—	0.32
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	0.19	1.43	0.01	0.06	0.06	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.17	—	0.02
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.04	0.26	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.03	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.12	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Reseeding (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.20	0.01	0.06	0.06	0.05	0.05

Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.20	0.01	0.06	0.06	0.05	0.05
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.04	0.00	0.00	0.17	0.00	0.04
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.05	0.00	0.00	0.17	0.00	0.04
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Select Backfill (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.24	1.88	14.0	0.05	0.55	0.55	0.51	0.51
Dust From Material Movement	—	—	—	—	—	0.44	—	0.05
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	0.17	1.22	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.04	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.22	< 0.005	0.01	0.01	0.01	0.01

Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.21	0.19	0.13	0.00	0.00	0.51	0.00	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.79	0.24	14.0	0.07	0.15	3.18	0.15	1.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.00	0.00	0.04	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.07	0.02	1.27	0.01	0.01	0.28	0.01	0.09
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.23	< 0.005	< 0.005	0.05	< 0.005	0.02

3.15. General Backfill (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.22	1.02	7.17	0.02	0.30	0.30	0.27	0.27
Dust From Material Movement	—	—	—	—	—	0.34	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.26	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.27	0.24	0.17	0.00	0.00	0.64	0.00	0.15
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.95	0.28	16.9	0.09	0.18	3.83	0.18	1.20
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	0.01	0.62	< 0.005	0.01	0.14	0.01	0.04
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.11	< 0.005	< 0.005	0.02	< 0.005	0.01

3.17. Select Fill Stability Berms (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.00	1.68	14.2	0.04	0.60	0.60	0.55	0.55
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.44	< 0.005	0.02	0.02	0.02	0.02
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.08	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	0.00	0.00	0.56	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.14	0.30	20.6	0.10	0.20	4.25	0.20	1.33
Average Daily	—	—	—	—	—	—	—	—

Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	0.01	0.63	< 0.005	0.01	0.13	0.01	0.04
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.12	< 0.005	< 0.005	0.02	< 0.005	0.01

3.19. Select Fill Stability Berms (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.94	1.63	13.4	0.04	0.57	0.57	0.53	0.53
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	0.19	1.52	< 0.005	0.07	0.07	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.08	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.28	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.23	0.20	0.17	0.00	0.00	0.56	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.04	0.30	19.8	0.10	0.20	4.25	0.20	1.33
Average Daily	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.00	0.00	0.06	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.12	0.04	2.20	0.01	0.02	0.48	0.02	0.15
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.40	< 0.005	< 0.005	0.09	< 0.005	0.03

3.21. Select Fill Dam Raise (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.65	1.39	11.8	0.03	0.50	0.50	0.46	0.46
Dust From Material Movement	—	—	—	—	—	0.57	—	0.06
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.49	< 0.005	0.02	0.02	0.02	0.02
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.09	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	0.00	0.00	0.56	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.87	0.23	15.7	0.08	0.15	3.24	0.15	1.02
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	0.01	0.64	< 0.005	0.01	0.13	0.01	0.04
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.12	< 0.005	< 0.005	0.02	< 0.005	0.01

3.23. Gravel Drain Extension (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.29	8.90	0.03	0.44	0.44	0.40	0.40
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.20	1.38	< 0.005	0.07	0.07	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.10	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.25	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.17	0.15	0.13	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.23	0.06	4.23	0.02	0.04	0.87	0.04	0.27
Average Daily	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.00	0.00	0.06	0.00	0.01

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	0.01	0.64	< 0.005	0.01	0.13	0.01	0.04
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.12	< 0.005	< 0.005	0.02	< 0.005	0.01

3.25. Gravel Drain Extension (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.48	1.25	8.43	0.03	0.41	0.41	0.38	0.38
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.48	1.25	8.43	0.03	0.41	0.41	0.38	0.38
Dust From Material Movement	—	—	—	—	—	0.62	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.96	0.81	5.44	0.02	0.27	0.27	0.24	0.24
Dust From Material Movement	—	—	—	—	—	0.40	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—

Off-Road Equipment	0.17	0.15	0.99	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.07	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.16	0.15	0.10	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.22	0.06	3.86	0.02	0.04	0.87	0.04	0.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.16	0.14	0.12	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.21	0.06	4.06	0.02	0.04	0.87	0.04	0.27
Average Daily	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.08	0.00	0.00	0.25	0.00	0.06
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.14	0.04	2.58	0.01	0.03	0.56	0.03	0.18
Annual	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.00	0.00	0.05	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	0.01	0.47	< 0.005	< 0.005	0.10	< 0.005	0.03

3.27. Concrete - Cutoff Wall (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.32	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.32	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.17	< 0.005	< 0.005	0.04	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.18	< 0.005	< 0.005	0.04	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.29. Concrete - PS Conduit Extension (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.05	0.29	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.05	0.29	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.09	0.06	0.00	0.00	0.21	0.00	0.05

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.09	< 0.005	< 0.005	0.02	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.09	< 0.005	< 0.005	0.02	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.31. Principal Spillway Intake Structure (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.28	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.25	< 0.005	< 0.005	0.06	< 0.005	0.02
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.33. Principal Spillway Stilling Basin (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.37	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.08	< 0.005	< 0.005	0.02	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.35. Concrete - RCC on Crest (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	0.41	3.03	0.01	0.12	0.12	0.11	0.11
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.17	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.34	< 0.005	< 0.005	0.08	< 0.005	0.02
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Mobilization	Site Preparation	2/1/2029	3/6/2029	5.00	24.0	Mobilization
Excavation	Site Preparation	4/5/2029	7/17/2029	5.00	74.0	Sediment
Excavation - Aux	Site Preparation	7/17/2029	10/14/2029	5.00	64.0	Auxillary Spillway
Stripping	Site Preparation	3/6/2029	4/5/2029	5.00	23.0	Overexcavation
Topsoil	Site Preparation	8/30/2030	9/28/2030	5.00	21.0	Topsoil
Reseeding	Site Preparation	9/28/2030	10/6/2030	5.00	5.00	Seeding
Select Backfill	Grading	4/28/2030	6/11/2030	5.00	32.0	Select Backfill
General Backfill	Grading	8/14/2030	8/30/2030	5.00	13.0	General Backfill
Select Fill Stability Berms	Grading	12/16/2029	2/27/2030	5.00	53.0	Stability Berms
Select Fill Dam Raise	Grading	11/26/2029	12/16/2029	5.00	15.0	Dam Raise
Gravel Drain Extension	Grading	10/14/2029	11/26/2030	5.00	292	Gravel Drain Install
Concrete - Cutoff Wall	Building Construction	2/27/2030	4/1/2030	5.00	24.0	Cutoff Wall
Concrete - PS Conduit Extension	Building Construction	8/30/2029	10/14/2029	5.00	32.0	PS Conduit Ext
Principal Spillway Intake Structure	Building Construction	6/11/2030	7/14/2030	5.00	24.0	Principal Spillway Intake Structure
Principal Spillway Stilling Basin	Building Construction	7/14/2030	8/14/2030	5.00	23.0	Principal Spillway Stilling Basin
Concrete - RCC on Crest	Building Construction	4/1/2030	4/28/2030	5.00	20.0	Concrete

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Excavation	Scrapers	Diesel	Average	6.00	8.50	367	0.40

Excavation	Crawler Tractors	Diesel	Average	2.00	8.50	84.0	0.37
Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	9.00	84.0	0.37
Excavation	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Excavation	Graders	Diesel	Average	1.00	9.00	148	0.41
Excavation - Aux	Excavators	Diesel	Average	1.00	8.00	367	0.40
Excavation - Aux	Dumpers/Tenders	Diesel	Average	4.00	8.50	84.0	0.37
Excavation - Aux	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Excavation - Aux	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Excavation - Aux	Graders	Diesel	Average	1.00	8.00	148	0.41
Excavation - Aux	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Stripping	Excavators	Diesel	Average	1.00	8.00	367	0.40
Stripping	Dumpers/Tenders	Diesel	Average	4.00	7.50	84.0	0.37
Stripping	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Stripping	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Stripping	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Stripping	Graders	Diesel	Average	1.00	8.00	148	0.41
Topsoil	Scrapers	Diesel	Average	6.00	7.50	367	0.40
Topsoil	Crawler Tractors	Diesel	Average	3.00	5.00	84.0	0.37
Topsoil	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Topsoil	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Topsoil	Graders	Diesel	Average	1.00	8.00	148	0.41
Reseeding	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.50	84.0	0.37
Reseeding	Off-Highway Trucks	Diesel	Average	1.00	1.00	376	0.38
Select Backfill	Crawler Tractors	Diesel	Average	1.00	8.00	36.0	0.38
Select Backfill	Off-Highway Trucks	Diesel	Average	1.00	2.00	148	0.41

Select Backfill	Graders	Diesel	Average	1.00	8.00	367	0.40
Select Backfill	Rollers	Diesel	Average	2.00	8.00	423	0.48
General Backfill	Crawler Tractors	Diesel	Average	1.00	6.00	36.0	0.38
General Backfill	Off-Highway Trucks	Diesel	Average	1.00	1.00	148	0.41
General Backfill	Graders	Diesel	Average	1.00	6.00	367	0.40
General Backfill	Rollers	Diesel	Average	1.00	6.00	423	0.48
Select Fill Stability Berms	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Select Fill Stability Berms	Crawler Tractors	Diesel	Average	2.00	8.50	148	0.41
Select Fill Stability Berms	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.40
Select Fill Stability Berms	Graders	Diesel	Average	1.00	8.00	423	0.48
Select Fill Stability Berms	Rollers	Diesel	Average	2.00	8.50	84.0	0.37
Select Fill Dam Raise	Excavators	Diesel	Average	1.00	7.00	36.0	0.38
Select Fill Dam Raise	Crawler Tractors	Diesel	Average	2.00	7.00	148	0.41
Select Fill Dam Raise	Off-Highway Trucks	Diesel	Average	1.00	1.00	367	0.40
Select Fill Dam Raise	Graders	Diesel	Average	1.00	7.00	423	0.48
Select Fill Dam Raise	Rollers	Diesel	Average	2.00	7.00	84.0	0.37
Gravel Drain Extension	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Gravel Drain Extension	Crawler Tractors	Diesel	Average	2.00	8.00	148	0.41
Gravel Drain Extension	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	367	0.40
Gravel Drain Extension	Off-Highway Trucks	Diesel	Average	1.00	2.00	423	0.48
Gravel Drain Extension	Graders	Diesel	Average	1.00	8.00	84.0	0.37
Concrete - Cutoff Wall	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20

Concrete - Cutoff Wall	Excavators	Diesel	Average	1.00	1.00	36.0	0.38
Concrete - Cutoff Wall	Dumpers/Tenders	Diesel	Average	1.00	1.00	16.0	0.38
Concrete - PS Conduit Extension	Excavators	Diesel	Average	1.00	1.00	367	0.29
Concrete - PS Conduit Extension	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Principal Spillway Intake Structure	Excavators	Diesel	Average	1.00	1.00	367	0.29
Principal Spillway Intake Structure	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Principal Spillway Stilling Basin	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.29
Concrete - RCC on Crest	Crawler Tractors	Diesel	Average	1.00	7.00	367	0.29
Concrete - RCC on Crest	Off-Highway Trucks	Diesel	Average	1.00	1.00	82.0	0.20
Concrete - RCC on Crest	Rollers	Diesel	Average	1.00	7.00	14.0	0.74

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Mobilization	—	—	—	—
Mobilization	Worker	48.0	11.7	LDA,LDT1,LDT2
Mobilization	Vendor	—	8.40	HHDT,MHDT
Mobilization	Hauling	2.00	20.0	HHDT
Mobilization	Onsite truck	—	—	HHDT
Excavation	—	—	—	—
Excavation	Worker	76.0	11.7	LDA,LDT1,LDT2
Excavation	Vendor	—	8.40	HHDT,MHDT

Excavation	Hauling	296	20.0	HHDT
Excavation	Onsite truck	—	—	HHDT
Excavation - Aux	—	—	—	—
Excavation - Aux	Worker	37.0	11.7	LDA,LDT1,LDT2
Excavation - Aux	Vendor	—	8.40	HHDT,MHDT
Excavation - Aux	Hauling	0.00	20.0	HHDT
Excavation - Aux	Onsite truck	—	—	HHDT
Stripping	—	—	—	—
Stripping	Worker	38.0	11.7	LDA,LDT1,LDT2
Stripping	Vendor	—	8.40	HHDT,MHDT
Stripping	Hauling	0.00	20.0	HHDT
Stripping	Onsite truck	—	—	HHDT
Topsoil	—	—	—	—
Topsoil	Worker	38.0	11.7	LDA,LDT1,LDT2
Topsoil	Vendor	—	8.40	HHDT,MHDT
Topsoil	Hauling	0.00	20.0	HHDT
Topsoil	Onsite truck	—	—	HHDT
Reseeding	—	—	—	—
Reseeding	Worker	20.0	11.7	LDA,LDT1,LDT2
Reseeding	Vendor	—	8.40	HHDT,MHDT
Reseeding	Hauling	0.00	20.0	HHDT
Reseeding	Onsite truck	—	—	HHDT
Select Backfill	—	—	—	—
Select Backfill	Worker	62.0	11.7	LDA,LDT1,LDT2
Select Backfill	Vendor	—	8.40	HHDT,MHDT
Select Backfill	Hauling	168	20.0	HHDT
Select Backfill	Onsite truck	—	—	HHDT
General Backfill	—	—	—	—

General Backfill	Worker	78.0	11.7	LDA,LDT1,LDT2
General Backfill	Vendor	—	8.40	HHDT,MHDT
General Backfill	Hauling	202	20.0	HHDT
General Backfill	Onsite truck	—	—	HHDT
Select Fill Stability Berms	—	—	—	—
Select Fill Stability Berms	Worker	68.0	11.7	LDA,LDT1,LDT2
Select Fill Stability Berms	Vendor	—	8.40	HHDT,MHDT
Select Fill Stability Berms	Hauling	224	20.0	HHDT
Select Fill Stability Berms	Onsite truck	—	—	HHDT
Select Fill Dam Raise	—	—	—	—
Select Fill Dam Raise	Worker	68.0	11.7	LDA,LDT1,LDT2
Select Fill Dam Raise	Vendor	—	8.40	HHDT,MHDT
Select Fill Dam Raise	Hauling	171	20.0	HHDT
Select Fill Dam Raise	Onsite truck	—	—	HHDT
Gravel Drain Extension	—	—	—	—
Gravel Drain Extension	Worker	48.0	11.7	LDA,LDT1,LDT2
Gravel Drain Extension	Vendor	—	8.40	HHDT,MHDT
Gravel Drain Extension	Hauling	46.0	20.0	HHDT
Gravel Drain Extension	Onsite truck	—	—	HHDT
Concrete - Cutoff Wall	—	—	—	—
Concrete - Cutoff Wall	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - Cutoff Wall	Vendor	0.00	8.40	HHDT,MHDT
Concrete - Cutoff Wall	Hauling	2.00	20.0	HHDT
Concrete - Cutoff Wall	Onsite truck	—	—	HHDT
Concrete - PS Conduit Extension	—	—	—	—
Concrete - PS Conduit Extension	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - PS Conduit Extension	Vendor	0.00	8.40	HHDT,MHDT
Concrete - PS Conduit Extension	Hauling	1.00	20.0	HHDT

Concrete - PS Conduit Extension	Onsite truck	—	—	HHDT
Principal Spillway Intake Structure	—	—	—	—
Principal Spillway Intake Structure	Worker	26.0	11.7	LDA,LDT1,LDT2
Principal Spillway Intake Structure	Vendor	0.00	8.40	HHDT,MHDT
Principal Spillway Intake Structure	Hauling	3.00	20.0	HHDT
Principal Spillway Intake Structure	Onsite truck	—	—	HHDT
Principal Spillway Stilling Basin	—	—	—	—
Principal Spillway Stilling Basin	Worker	26.0	11.7	LDA,LDT1,LDT2
Principal Spillway Stilling Basin	Vendor	0.00	8.40	HHDT,MHDT
Principal Spillway Stilling Basin	Hauling	1.00	20.0	HHDT
Principal Spillway Stilling Basin	Onsite truck	—	—	HHDT
Concrete - RCC on Crest	—	—	—	—
Concrete - RCC on Crest	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - RCC on Crest	Vendor	0.00	8.40	HHDT,MHDT
Concrete - RCC on Crest	Hauling	4.00	20.0	HHDT
Concrete - RCC on Crest	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)

Mobilization	0.00	—	0.00	0.00	—
Excavation	—	175,000	742	0.00	—
Excavation - Aux	—	—	64.0	0.00	—
Stripping	0.00	—	23.0	0.00	—
Topsoil	—	—	148	0.00	—
Reseeding	—	—	0.00	0.00	—
Select Backfill	42,876	—	46.0	0.00	—
General Backfill	21,000	—	14.0	0.00	—
Select Fill Stability Berms	95,000	—	114	0.00	—
Select Fill Dam Raise	20,500	—	24.9	0.00	—
Gravel Drain Extension	16,491	—	42.0	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
City Park	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2029	0.00	204	0.03	< 0.005
2030	0.00	204	0.03	< 0.005

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Projected schedule
Construction: Dust From Material Movement	Excavation includes substantial material movement.
Construction: Off-Road Equipment	Based on construction estimate for machines and equipment
Construction: Trips and VMT	Based on concrete and gravel installed during relevant phases

Matanzas Creek Dam Rehab - Alt 3 Custom Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Matanzas Creek Dam Rehab - Alt 3
Construction Start Date	5/4/2029
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.20
Precipitation (days)	15.6
Location	Matanzas Creek Reservoir, California 95404, USA
County	Sonoma-San Francisco
City	Unincorporated
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	977
EDFZ	2
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
City Park	48.2	Acre	48.2	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Unmit.	9.28	6.96	73.0	0.27	2.22	12.2	2.06	4.18
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Unmit.	6.51	5.22	67.3	0.27	1.60	11.5	1.47	3.98
Average Daily (Max)	—	—	—	—	—	—	—	—
Unmit.	2.24	1.65	18.4	0.07	0.53	3.10	0.50	1.06
Annual (Max)	—	—	—	—	—	—	—	—
Unmit.	0.41	0.30	3.37	0.01	0.10	0.57	0.09	0.19
Exceeds (Daily Max)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	54.0	—	82.0	—	54.0	—
Unmit.	No	No	Yes	—	No	—	No	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	54.0	—	82.0	—	54.0	—
Unmit.	No	No	No	—	No	—	No	—
Exceeds (Annual)	—	—	—	—	—	—	—	—
Threshold	100	100	100	100	—	100	—	100
Unmit.	No	No	No	No	—	No	—	No

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Daily - Summer (Max)	—	—	—	—	—	—	—	—
2029	9.28	6.96	73.0	0.27	2.22	12.2	2.06	4.18
2030	6.88	5.19	53.7	0.22	1.63	10.2	1.52	3.31
Daily - Winter (Max)	—	—	—	—	—	—	—	—
2029	6.51	4.25	67.3	0.27	1.55	11.5	1.45	3.98
2030	6.39	5.22	41.4	0.15	1.60	7.17	1.47	2.39
Average Daily	—	—	—	—	—	—	—	—
2029	2.24	1.65	18.4	0.07	0.53	3.10	0.50	1.06
2030	1.29	0.93	11.0	0.05	0.30	1.98	0.28	0.68
Annual	—	—	—	—	—	—	—	—
2029	0.41	0.30	3.37	0.01	0.10	0.57	0.09	0.19
2030	0.23	0.17	2.01	0.01	0.05	0.36	0.05	0.12

3. Construction Emissions Details

3.1. Mobilization (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.17	0.15	0.13	0.00	0.00	0.40	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Excavation (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	4.60	3.87	29.9	0.10	1.27	1.27	1.17	1.17
Dust From Material Movement	—	—	—	—	—	3.35	—	0.36
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.93	0.78	6.07	0.02	0.26	0.26	0.24	0.24
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	0.14	1.11	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.12	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.24	0.24	0.15	0.00	0.00	0.56	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.52	0.42	25.9	0.13	0.26	5.61	0.26	1.76
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.03	0.00	0.00	0.11	0.00	0.03
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.31	0.08	5.42	0.03	0.05	1.13	0.05	0.35

Annual	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	0.02	0.99	0.01	0.01	0.21	0.01	0.06

3.5. Excavation - Aux (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.77	2.31	17.0	0.04	0.69	0.69	0.64	0.64
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41	0.34	2.51	0.01	0.10	0.10	0.09	0.09
Dust From Material Movement	—	—	—	—	—	0.06	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.46	< 0.005	0.02	0.02	0.02	0.02
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.00	0.00	0.05	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Stripping (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.58	2.15	15.8	0.04	0.65	0.65	0.60	0.60
Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.58	2.15	15.8	0.04	0.65	0.65	0.60	0.60

Dust From Material Movement	—	—	—	—	—	0.41	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.14	0.99	< 0.005	0.04	0.04	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.03	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.18	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.12	0.11	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Topsoil (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	3.97	3.33	24.8	0.09	1.07	1.07	0.99	0.99
Dust From Material Movement	—	—	—	—	—	2.92	—	0.32
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	3.97	3.33	24.8	0.09	1.07	1.07	0.99	0.99
Dust From Material Movement	—	—	—	—	—	2.92	—	0.32
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.20	1.50	0.01	0.06	0.06	0.06	0.06
Dust From Material Movement	—	—	—	—	—	0.18	—	0.02
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.27	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.03	—	< 0.005

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.12	0.08	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.11	0.10	0.00	0.00	0.31	0.00	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Reseeding (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.20	0.01	0.06	0.06	0.05	0.05

Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	0.00	—	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.05	0.00	0.00	0.17	0.00	0.04
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Select Backfill (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.24	1.88	14.0	0.05	0.55	0.55	0.51	0.51
Dust From Material Movement	—	—	—	—	—	0.44	—	0.05
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.16	1.19	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.04	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.22	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.19	0.17	0.11	0.00	0.00	0.45	0.00	0.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.81	0.24	14.5	0.08	0.15	3.28	0.15	1.03
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.00	0.00	0.04	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.07	0.02	1.27	0.01	0.01	0.28	0.01	0.09
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.23	< 0.005	< 0.005	0.05	< 0.005	0.02

3.15. General Backfill (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.19	8.35	0.03	0.35	0.35	0.32	0.32
Dust From Material Movement	—	—	—	—	—	0.40	—	0.04
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.39	< 0.005	0.02	0.02	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.23	0.20	0.14	0.00	0.00	0.55	0.00	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.14	0.34	20.3	0.11	0.21	4.61	0.21	1.45
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.05	0.02	0.98	< 0.005	0.01	0.21	0.01	0.07
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.18	< 0.005	< 0.005	0.04	< 0.005	0.01

3.17. Select Fill Stability Berms (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	2.00	1.68	14.2	0.04	0.60	0.60	0.55	0.55
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.30	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dust From Material Movement	—	—	—	—	—	< 0.005	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.21	0.18	0.17	0.00	0.00	0.49	0.00	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.16	0.31	21.0	0.11	0.20	4.33	0.20	1.36
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	0.01	0.44	< 0.005	< 0.005	0.09	< 0.005	0.03
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.08	< 0.005	< 0.005	0.02	< 0.005	0.01

3.19. Select Fill Stability Berms (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.94	1.63	13.4	0.04	0.57	0.57	0.53	0.53
Dust From Material Movement	—	—	—	—	—	0.68	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.20	1.65	< 0.005	0.07	0.07	0.07	0.07
Dust From Material Movement	—	—	—	—	—	0.08	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.30	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.02	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.20	0.18	0.15	0.00	0.00	0.49	0.00	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.06	0.31	20.2	0.10	0.20	4.33	0.20	1.36
Average Daily	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.02	0.00	0.00	0.06	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.13	0.04	2.44	0.01	0.02	0.53	0.02	0.17
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.01	0.45	< 0.005	< 0.005	0.10	< 0.005	0.03

3.21. Select Fill Dam Raise (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.94	1.63	13.8	0.04	0.58	0.58	0.53	0.53
Dust From Material Movement	—	—	—	—	—	0.65	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.13	< 0.005	0.05	0.05	0.04	0.04
Dust From Material Movement	—	—	—	—	—	0.05	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.21	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.21	0.19	0.17	0.00	0.00	0.50	0.00	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	1.00	0.26	18.0	0.09	0.17	3.72	0.17	1.17
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.00	0.00	0.04	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.08	0.02	1.46	0.01	0.01	0.30	0.01	0.10
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	< 0.005	0.27	< 0.005	< 0.005	0.06	< 0.005	0.02

3.23. Gravel Drain Extension (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.48	1.25	8.43	0.03	0.41	0.41	0.38	0.38
Dust From Material Movement	—	—	—	—	—	0.63	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Off-Road Equipment	1.48	1.25	8.43	0.03	0.41	0.41	0.38	0.38
Dust From Material Movement	—	—	—	—	—	0.63	—	0.07
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.11	0.74	< 0.005	0.04	0.04	0.03	0.03
Dust From Material Movement	—	—	—	—	—	0.06	—	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.13	< 0.005	0.01	0.01	0.01	0.01
Dust From Material Movement	—	—	—	—	—	0.01	—	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.16	0.14	0.10	0.00	0.00	0.38	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.30	0.09	5.40	0.03	0.06	1.22	0.06	0.38
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.15	0.14	0.12	0.00	0.00	0.38	0.00	0.09
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.30	0.09	5.69	0.03	0.06	1.22	0.06	0.38
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	0.01	0.49	< 0.005	< 0.005	0.11	< 0.005	0.03

Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.09	< 0.005	< 0.005	0.02	< 0.005	0.01

3.25. Concrete - Cutoff Wall (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.32	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.32	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.17	< 0.005	< 0.005	0.04	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.07	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.18	< 0.005	< 0.005	0.04	< 0.005	0.01
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.27. Concrete - PS Conduit Extension (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.05	0.29	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.09	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.09	< 0.005	< 0.005	0.02	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.00	0.00	0.02	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.29. Principal Spillway Intake Structure (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.28	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.08	< 0.005	< 0.005	0.02	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

3.31. Principal Spillway Stilling Basin (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.37	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.33. Concrete - RCC on Crest (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	SO2	PM10E	PM10T	PM2.5E	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.54	0.45	3.20	0.01	0.13	0.13	0.12	0.12
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.18	< 0.005	0.01	0.01	0.01	0.01
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.06	0.00	0.00	0.21	0.00	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.17	< 0.005	< 0.005	0.04	< 0.005	0.01
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Annual	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	0.00	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Mobilization	Site Preparation	2/1/2029	3/6/2029	5.00	24.0	Mobilization
Excavation	Site Preparation	4/5/2029	7/17/2029	5.00	74.0	Sediment
Excavation - Aux	Site Preparation	7/17/2029	9/30/2029	5.00	54.0	Auxillary Spillway
Stripping	Site Preparation	3/6/2029	4/5/2029	5.00	23.0	Overexcavation
Topsoil	Site Preparation	9/10/2030	10/9/2030	5.00	22.0	Topsoil
Reseeding	Site Preparation	10/9/2030	10/17/2030	5.00	7.00	Seeding
Select Backfill	Grading	5/3/2030	6/16/2030	5.00	31.0	Select Backfill
General Backfill	Grading	8/19/2030	9/10/2030	5.00	17.0	General Backfill
Select Fill Stability Berms	Grading	12/21/2029	3/4/2030	5.00	52.0	Stability Berms
Select Fill Dam Raise	Grading	11/12/2029	12/21/2029	5.00	30.0	Dam Raise
Gravel Drain Extension	Grading	9/30/2030	11/12/2030	5.00	32.0	Gravel Drain Install
Concrete - Cutoff Wall	Building Construction	3/4/2030	4/6/2030	5.00	25.0	Cutoff Wall
Concrete - PS Conduit Extension	Building Construction	8/16/2029	9/30/2029	5.00	32.0	PS Conduit Ext
Principal Spillway Intake Structure	Building Construction	6/16/2030	7/19/2030	5.00	25.0	Principal Spillway Intake Structure
Principal Spillway Stilling Basin	Building Construction	7/19/2030	8/19/2030	5.00	22.0	Principal Spillway Stilling Basin
Concrete - RCC on Crest	Building Construction	4/6/2030	5/3/2030	5.00	20.0	Concrete

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Excavation	Scrapers	Diesel	Average	6.00	8.50	367	0.40
Excavation	Crawler Tractors	Diesel	Average	2.00	8.50	84.0	0.37
Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	9.00	84.0	0.37
Excavation	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Excavation	Graders	Diesel	Average	1.00	9.00	148	0.41
Excavation - Aux	Excavators	Diesel	Average	1.00	8.00	367	0.40
Excavation - Aux	Dumpers/Tenders	Diesel	Average	4.00	8.50	84.0	0.37
Excavation - Aux	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Excavation - Aux	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Excavation - Aux	Graders	Diesel	Average	1.00	8.00	148	0.41
Excavation - Aux	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Stripping	Excavators	Diesel	Average	1.00	8.00	367	0.40
Stripping	Dumpers/Tenders	Diesel	Average	4.00	7.50	84.0	0.37
Stripping	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Stripping	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Stripping	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38
Stripping	Graders	Diesel	Average	1.00	8.00	148	0.41
Topsoil	Scrapers	Diesel	Average	6.00	7.50	367	0.40
Topsoil	Crawler Tractors	Diesel	Average	3.00	5.00	84.0	0.37
Topsoil	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Topsoil	Off-Highway Trucks	Diesel	Average	1.00	2.00	376	0.38

Topsoil	Graders	Diesel	Average	1.00	8.00	148	0.41
Reseeding	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.50	84.0	0.37
Reseeding	Off-Highway Trucks	Diesel	Average	1.00	1.00	376	0.38
Select Backfill	Crawler Tractors	Diesel	Average	1.00	8.00	36.0	0.38
Select Backfill	Off-Highway Trucks	Diesel	Average	1.00	2.00	148	0.41
Select Backfill	Graders	Diesel	Average	1.00	8.00	367	0.40
Select Backfill	Rollers	Diesel	Average	2.00	8.00	423	0.48
General Backfill	Crawler Tractors	Diesel	Average	1.00	7.00	36.0	0.38
General Backfill	Off-Highway Trucks	Diesel	Average	1.00	1.00	148	0.41
General Backfill	Graders	Diesel	Average	1.00	7.00	367	0.40
General Backfill	Rollers	Diesel	Average	1.00	7.00	423	0.48
Select Fill Stability Berms	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Select Fill Stability Berms	Crawler Tractors	Diesel	Average	2.00	8.50	148	0.41
Select Fill Stability Berms	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.40
Select Fill Stability Berms	Graders	Diesel	Average	1.00	8.00	423	0.48
Select Fill Stability Berms	Rollers	Diesel	Average	2.00	8.50	84.0	0.37
Select Fill Dam Raise	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Select Fill Dam Raise	Crawler Tractors	Diesel	Average	2.00	8.00	148	0.41
Select Fill Dam Raise	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.40
Select Fill Dam Raise	Graders	Diesel	Average	1.00	8.00	423	0.48
Select Fill Dam Raise	Rollers	Diesel	Average	2.00	8.00	84.0	0.37
Gravel Drain Extension	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Gravel Drain Extension	Crawler Tractors	Diesel	Average	2.00	8.00	148	0.41

Gravel Drain Extension	Tractors/Loaders/Back	Diesel	Average	1.00	8.00	367	0.40
Gravel Drain Extension	Off-Highway Trucks	Diesel	Average	1.00	2.00	423	0.48
Gravel Drain Extension	Graders	Diesel	Average	1.00	8.00	84.0	0.37
Concrete - Cutoff Wall	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Concrete - Cutoff Wall	Excavators	Diesel	Average	1.00	1.00	36.0	0.38
Concrete - Cutoff Wall	Dumpers/Tenders	Diesel	Average	1.00	1.00	16.0	0.38
Concrete - PS Conduit Extension	Excavators	Diesel	Average	1.00	1.00	367	0.29
Concrete - PS Conduit Extension	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Principal Spillway Intake Structure	Excavators	Diesel	Average	1.00	1.00	367	0.29
Principal Spillway Intake Structure	Off-Highway Trucks	Diesel	Average	1.00	2.00	82.0	0.20
Principal Spillway Stilling Basin	Off-Highway Trucks	Diesel	Average	1.00	2.00	367	0.29
Concrete - RCC on Crest	Crawler Tractors	Diesel	Average	1.00	7.00	367	0.29
Concrete - RCC on Crest	Off-Highway Trucks	Diesel	Average	1.00	1.00	376	0.38
Concrete - RCC on Crest	Rollers	Diesel	Average	1.00	7.00	14.0	0.74

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Mobilization	—	—	—	—
Mobilization	Worker	48.0	11.7	LDA,LDT1,LDT2

Mobilization	Vendor	—	8.40	HHDT,MHDT
Mobilization	Hauling	0.00	20.0	HHDT
Mobilization	Onsite truck	—	—	HHDT
Excavation	—	—	—	—
Excavation	Worker	68.0	11.7	LDA,LDT1,LDT2
Excavation	Vendor	—	8.40	HHDT,MHDT
Excavation	Hauling	296	20.0	HHDT
Excavation	Onsite truck	—	—	HHDT
Excavation - Aux	—	—	—	—
Excavation - Aux	Worker	38.0	11.7	LDA,LDT1,LDT2
Excavation - Aux	Vendor	—	8.40	HHDT,MHDT
Excavation - Aux	Hauling	0.00	20.0	HHDT
Excavation - Aux	Onsite truck	—	—	HHDT
Stripping	—	—	—	—
Stripping	Worker	38.0	11.7	LDA,LDT1,LDT2
Stripping	Vendor	—	8.40	HHDT,MHDT
Stripping	Hauling	0.00	20.0	HHDT
Stripping	Onsite truck	—	—	HHDT
Topsoil	—	—	—	—
Topsoil	Worker	38.0	11.7	LDA,LDT1,LDT2
Topsoil	Vendor	—	8.40	HHDT,MHDT
Topsoil	Hauling	0.00	20.0	HHDT
Topsoil	Onsite truck	—	—	HHDT
Reseeding	—	—	—	—
Reseeding	Worker	20.0	11.7	LDA,LDT1,LDT2
Reseeding	Vendor	—	8.40	HHDT,MHDT
Reseeding	Hauling	0.00	20.0	HHDT
Reseeding	Onsite truck	—	—	HHDT

Select Backfill	—	—	—	—
Select Backfill	Worker	54.0	11.7	LDA,LDT1,LDT2
Select Backfill	Vendor	—	8.40	HHDT,MHDT
Select Backfill	Hauling	173	20.0	HHDT
Select Backfill	Onsite truck	—	—	HHDT
General Backfill	—	—	—	—
General Backfill	Worker	66.0	11.7	LDA,LDT1,LDT2
General Backfill	Vendor	—	8.40	HHDT,MHDT
General Backfill	Hauling	243	20.0	HHDT
General Backfill	Onsite truck	—	—	HHDT
Select Fill Stability Berms	—	—	—	—
Select Fill Stability Berms	Worker	59.5	11.7	LDA,LDT1,LDT2
Select Fill Stability Berms	Vendor	—	8.40	HHDT,MHDT
Select Fill Stability Berms	Hauling	228	20.0	HHDT
Select Fill Stability Berms	Onsite truck	—	—	HHDT
Select Fill Dam Raise	—	—	—	—
Select Fill Dam Raise	Worker	60.0	11.7	LDA,LDT1,LDT2
Select Fill Dam Raise	Vendor	—	8.40	HHDT,MHDT
Select Fill Dam Raise	Hauling	196	20.0	HHDT
Select Fill Dam Raise	Onsite truck	—	—	HHDT
Gravel Drain Extension	—	—	—	—
Gravel Drain Extension	Worker	46.0	11.7	LDA,LDT1,LDT2
Gravel Drain Extension	Vendor	—	8.40	HHDT,MHDT
Gravel Drain Extension	Hauling	64.4	20.0	HHDT
Gravel Drain Extension	Onsite truck	—	—	HHDT
Concrete - Cutoff Wall	—	—	—	—
Concrete - Cutoff Wall	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - Cutoff Wall	Vendor	0.00	8.40	HHDT,MHDT

Concrete - Cutoff Wall	Hauling	2.00	20.0	HHDT
Concrete - Cutoff Wall	Onsite truck	—	—	HHDT
Concrete - PS Conduit Extension	—	—	—	—
Concrete - PS Conduit Extension	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - PS Conduit Extension	Vendor	0.00	8.40	HHDT,MHDT
Concrete - PS Conduit Extension	Hauling	1.00	20.0	HHDT
Concrete - PS Conduit Extension	Onsite truck	—	—	HHDT
Principal Spillway Intake Structure	—	—	—	—
Principal Spillway Intake Structure	Worker	26.0	11.7	LDA,LDT1,LDT2
Principal Spillway Intake Structure	Vendor	0.00	8.40	HHDT,MHDT
Principal Spillway Intake Structure	Hauling	1.00	20.0	HHDT
Principal Spillway Intake Structure	Onsite truck	—	—	HHDT
Principal Spillway Stilling Basin	—	—	—	—
Principal Spillway Stilling Basin	Worker	26.0	11.7	LDA,LDT1,LDT2
Principal Spillway Stilling Basin	Vendor	0.00	8.40	HHDT,MHDT
Principal Spillway Stilling Basin	Hauling	0.00	20.0	HHDT
Principal Spillway Stilling Basin	Onsite truck	—	—	HHDT
Concrete - RCC on Crest	—	—	—	—
Concrete - RCC on Crest	Worker	26.0	11.7	LDA,LDT1,LDT2
Concrete - RCC on Crest	Vendor	0.00	8.40	HHDT,MHDT
Concrete - RCC on Crest	Hauling	2.00	20.0	HHDT
Concrete - RCC on Crest	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Mobilization	0.00	—	0.00	0.00	—
Excavation	—	175,000	742	0.00	—
Excavation - Aux	—	—	54.0	0.00	—
Stripping	—	—	23.0	0.00	—
Topsoil	—	—	155	0.00	—
Reseeding	—	—	0.00	0.00	—
Select Backfill	42,876	—	46.0	0.00	—
General Backfill	33,000	—	14.0	0.00	—
Select Fill Stability Berms	95,000	—	114	0.00	—
Select Fill Dam Raise	47,000	—	24.9	0.00	—
Gravel Drain Extension	16,491	—	42.0	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
City Park	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2029	0.00	204	0.03	< 0.005
2030	0.00	204	0.03	< 0.005

8. User Changes to Default Data

Screen	Justification
Land Use	—
Construction: Construction Phases	Projected schedule
Construction: Dust From Material Movement	Excavation includes substantial material movement.
Construction: Off-Road Equipment	Based on construction estimate for machines and equipment
Construction: Trips and VMT	Based on concrete and gravel installed during relevant phases