DRAFT
Tennessee Valley Dam Removal and Lower Valley Restoration Project
Environmental Assessment

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1 PURPOSE AND NEED

1.1 Introduction

The Tennessee Valley Dam Removal and Lower Valley Restoration Project (Project) is located within the Tennessee Valley watershed in Marin County, California, approximately 9 miles northwest of San Francisco (Figure 1). The Project site is within the Golden Gate National Recreation Area (GGNRA), on land owned and administered by the National Park Service (NPS).

The NPS is proposing to remove a small earthen dam in the Tennessee Valley coastal watershed to eliminate a safety hazard to visitors at the beach downstream of the dam. NPS also proposes a set of actions associated with the dam removal to restore habitats in the lower valley, including reaches both upstream and downstream of the dam. This Environmental Assessment (EA) evaluates potential impacts of the proposed actions on the environment and analyzes one Proposed Action Alternative as well as the No Action Alternative.

1.2 Background

Tennessee Valley Dam is approximately 900 linear feet upstream of the beach and has been classified by the U.S Bureau of Reclamation (Reclamation) as “high hazard” due to its potential catastrophic effect to the public in the event of a sudden breach. Hydraulic analyses showed that if the dam fails when impounded water elevations are high, the water released could reach a depth and velocity sufficient to cause an injury or fatality (U.S. Bureau of Reclamation, 2017). It has also been determined to be a high risk due to its poor condition, with existing erosion patterns and lack of seismic engineering standards (U.S. Bureau of Reclamation, 2017). Currently, NPS closes the trail to the beach during and after storms when water elevations behind the dam are high.

The dam is a 230 linear feet earthen structure situated on top of marsh soils, spanning a narrow valley at the downstream end of an undeveloped coastal watershed. The dam was built by a prior landowner around 1960 to impound the main creek[1] flowing through the watershed and create a pond for waterfowl hunting. The original size of the pond has diminished substantially over time due to sediment deposition and encroachment by emergent vegetation. Currently, the pond is the largest breeding habitat in the watershed for the California red-legged frog (*Rana draytonii*). The entire 2.35-square-mile watershed of Tennessee Valley, including the dam and pond, became part of the GGNRA in 1972. The dam is adjacent to the main visitor trail and beach access at Tennessee Cove. The trail is eroded due to bypass flows from the dam.

[1] The U.S. Geological Survey is considering a proposed formal name for the main channel through Tennessee Valley. The name was proposed by the Federated Indians of Graton Rancheria and is expected to replace the label "Elk Creek," which is a colloquial name that had not been issued by USGS. This EA has been prepared during a period when USGS is considering the proposal and the name change is not final.

Figure 1. Project Vicinity

The NPS Director's Order (DO) #40: Dam Safety & Security Program requires parks to minimize the risk associated with ownership of dams and to prevent potential catastrophic losses due to failure. NPS Management Policies 2006 Section 9.5 requires NPS to permanently remove obsolete dams "unless they contribute to the cultural, natural, or recreational resource bases of the area or are a necessary part of a park's water system." The Tennessee Valley Dam is obsolete and does not contribute to cultural or recreational resources or water system services at GGNRA. The dam's natural resource value as habitat for the federally listed threatened California red-legged frog (CRLF) can be mitigated by creating new breeding ponds for California red-legged frog at other locations in the watershed.

1.3 Purpose and Need for the Project

The purpose of the Tennessee Valley Dam Removal and Lower Valley Restoration Project is to remove the dam for safety purposes and to restore the natural channel, wetland, riparian, and coastal functions within lower Tennessee Valley. The existing dam embankment and pond are shown in Figure 2.

Figure 2. Dam Embankment and Pond from the South Slope

The project is needed to eliminate the possibility of catastrophic injury or fatality to Tennessee Valley visitors from sudden dam failure. The Tennessee Valley earthen dam has been classified as "high hazard" by Reclamation and is also a high risk for failure. Removal of the dam is necessary for public safety due to the current conditions of the existing structure.

The project would eliminate the threat to public safety from sudden dam failure and would return the creek and wetlands within and downstream of the impoundment to their natural functions. The proposed restoration of natural processes and functions supports ecological diversity and

resilience to climate change. NPS policy directs parks to reestablish natural functions and processes and restore biological and physical resources to accelerate the recovery of landscape and biological structure and function (National Park Service, 2006). By completing this Project, the park would meet these directives.

1.4 Project Goals and Objectives

An interdisciplinary team of NPS staff and consultants reviewed the site conditions, ecological needs, opportunities, and constraints of the project area to identify a set of project goals. The project goals are as follows:

- Modify the Tennessee Valley Dam to achieve a non-jurisdictional determination in accordance with NPS Director's Order #40 and Reference Manual 40: Dam Safety & Security Program (National Park Service, 2010)
- Restore natural function and processes to be compatible with long-term watershed restoration
- Minimize future maintenance requirements by designing features to be self-sustaining
- Reuse dam material beneficially in the watershed, including for natural resource condition improvement or trail improvement
- Repair road damage associated with the dam
- Improve climate change resiliency for facilities and natural resources by increasing the capacity for adaptation to changing conditions

The following objectives are also identified for this project:

- Protect historic road and turn-around footprint (military-era cultural resource)
- Sustain the beach by restoring creek sediment delivery processes; avoid actions that would increase erosion at the beach
- Repair the road and any equipment impacts from work on the dam
- Avoid import of non-native material

1.5 Related Laws, Legislation, and Management Guidelines

1.5.1 National Environmental Policy Act

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) regulations for the implementation of NEPA (40 Code of Federal Regulations [CFR] §§ 1500–1508), Department of Interior (DOI) regulations for the implementation of NEPA (43 CFR § 46), NPS DO #12: Conservation Planning, Environmental Impact Analysis, and Decision-Making, and the NPS NEPA Handbook (2015). As per DO #12 Section 4.2, where other directives or guidelines differ from the NPS NEPA Handbook, the handbook will take precedence.

1.5.2 California Environmental Quality Act

California Environmental Quality Act (CEQA) compliance is required prior to any state agency taking action on the project, such as the Regional Water Quality Control Board (RWQCB)

issuing a Section 401 water quality certification. Section 15221 of the CEQA Guidelines (California Code of Regulations Title 14, Division 6, Chapter 3) sets forth rules governing use of a NEPA document to satisfy CEQA. When a project will require compliance with both CEQA and NEPA, a state agency has the ability to use the EA/ Finding of No Significant Impact (FONSI) rather than preparing a separate CEQA document if the EA/FONSI is prepared before the CEQA document, and it complies with the CEQA guidelines (State of California, 2022). The CEQA analytical topics to facilitate adoption of the document by a state agency as a CEQA-equivalent document are included in Appendix B. This is not a joint NEPA/CEQA document.

1.5.3 Clean Water Act

The NPS must comply with the Clean Water Act (CWA) Section 401 permitting process. For any activity which may result in a discharge to a water body, the applicant must obtain a CWA Section 401 water quality certification to ensure that the proposed activity will comply with water quality standards. The local RWQCB has jurisdiction over Section 401 permitting. NPS would apply for 401 water quality certification during the preparation of final design.

The NPS must also comply with CWA Section 404, which regulates the discharge of dredged and fill material into Waters of the United States, including wetlands, and is regulated by the U.S. Army Corps of Engineers (USACE). Based on a review of the proposed action, in its conceptual planning phase, USACE has stated that the project is expected to be permittable under Nationwide Permit (NWP) 53 for removal of low-head dams and NWP 27 for aquatic habitat restoration, enhancement, and establishment (Morgenstern, 2020). NWP 27 would allow discharge of fill for the purpose of achieving natural watershed function as well as creation of new ponds for threatened and endangered habitat. NPS will seek a CWA Section 404 permit during the construction design phase.

Section 402 of the Clean Water Act requires that all construction sites encompassing 1 acre or more of land, as well as municipal, industrial and commercial facilities, discharging wastewater or stormwater directly from a point source (e.g., pipe, ditch, or channel) into a surface water of the United States (e.g., lake, river, and/or ocean) must obtain permission under a National Pollutant Discharge Elimination System (NPDES) permit. All NPDES permits are written to ensure the nation's receiving waters would achieve specified Water Quality Standards (WQS). Given the proposed alternative would be over an acre, the contractor would be required to coordinate with the local RWQCB to obtain a construction permit and submit for approval a Stormwater Pollution Prevention Plan (SWPPP). All SWPPP information would be entered in the RWQCB Stormwater Multiple Application and Report Tracking System (SMARTS). SWPPPs are site-specific, written documents that (1) identify potential sources of stormwater pollution on a construction, industrial, and/or municipal site; (2) describe stormwater control measures and best management practices (BMPs) that would be used to reduce or eliminate pollutants in stormwater discharges from the project site; and (3) identify the procedures the operator of the project site would implement to comply with the terms and conditions of the site-specific general permit.

1.5.4 Coastal Zone Management Act

The National Oceanic and Atmospheric Administration (NOAA) administers the Coastal Zone Management Act (CZMA), passed by Congress in 1972 to address growth and development in coastal areas. The stated goal of the CZMA is to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's Coastal zone for this and succeeding generations" (NOAA, 2022). California's Coastal Management Act is administered by the California Coastal Commission (CCC) and requires the commission to implement and administer a coastal development permit process within the coastal zone. Because a portion of the project is located within the California Coastal Zone (Figure 3), NPS is coordinating with CCC. Consultation will result in a federal Negative Determination (ND) or a Consistency Determination (CD), depending on CCC's determination of impacts and mitigation.

1.5.5 Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 et seq.) prohibits the incidental taking of marine mammals. The MMPA defines take as "…to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal..."; and further defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

1.5.6 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA; 16 U.S. Code 661), as amended in 1964, was enacted to protect fish and wildlife when federal actions result in control or modification of a natural stream or body of water. The statute requires federal agencies take into consideration the effect that water-related projects would have on fish and wildlife resources and provide for the development and improvement of these resources.

1.5.7 Director's Order 40: Dam Safety & Security Program

The Tennessee Valley Dam is currently under the jurisdiction of the NPS Dam Safety Program due to its size, which meets the definition of a dam. Under the NPS DO 40, the NPS is responsible for minimizing risks associated with the ownership of dams through actions to improve the safety of its dams, remove unnecessary dams, and conduct emergency planning to prevent catastrophic losses in case of dam failure (National Park Service, 2010). In accordance with Reference Manual 40: Dam Safety Program, a high hazard rating requires NPS to regularly re-evaluate the existing structures and seek to deactivate high hazard structures or prepare emergency action plans if the structure is retained (National Park Service, 2013). After project actions, there would no longer be a Tennessee Valley Dam under jurisdiction of the NPS Dam Safety Program.

1.5.8 Executive Order 11988 Floodplain Management and NPS Director's Order 77-2

Floodplain policy is administered under Executive Order 11988 and NPS DO #77-2. It is NPS policy to recognize and manage the preservation of floodplains to minimize potentially hazardous conditions associated with flooding and to comply with all other federal laws and executive orders related to the management of activities in flood-prone areas (including coastal flood-prone areas). According to DO #77-2, a Statement of Findings must be prepared if a proposed action is found to be within a regulatory floodplain. The NPS Water Resources Division reviewed the project and determined that a Statement of Findings is not needed because a) the floodplain does not have facilities or cultural resources at risk, b) the project would not alter floodplain function except to eliminate the risk of sudden dam failure, and c) the project is a restoration project that would allow natural floodplain function (Martin, 2021).

1.5.9 Executive Order 11990 Protection of Wetlands and NPS Director's Order #77-1

The NPS is guided to protect wetlands in accordance with Executive Order 11990 Protection of Wetlands and NPS DO #77-1: Wetland Protection. Unlike Section 404 of the Clean Water Act, adverse impacts under Executive Order 11990 are not interpreted strictly as discharge of dredged or fill material but encompass a much broader range of actions, including groundwater withdrawals, water diversions, nutrient enrichment, livestock grazing, pumping, flooding, and impounding. DO #77-1 directs the NPS to a) avoid adverse wetland impacts to the extent practicable, b) minimize impacts that could not be avoided, and c) compensate for remaining unavoidable adverse wetland impacts via restoration of degraded wetlands. DO 77 also directs the NPS to prepare a Statement of Findings that describes and provides rationale for adverse impacts to wetlands. The NPS Water Resources Division reviewed the Proposed Action and determined that since the project is a restoration project and new ponds would provide habitat for federally-listed threatened species, a Wetland Statement of Findings is not needed (Noon, 2021).

1.5.10 Endangered Species Act

The NPS initiated formal Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) and submitted a Biological Assessment for potential impacts to the federally listed threatened California red-legged frog (CRLF; *Rana draytonii*) and the federally listed endangered tidewater goby (*Eucyclogobius newberryi*) on May 23, 2022. The Biological Assessment included a determination of "likely to adversely affect" CRLF due to construction and relocation activities and "not likely to adversely affect" for the tidewater goby.

1.5.11 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the take of protected migratory bird species without prior authorization by the USFWS (16 U.S.C.§§703–712). "Take" is defined broadly under the MBTA to include actions to pursue, hunt, capture, kill, collect, possess, sell, barter, and/or transport migratory birds, or to attempt such activities. This refers to both live or deceased birds and their parts, including feathers, nests, and eggs. The list of migratory bird species protected by the law is published by USFWS and was most recently updated in 2020 (CFR Code

of Federal Regulations Title 50 § 10.13[c][1]). All federal project actions must comply with this act; therefore, they cannot result in unauthorized take of migratory birds.

1.5.12 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108) and its implementing regulations (36 CFR 800) require federal agencies to consider the effects of their undertakings on historic properties.

NPS recognizes a portion of the lower watershed area, including the footprint of the dam and the pond and some of the wetland area upstream of the pond, is recognized as a Cultural Landscape because it was part of the Fort Cronkhite coastal defense system during World War II (PaleoWest, 2022). The period of significance for the Cultural Landscape pre-dated the dam; therefore, actions which remove the dam and restore a natural creek and wetland system are consistent with protecting the Cultural Landscape. Two of the proposed new frog pond locations are within the Forts Baker, Barry, and Cronkhite historic district (Historic District). The Bettencourt Ranch (C/D) has been determined ineligible for listing on the National Register (NR) of Historic Places (State Historic Preservation Office, 2007).

An intensive pedestrian survey was conducted within the project area APE. No prehistoric artifacts were identified within the APE in either the pedestrian survey or the subsurface testing. Testing at the pond location near Bettencourt Ranch revealed several out-of-context historic artifacts.

The NPS Cultural Resource Division initiated Section 106 consultation through letters in October 2021 with the California State Historical Preservation Officer (SHPO) and Federated Indians of Graton Rancheria (Appendix C). The letter identified the area of potential effect (APE), the historic properties within the APE, and assessed the project's effects on the historic resources. The NPS found that the project had no adverse effect on historic resources and requested SHPO concurrence. SHPO set a letter of concurrence with NPS finding of no adverse effect on October 5, 2022.

1.5.13 National Park Service Organic Act

The 1916 National Park Service Organic Act (Organic Act) established the mission of NPS and directs the NPS to manage units "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner as will leave them unimpaired for the enjoyment of future generations" (United States Code Title 16 § 1). The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts. The proposed project is considered a restoration project, with objectives that would be beneficial to the natural processes and resources of the park, and therefore does not propose actions that would impair park resources.

1.5.14 National Park Service Management Policies

NPS Management Policies (2006) provide guidance to "protect park resources and values to ensure that these resources and values are maintained in as good or better condition for the enjoyment of present and future generations" (National Park Service, 2006). These policies are based on laws, executive orders, proclamations, and regulations that govern NPS as well as departmental policies and longstanding NPS practices. This EA was prepared consistent with NPS Management policies (2006).

1.5.15 Golden Gate Natural Recreation Area General Management Plan

The Tennessee Valley Dam Removal and Lower Valley Restoration Project is consistent with the GGNRA General Management Plan (National Park Service, 2014). The GMP calls for removal of the dam as one of a number of actions that would fulfill NPS objectives to preserve, restore, and/or improve natural and cultural resources of the park as well as public access, park facilities, and infrastructure. The GMP has identified eight management zones; the Lower Tennessee Valley is within the Natural Zone. This management zone aims to retain and restore natural and dynamic landscape characteristics and ecological functions. Natural resources would be managed to preserve resource integrity while providing for various types of visitor experience, and impacted areas would be restored to the greatest extent possible (National Park Service, 2014).

1.5.16 New Legal and Policy Issues

Under direction of the Biden Administration, CEQ issued the Phase 1 Final Rule to amend parts of text in 40 CFR parts 1500-1508 on April 20, 2022. The changes restore regulatory provisions in effect prior to the 2020 rule modifications under the Trump Administration. Changes include increased federal emphasis on equity-impact analyses, equity engagement, climate change considerations, and restoration of cumulative effects analyses. The scope of this environmental review is in line with the Phase 1 Final rule and general approach to environmental reviews for federal projects and decisions.

2 ALTERNATIVES

This chapter discusses two alternatives, the Proposed Action Alternative, and the No Action Alternative, as well as alternatives considered but dismissed. The Proposed Action was developed by an interdisciplinary team of park staff, NPS Water Resource Division staff, and modified in response to agency and public comments. A range of alternatives was evaluated by the NPS using the Choosing-by-Advantages (CBA) selection process. The Proposed Action was determined to be the most reasonable, have the most advantages, and be the most cost-effective to achieve the purpose and need and best meet the goals and objectives of the project.

2.1 Proposed Action Alternative

The Proposed Action includes the following elements:

- Actions at the dam including:
    - Remove the Tennessee Valley dam embankment to a safe elevation and retain a 3-foot-high remnant berm.
    - Use dam material to construct low gradient "aprons" on either side of the remnant berm to allow water to cross the feature as sheet flow, avoiding or reducing potential erosive effects.
    - Install log grade-control and flow-diversion structures and earthen dam material upstream of the existing pond to manage the transition of the channel to a steeper gradient and to prevent channel incision.
- Construct three new ponds for CRLF breeding and rearing.
- Beneficial fill reuse including:
    - Downstream of the dam plug the incised channel to prevent upstream head-cutting and restore wetland functions.
    - Upstream of the dam create a floodplain terrace habitat surrounding the existing pond and repair the eroded trail adjacent to the dam.
- Actions at Haypress tributary including:
    - Recontour and outslope the Haypress Trail
    - Repair some incision in the Haypress tributary drainage
    - Restoration of Haypress wet meadow
- Eucalyptus Removal including:
    - In the Haypress area of the upper watershed;
    - Along the channel adjacent to Pond D;
    - At Backdoor Pond
- Bettencourt Ranch demolition and restoration including:
    - Demolish derelict structures;
    - Rehabilitate channel crossing to Bettencourt Ranch and Pond D to facilitate heavy equipment access.

All project elements are shown on Figure 3. Project details are shown on Figures 4 through Figure 6.

Figure 3. Project Overview

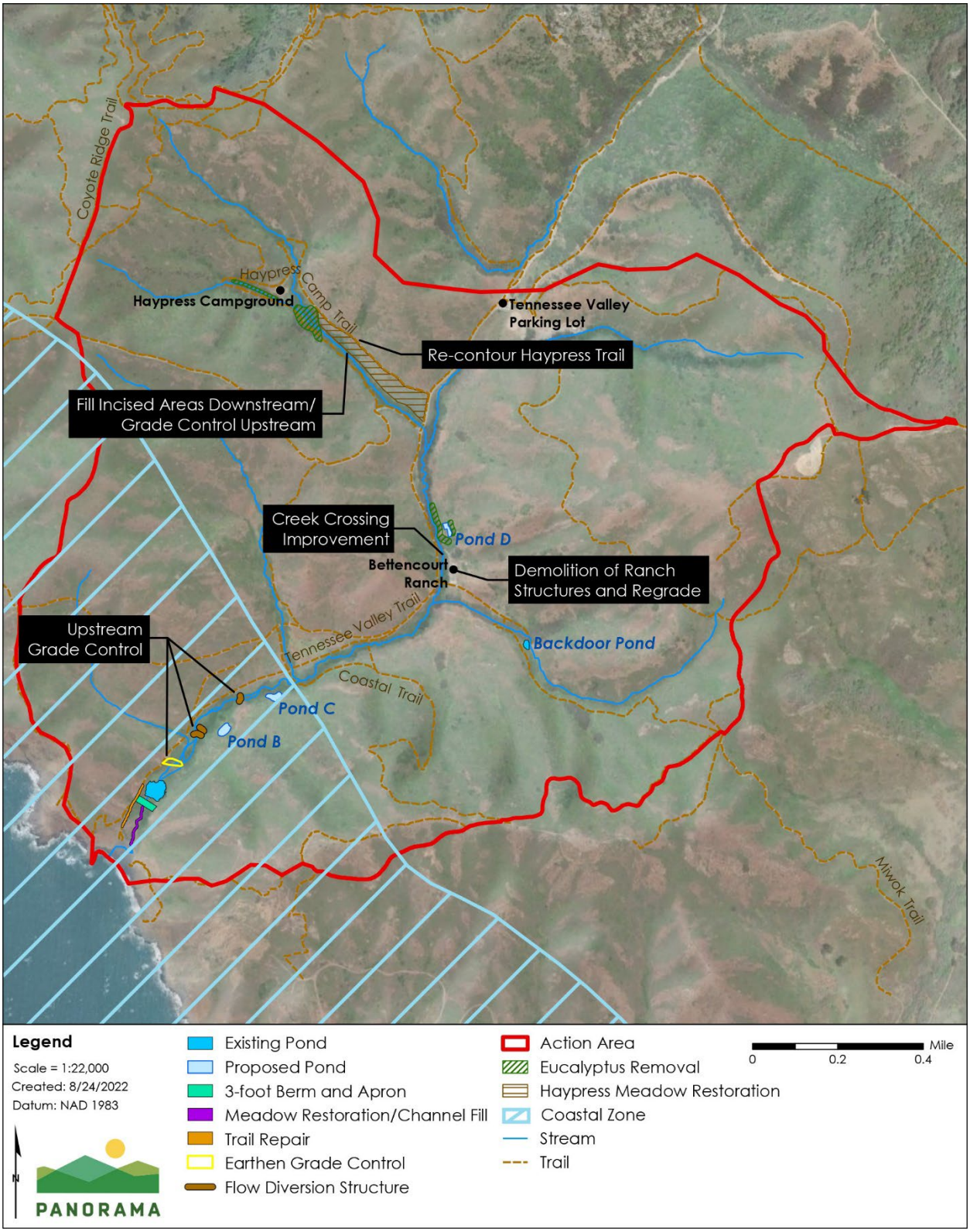


Figure 4. Lower Valley Project Elements

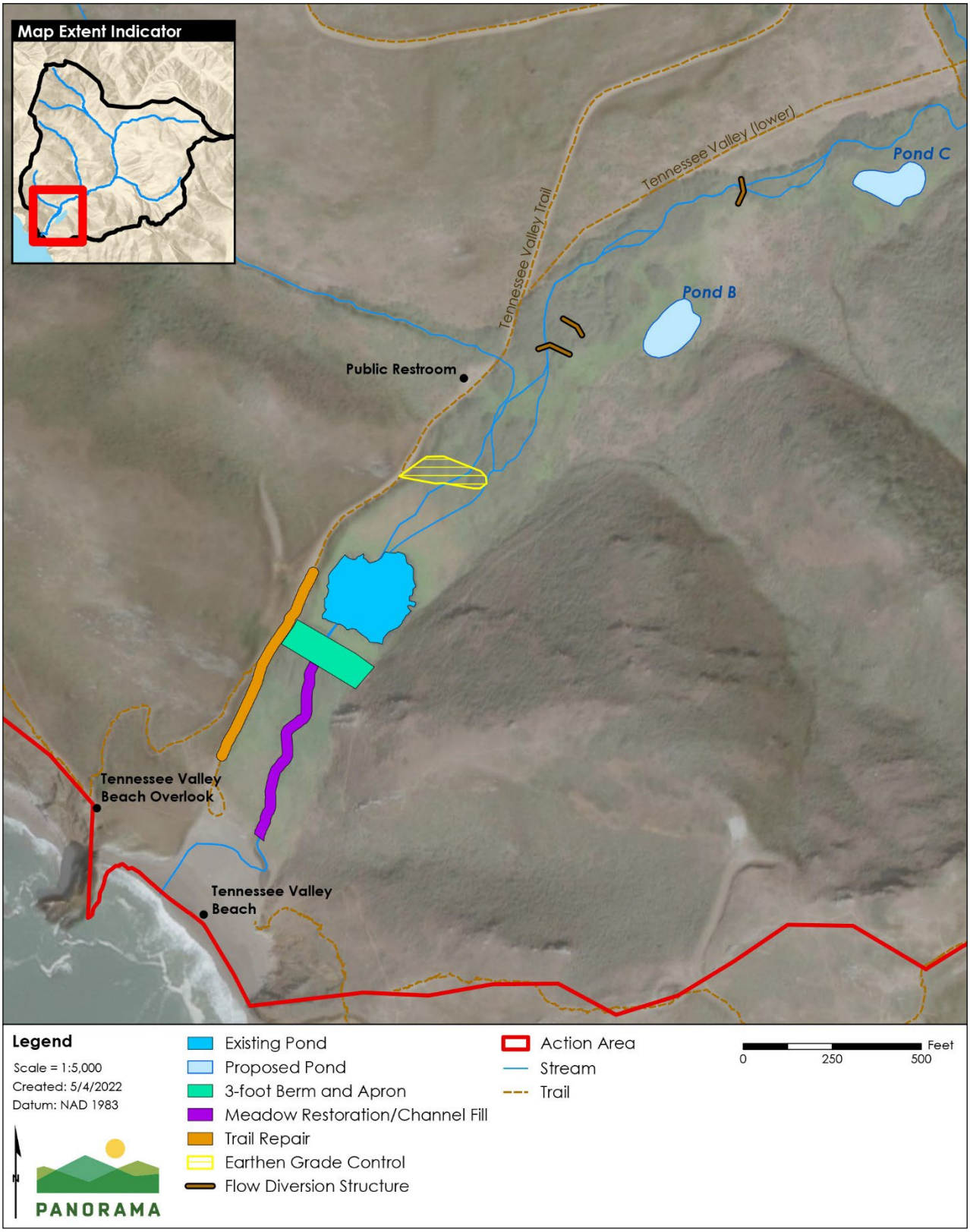


Figure 5. Bettencourt Ranch Project Elements

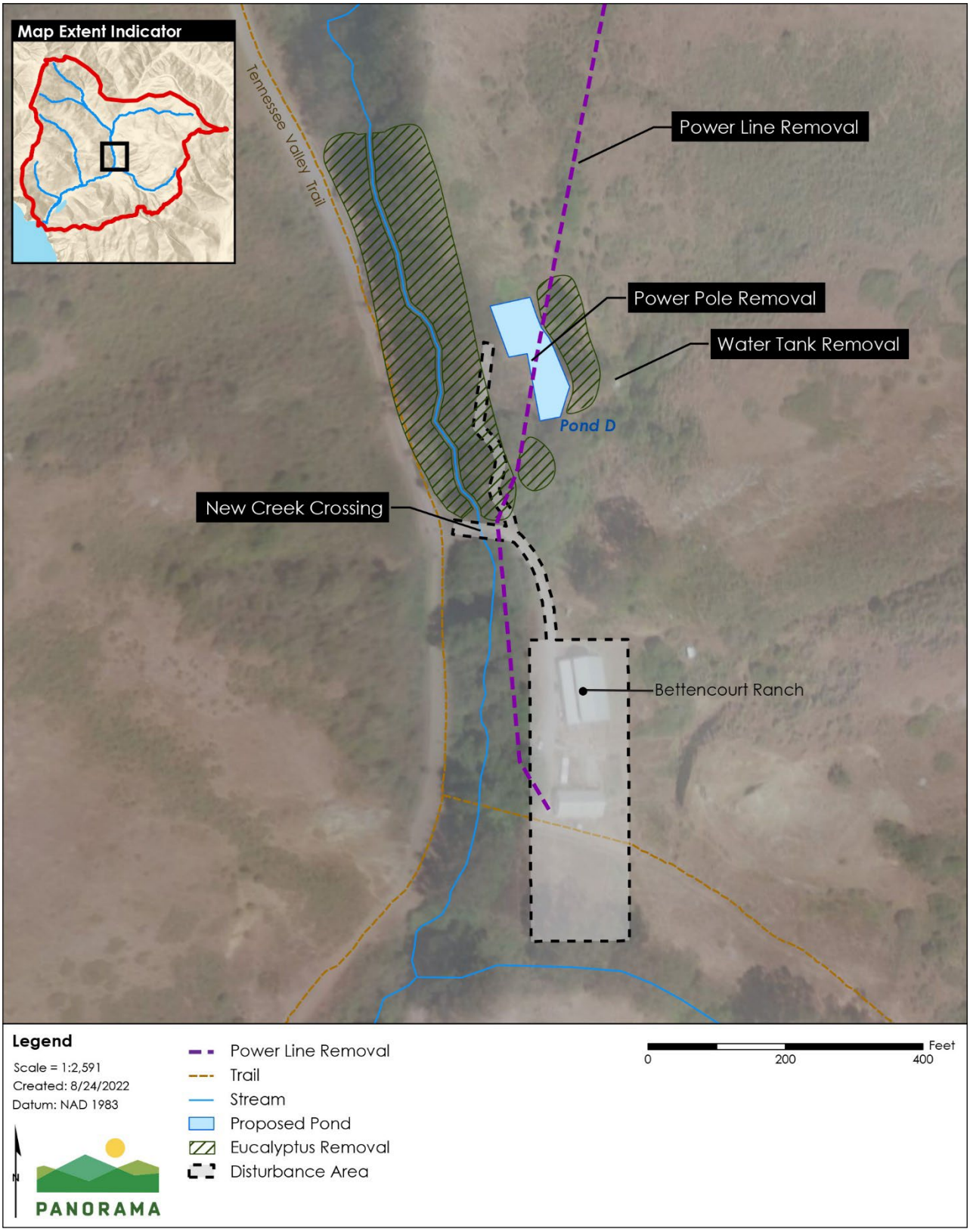
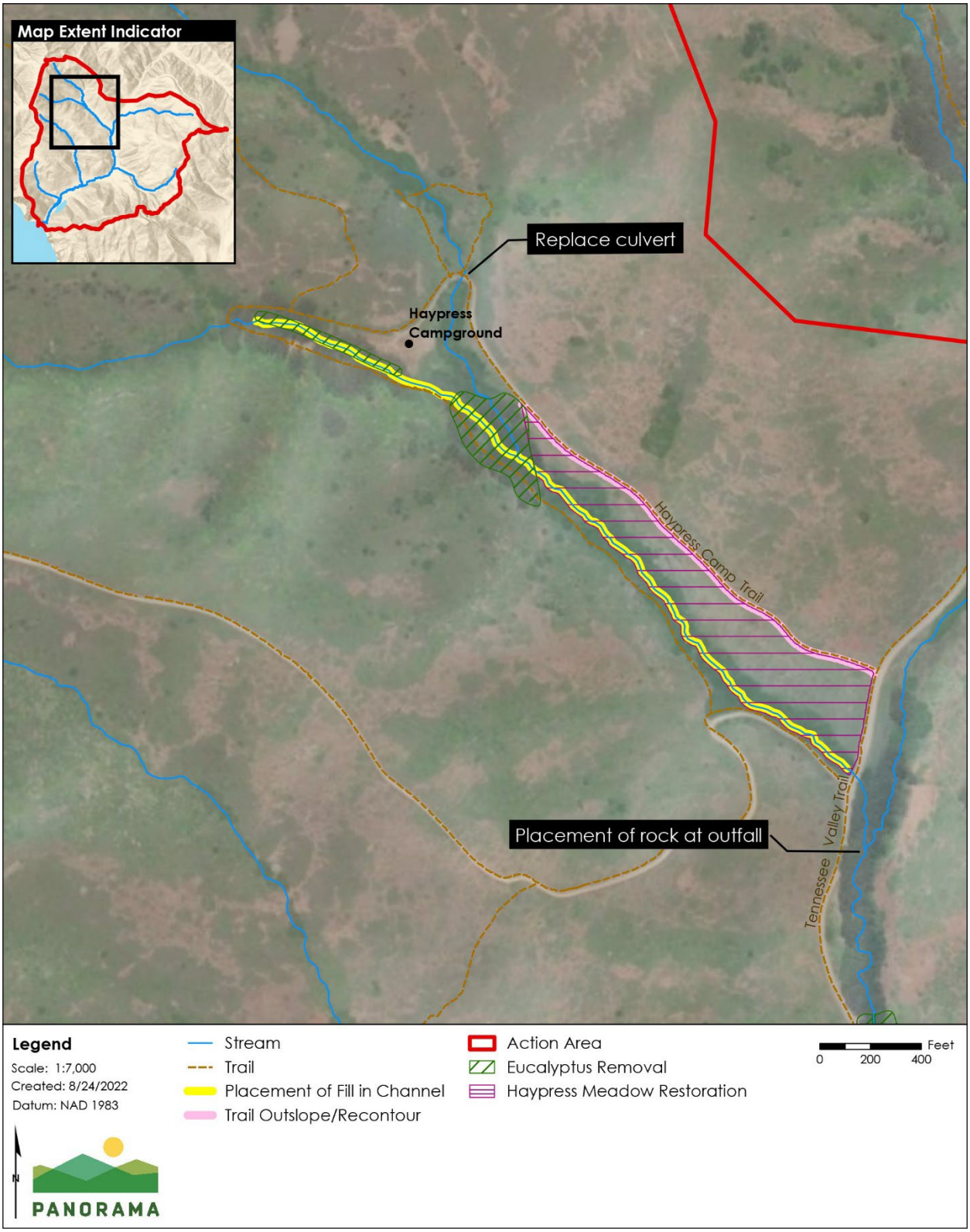


Figure 6. Haypress Area Project Elements



2.1.1 Lower Tennessee Valley Dam Embankment

The existing 12- to 16-foot-high dam would be removed, leaving a 3-foot-high berm in its footprint. The remnant berm would no longer be considered jurisdictional to the NPS Dam Safety program due to the reduction of height and volume of impounded water (National Park Service, 2010). In the long term, it is anticipated that the remaining pool behind the berm would naturally fill and transition to native wetland habitat and the risk of breach would be eliminated.

The remnant berm would act as a feature to manage the transition back to a natural wetland and riparian area. The berm would be a grade control structure to reduce the effect on flow patterns from the sudden shift to a steeper valley gradient after dam removal and would prevent or reduce the development of incision through the fine soils in the pond footprint and upstream of the pond. The grade control would be accomplished by reusing dam material as compacted fill material, placed on the upstream and downstream sides of the embankment, extending about 10 to 15 feet beyond the current toe of the dam. The fill would establish uniform, gently sloped transition "aprons" from the elevation of the pond bottom to the downstream wetland area. The aprons, with a gentle slope of not more than 5:1, would disperse the energy of high flows and promoting a more natural grade transition. The aprons would be covered with topsoil to revegetate with native species, and they would likely be covered in erosion control fabric. The berm and aprons would be well-constructed, but since their purpose is to support the transitional landscape, if or when they fail in the long-term, they would not be repaired. Once vegetation has become established in the former pond area, the risk of incision would be reduced.

The berm may retain a small but shallower remnant pond of about 0.31 acres for a few additional years and may support CRLF breeding; however, it may not function as breeding habitat due to high-velocity winter flows, which would no longer be attenuated by the dam. Any remaining open water would likely fill in with sediment and wetland vegetation over subsequent years.

In the short term, emergent vegetation would likely rapidly colonize the smaller, shallower (<5 feet deep) pond following construction. The pond would transition from open water to marsh as the water depth would not be sufficient to preclude encroachment by both floating aquatic and emergent marsh vegetation. Emergent marsh would likely dominate the deepest portions of the pond.

The shallow pond behind the berm, and the smaller newly constructed frog ponds, could become infested with non-native parrot feather (*Myriophyllum aquaticum*) or other invasive aquatic or emergent vegetation from an increase in shallow pond area or from introduction during construction activities, respectively. Manual or chemical treatments may be required to control the infestation(s) and preserve the ponds as valuable habitat.

Following construction of berm and apron and after installation of erosion control materials, small brush bundles would be placed throughout this unvegetated surface to provide temporary cover for red-legged frogs.

Grade Control

Lowering the dam would increase the channel slope through the existing ponded footprint. If unchecked, the increased channel slope would result in an increase of scour and erosion potential both through the pond area and upstream of the existing pond in wetland and riparian areas. As measures supporting the remnant berm to minimize the scour and erosion impacts of removing the dam, large wooden grade-control structures would be placed in the channel upstream of the ponded area. The grade-control structures would be installed lower than the anticipated scour depth and would span the creek channel. Multiple 1- to 3-foot-diameter tree trunks with root wads would be tied, anchored, and buried to meet the lower channel grade and covered with compacted soil. The surface would be restored, stabilized, and revegetated.

Flow Diversion Structures

To provide additional scour protection, two or more large wooden flow-diversion structures would be constructed in the channel upstream of the buried grade-control structure to disperse flows onto the adjacent wetland floodplain. The flow-diversion structures would be made from tree trunks and would function like a natural log jam during low flows. During higher flows, the flow-diversion structures would obstruct the channel and disperse water onto the floodplain, reducing flow velocity and channel scour. To limit scour around the structure edges, small berms would be formed to route diverted flows away from the channel and onto the adjoining floodplain.

2.1.2 California Red-Legged Frog Breeding Ponds

The impoundment at Tennessee Valley dam is occupied by CRLF. Creation of ponds that provide breeding habitat for CRLF is necessary to support long-term, self-sustaining CRLF populations within the watershed. The NPS evaluated locations and is proposing to develop three new breeding ponds, referred to here as Ponds B, C, and D.[2] The creation of multiple CRLF breeding ponds would provide added habitat resilience, thus increasing the diversity of breeding opportunities and increasing the likelihood of the population to withstand future environmental climate conditions. The CRLF breeding pond site selection approach is described in the Feasibility Study and Alternatives Analysis (Kamman, 2020).

Information on the location, dimensions, and water sources of each proposed new CRLF pond is provided in Table 1, below, and the CRLF ponds are shown in Figure 4 and Figure 5. New groundwater wells would be installed where needed to monitor groundwater elevations near the ponds.

[2]A fourth location for Pond A was also evaluated but was not proposed for construction because the three most-preferred locations were found to meet requirements. The Pond A location was least preferred due to its proximity to the channel flow path. The nomenclature for the ponds follows that used in the Feasibility Study (Kamman 2020).

Table 1 CRLF Pond Characteristics

Pond label	General location	Size (acres)	Max. depth of excavation (feet)[1]	Excavation volume (cubic yards)	Water source(s)	Habitat
B	600 feet upstream of Tennessee Valley Pond, on south side of creek in wetland area	0.4	7	2,300	Perennial shallow groundwater, spring-fed, wet season runoff	Year-round open water
C	1,200 feet upstream of Tennessee Valley Pond, on south side of creek in wetland area	0.3	7	2,200	Perennial shallow groundwater, spring-fed	Year-round open water
D	At old Bettencourt Ranch, at toe of hillslope, about 5,000 feet upstream of Tennessee Valley Pond	0.23	~6	1,400	Spring-fed, groundwater	Potential natural draw down in fall to deter possible predatory non-native animals

[1]Pond designs have low-gradient sidewalls sloping down to the maximum depth to support emergent vegetation on one side and open water on the other.
Source: Rachel Kamman, "Memorandum: Tennessee Valley Dam Modification FS: CRLF Breeding Pond Mitigation Site Summary: Internal Review" (2019); Rachel Kamman, "Tennessee Valley Dam Modification Project: Feasibility Study and Alternatives Analysis (2020)

All CRLF breeding pond sites share the following characteristics:

- Located within 1 mile of the existing pond to provide habitat within the known CRLF migration range
- Located near to the creek channel, which would serve as an ecological corridor
- Supplied by springs and/or groundwater as consistent water sources

Ponds B and C, approximately 600 and 1,200 feet upstream of the dam, respectively, would be constructed by excavating the ground surface and creating a berm along the perimeter of the pond to protect the pond from creek flows and sedimentation over time. Salvaged native wetland plants would be replanted in suitable nearby locations or upstream in the Haypress meadow restoration. New ponds may be inoculated with sediments collected from the channel downstream of the dam to jumpstart populations of native aquatic invertebrates. Optimal construction sequencing would construct these two ponds upstream of the dam prior to removal of the dam to allow for establishment of new CRLF breeding habitat prior to dam removal. Construction of new ponds prior to dam removal would allow for translocation of CRLF egg

masses and/or frogs in larval or adult stages that would be taken from the Tennessee Valley pond prior to and during dam removal. Removal of eggs from the Tennessee Valley pond would reduce take during dam removal activities as well as jumpstart breeding populations at the newly constructed ponds. Immediately following construction, salvaged wetland vegetation and brush piles would be placed along the periphery of the new ponds at locations that would be shallowly inundated during the winter to serve as egg attachment locations for CRLF.

Pond D, approximately 5,000 feet upstream of the dam, would be constructed at Bettencourt Ranch after dam removal and would likely not need a perimeter berm due to channel incision in this area and the disconnection of the floodplain from channel flows. A series of power poles, power lines, and water storage tank and pipes adjacent to Pond D would be removed to construct the pond, and those actions would be a part of the removal of the remnant structures at the Bettencourt Ranch structures. Soils within the upper 1.5 feet of excavation at Pond D do not meet the RWQCB criteria for beneficial reuse in wetland surfaces; however, they are not considered hazardous. These soils would be removed from the area and transported to a landfill. Soils between 1.5 and 3 feet below ground surface (bgs) at Pond D are not suitable for replacement at the surface but are suitable for placement 3 feet or deeper bgs (Kleinfelder, Inc., 2022); these soils would either be buried as necessary or transported to a landfill. The deeper soils determined to meet the RWQCB's criteria for reuse in wetlands may be integrated into grading the 3- to 5-acre area at Bettencourt Ranch after removal of structures or possibly used in association with work at the Haypress drainage.

2.1.3 Beneficial Reuse of Fill

Plug Incised Channel Downstream of Dam

Compacted earthen plugs and soil would be used to fill approximately 500 linear feet of the existing channel incision downstream of the dam to prevent headcutting after dam removal. The small lagoon within the dune and lower edge of the wetland area would not be filled. The channel incision has been exasperated by discharge through a culvert in the dam. Repairing channel incision downstream of the dam would sustain higher groundwater levels in the adjoining marsh, encourage sheet flow over the broad floodplain area of the lower valley, and increase resiliency to sea level rise by increasing ponding of freshwater in the area as opposed to saltwater intrusion from the ocean. The channel would be filled through a combination of intermittent compacted plugs, backfilled with approximately 60 cubic yards of material excavated from the dam embankment and organic material.

With the filled channel, the area would continue to sustain freshwater marsh conditions and is less likely to cut as deeply through the beach, thus allowing for more build-up of the back beach berm. The filled channel would keep water impounded behind the back beach berm longer and allow the low marsh to be flooded more frequently. The low marsh would be flooded more frequently and would likely be brackish at its downstream end and progressively fresher upstream. When conditions at the back beach support the greater period of inundation in the low marsh, then that impoundment would become the lagoon, and the lagoon identified in existing

conditions would likely be smaller. When the beach berm is breached and the marsh drained, that process would likely support a small lagoon, similar to its existing condition.

Trail Repair

Approximately 300 to 350 linear feet of the trail adjacent the existing dam embankment would be repaired with an estimated 380 cubic yards of excavated dam embankment material. The dam material is suitable for use on trails. The trail surface is highly irregular because it has been eroded during previous storm events when water bypassed the dam and flowed down the trail. The repaired trail surface would be uniform and suitable for safe public access. No trail construction would occur within the historic Navy coastal access loop at the end of the trail, bordering the beach.

In the upper watershed, the Haypress trail would be outsloped and possibly recontoured using approximately 2,000 cubic yards of fill produced from the dam (see Figure 6). Outsloping the trail would direct flow to the adjacent meadow rather than down the trail. The trail is typically rutted due to existing run-off patterns and has required repeated maintenance. Outsloping and recontouring would reduce the need for long-term, ongoing road maintenance. In addition to improving the trail conditions and reducing the maintenance burden, this action would further support the wet meadow restoration adjacent to the Haypress tributary.

An oversteepened and overly narrow culvert which conveys flows under the upper Haypress trail from a tributary and the former Haypress dam removal area would be replaced with because it is likely contributing to incision in the Haypress channel. Some rock may need to be added to its outfall.

Construct Floodplain Terraces

To provide scour protection at the head of the Tennessee Valley pond, suitable material removed from the dam embankment may be placed as a low-riparian riparian/floodplain terrace, lightly compacted and revegetated with riparian species. Up to about 1,460 cubic yards of material would be placed on an area up to about 0.27 acres (11,780 feet^2), extending up to 210 feet across the valley, including the channel alignment upstream of the transition to the pond. The feature would provide erosion/incision protection at the transition between the upstream riparian channel and the pond. This feature would be compacted to resist scour and support riparian vegetation. This feature, together with the log grade controls, flow diversion structures and the low berm in the dam footprint would act together to deter the development of channel incision after dam removal.

Fill from the dam embankment removal, if available, may also be placed along the right bank of the existing pond to create a low floodplain terrace. Depending on the quantity of fill available for reuse, the terrace could extend up to 210 linear feet, covering up to 0.27 acre. The surface of the terrace would not be heavily compacted to allow for riparian revegetation. This feature would not function as a grade control.

Repair Haypress Drainage Incision

The incised Haypress tributary would be treated through a range of actions to halt active incision and, if more material is available, recover more natural channel function. The Haypress channel incision is pronounced, with channel depths extending to as much as 20 to 30 feet below the top of the bank even though it is only about 3,100 LF and drains a small 0.4-square-mile subwatershed. The channel incision occurred in association with past agricultural activities that altered drainage patterns and runoff velocity (Kamman, 2020). The incision accelerates runoff, reduces groundwater storage, and reduces the available riparian or wet meadow habitat that would be supported by water retention.

Actions within the Haypress tributary would consist of strategically placing suitable materials in the channel to slow runoff, promote aggradation through sediment deposition, and store more groundwater. Materials would be placed in the tributary to halt active incision near a eucalyptus grove downstream of the campground. Additional material, as available, would be placed along a longer segment of the tributary or as intermittent plugs to raise the channel grade and/or pond water. In some locations, flows may be directed to the floodplain. Supplemental grade control features such as logs, boulders or a combination of the two would be used to prevent sediment mobilization.

The clays and silts to be generated from new CRLF pond excavation would be used to fill the Haypress drainage. The RWQCB has deemed that other than the top 1.5 feet of soils from Pond D, the excavated soils are suitable for beneficial reuse. Soil quantities may be augmented by bank grading or terracing, surface soils scraped about 1 to 2 feet deep from the adjacent weedy meadow, or similar sources. Available soil may be supplemented by wood chips from felled eucalyptus trees to add volume. The quantity of suitable material to be generated from the new CRLF pond construction is only about 10 percent of the total capacity of the incised channel. Therefore, the action at Haypress drainage would be tailored to the quantities of material available. The Haypress drainage repair may be augmented at a later time if more fill becomes available.

Riparian vegetation along the channel bank would be temporarily disturbed during earthwork. Native plant restoration would be conducted along the Haypress channel after earthwork.

At the downstream end of the Haypress tributary, a drop structure would be built that connects the top of the channel fill to the culvert invert at the inlet. The drop structure would retain upstream fill while allowing high flows to be conveyed to the culvert under the main trail. The drop structure would likely consist of a small concrete headwall and a rock ramp grading from the top of the wall to the culvert invert. The culvert would be replaced or, at minimum, additional rock would be placed at the culvert outlet to dissipate discharge energy, thereby minimizing additional scour and potential incision on the mainstem channel.

During average winter flows, runoff would sheet flow over the wet meadow. During larger flow events, discharge would be directed to the channel by an existing inboard ditch adjacent to the main trail.

Reducing discharge from the Haypress tributary benefits the downstream dam-removal area by reducing discharge and flow velocities in the dam area where new grade controls are intended to prevent incision.

2.1.4 Haypress Wet Meadow Restoration

A 5.9-acre meadow in the Haypress Creek subwatershed would be restored to a more frequently saturated wet meadow with native wetland plant cover (see Figure 6). The meadow restoration would be supported by actions in the Haypress channel to promote channel aggradation, which would cause more groundwater to be stored and thereby raise groundwater elevations in the adjacent meadow.

If material is scraped from the meadow surface to generate fill for the channel, the action would complement meadow restoration by removing the seed bank of noxious non-native Harding grass (*Phalaris aquatica*) and other non-native grasses currently dominating the meadow. Placed fill would be managed to prevent spread of weeds. The meadow would be planted with native wet meadow species that occur in the downstream wetlands. If actions at the downstream dam area are sequenced with the meadow scraping, some native wetland plants salvaged during the dam-related work could be replanted in the meadow.

The enhanced native meadow and riparian habitat would improve non-breeding habitat for the CRLF. The cover with native wetland plants would be highly visible from the main visitor trail, enhancing the experience of being in a more natural park area.

2.1.5 Eucalyptus Tree Removal

Eucalyptus trees would be removed form Pond D, a eucalyptus grove along Haypress drainage, and at Backdoor Pond (Figure 5 and Figure 6). The total number of eucalyptus trees and size class of each tree removed in provided in Table 2 below. Eucalyptus trees would be toppled with rootballs attached; other trees not to be used for grade control near the dam would also be cut, and some may be used for grade control upstream of the existing pond and in the Haypress drainage. Some bank regrading in the Haypress drainage may be necessary after toppling. Eucalyptus tree removal would allow restoration at the upstream end of the Haypress drainage and improve habitat conditions for CRLF at Pond D and at Backdoor Pond. The areas of eucalyptus removal would be re-established with native willow growth. If other large trees or shrubs eventually surround any of the new ponds, they would be removed either to prevent shading or to allow more wind activity that would reduce mosquitoes.

To reduce the potential for spread of live eucalyptus during installation for grade control and flow deflection, eucalyptus trees would be toppled a minimum of 6 months prior to installation. Additionally, the trees would have their roots cleaned using high-pressure water to tear up tissue on roots, allowing them to desiccate. An herbicide may be applied directly to the exposed root tissue. The trees would be stockpiled at or near Haypress Campground prior to being used for installation as grade-control and flow-diversion structures.

Table 2 Proposed Eucalyptus Tree Removals

Location	Number of trees per diameter at breast height (DBH) proposed for removal						Primary purpose
	<1 ft.	1–2 ft.	2–3 ft.	1–3 ft.	>3 ft.	Total	
Pond D – Bettencourt -	1	—	—	9	10	20	Reduce shade on new pond
Pond D – Bettencourt (other)	1	—	—	2	3	6	Reduce shade on pond
	2	—	—	2	2	6	Other eucalyptus in vicinity; do not shade pond, but removal would complete removal of non-natives in this reach
Grove 1 along Haypress drainage near Haypress Campground (upstream end)	24	—	—	47	18	89	Provide eucalyptus logs for downstream grade control structures in the mainstem channel and possibly Haypress channel. Secondary benefit: allows channel to be re-established with native willow growth.
Grove 2 along Haypress drainage downstream of Haypress Campground	89	—	—	33	3	125	Provide eucalyptus logs for downstream grade-control structures in the mainstem channel and possibly Haypress channel. Secondary benefit: allows channel to be re-established with native willow growth.
Back Door Pond	24	9	7	—	10	50	Reduce shade on Backdoor Pond, to be used temporarily to relocate CRLF tadpoles during construction. If new ponds are already constructed and suitable for relocation, this action may not need to be conducted.
TOTAL	**141**	**9**	**7**	**93**	**46**	**284**	
Source: NPS Onsite Survey							

2.1.6 Bettencourt Ranch Structure Removal

Actions in the former dairy ranch known as the Bettencourt Ranch (and Ranch C-D) include the full demolition of remnant structures and utilities and returning the site to a natural area. The

Bettencourt Ranch structures precede NPS ownership of Tennessee Valley, and they are in disrepair and no longer used. Actions at the Bettencourt area are as follows:

- Stabilizing the access road over the creek by removing the existing corrugated metal culvert and installing a concrete box culvert, or similar. This would allow safe access of heavy equipment into the site.
- Removal of a two-story, 5,670-square-foot barn and 1,925-square-foot administrative building and an estimated 221 cubic yards of associated reinforced concrete foundation slabs
- Removal of approximately 70 cubic yards of foundation slabs remaining from previously demolished buildings
- Removal of approximately 2,100 linear feet of 4- to 5-foot-high steel and wood corral and drift fence.
- Removal of various ancillary structures, including water systems composed of multiple polyethylene storage tanks, piping, and several poured concrete spring boxes. This would allow two productive natural springs to flow unimpeded from the hillslopes onto the floodplain.
- Grinding, removal, and recycling of an existing access road from Tennessee Valley trail to Bettencourt Ranch Complex, comprising 170 cubic yards of road asphalt
- Removal of 16 power and telecommunication poles and associated wiring and meters from the Bettencourt area to the existing Miwok Stables area
- Site regrading (up to 5 acres), as necessary, to achieve natural contours and runoff patterns, to support revegetation, and to enhance wetlands and riparian function where possible

All demolished and removed material would be hauled offsite to an appropriate landfill. The Bettencourt structure removal is integrated with the construction of CRLF Pond D as the access road must be constructed for safe equipment access and the powerlines, water tanks, and pipes on the adjacent hillslope must be removed prior to Pond D construction. Improving the creek-crossing structure would also facilitate Pond D construction. The natural spring flow would discharge into the pond and provide a consistent water source.

2.1.7 Temporary Construction and Restoration Activities

Temporary Access and Staging

The main trail from the Tennessee Valley parking lot to the Tennessee Valley dam would be used as primary access for construction. Staging for heavy equipment, trucks, and materials would occupy the lower end of the main trail, from approximately the intersection of the main trail and the lower trail down to the dam. This would include the area around the vault toilet adjacent to the main trail. During construction of Ponds B and C, and during installation of the large woody debris within the channel upstream of the dam, staging is likely to occupy a segment of the lower trail for equipment access. The main visitor trail would be used to haul material either to the upper watershed for reuse or off site.

Temporary access routes would be constructed from the primary access route through the riparian corridor and crossing the creek to provide access to Pond B and Pond C as well as for construction access for installation of grade-control structures. Vegetation would be removed within the temporary access route to Ponds B and C. Temporary fill atop landscape fabric or construction mats or steel plates would be used at the creek crossings and in wetland areas to provide safe equipment access and reduce impacts on the stream corridor.

Materials would be staged for construction adjacent to the work areas on the trail and in existing disturbed areas, including near the vault toilet in the lower watershed and at Haypress Campground.

CRLF Translocation

A constructed pond, referred to as Backdoor Pond, which remains from the Tennessee Valley's mid-century use as a dairy ranch, may be used as a translocation site for all CRLF lifestages including for CRLF tadpole and/or egg mass relocation if desired habitat conditions are not available at the new ponds during dam removal (Pond B and Pond C). The approximately 500-square-meter Backdoor Pond occurs along a steep reach of an unnamed tributary near the Bettencourt Ranch area, in the upper watershed. The pond is unstable for the long term, with a downstream impoundment that is only partially intact. Emergent vegetation (cattails) and submergent vegetation (water lily and water hyacinth) occupy much of the pond area. The pond is surrounded by tall eucalyptus trees shading the pond. If the pond is to be used for tadpole relocation, eucalyptus trees would be cut near the pond to limit shading (as discussed previously). CRLF removed from the Tennessee Valley pond could also be translocated to Mountain Lake in the Presidio, but relocation to Mountain Lake would be addressed in a separate consultation between the Presidio and USFWS under the Endangered Species Act.

Dewatering

The pond behind the Tennessee Valley Dam would likely be dewatered prior to beginning construction on the embankment unless a sheet pile wall could be installed to prevent water from the pond entering the dam embankment work area, minimizing the need for dewatering. The channel below the dam would also likely require dewatering prior to filling of the channel. If dewatering at the pond is necessary, the water level would be slowly lowered during the CRLF non-breeding season (April – October) and as late in the dry season as feasible to complete construction before late fall rains. Dewatering would be accomplished through a controlled discharge so as to avoid erosion of the embankment or loss of embankment soils needed for other purposes. The water may be siphoned, a process initiated by short-term pump use, but the pump is not needed continuously. Due to the large volume of water and the limited construction window, it is possible one or more pumps may need to be installed within the pond and operate continuously. The pumps at the pond or a siphon, if used, would be screened and monitored to avoid taking in small aquatic animals.

A possible method to avoid full dewatering of the upstream areas of the pond would be to install vertical, interlocking sheetpile about 20 feet from the dam and parallel to the full length of the dam. This would allow for segregation of a dewatered work zone to construct the apron while

leaving upstream areas with shallow-ponded water. An excavator would press or vibrate the sheetpile into place. To create access for the equipment, the dam surface may need to be widened by excavating some dam material and repacking it adjacent to the dam.

During construction of Pond B and Pond C, and during placement of grade-control structures and flow-diversion structures within the creek, the work would avoid direct contact between equipment and the flowing creek. Either the creek flows would be diverted around the access route to allow construction vehicle and equipment access to Pond B and Pond C or creek flows would be routed through a pipe under the temporary access road crossing. If discharge in the upstream creek is substantial during the work, a coffer dam and additional pump may capture creek discharge to also pump the creek flows around the work zone. A diversion would consist of a small coffer dam or gravel or sandbag barrier and pumps and temporary pipeline to divert flows around the access area to an area downstream of the access route and any work areas within the creek. Sediment-control BMPs would be used to reduce turbidity at the diversion discharge location. Discharges may be distributed via a pipe system into the downstream wetland and close to the beach area to avoid wetting the downstream work zone. Discharge locations are likely to be relocated throughout the dewatering process to distribute sediment deposits, which are beneficial to the downstream wetland where sediment transport has been deficient due to the existing dam. A scour hole within the channel on the downstream side of the dam would also be dewatered during construction in order to construct the earthen aprons.

The channel downstream of the dam would also require localized flow diversion during installation of soil within the channel. Water would be pumped around the active work area and discharged downstream of the work area. The coffer dam removal process would likely be conducted in stages where the channel would receive a small amount of flow to wet the soil and conduct and initial flush with a barrier downstream to collect the sediment. Once the channel has received the initial flush and turbid flows have settled into clear water, flows would be allowed to reenter the dewatered area.

Stockpiling

No stockpiling would occur at the Tennessee Valley Trailhead visitor parking lot. The Haypress Campground or adjacent areas in the Haypress meadow would function as a temporary stockpiling area for removed eucalyptus trees. The tree stockpile may displace a few camp sites temporarily but other camp sites would be available. The fence at the campground, if disturbed, would be reconstructed to existing conditions. Tree removal would target the late fall/winter season, when the campground is typically closed. In a subsequent period, when trees are loaded into trucks and transported to downstream work zones, campground use would be temporarily closed.

Soils transported to the Haypress area for beneficial reuse in the tributary or on the trail would be stockpiled as close as possible to reuse locations. If the material is to be reused in the same season, soils for tributary placement would be stockpiled in areas cleared of weeds along the tributary. Soils for trail repair would be placed on the road or in adjacent areas cleared of weeds. If material for either the tributary or the trail is to be used in a different construction season, it

would be placed at designated locations in the Haypress meadow or the edge of the Haypress Campground where the ground surface is stable and cleared of weeds; all stockpiles would be winterized to prevent runoff and weed seed exposure. Any material placed at the Haypress Campground would occupy a location farthest from the camp sites. Truck trips to and from the stockpiles during dry months, when the campground is open, may be required.

Revegetation

Native plants salvaged during the work or sourced from within the watershed and/or grown in an NPS local nursery would be used for revegetation. Areas of temporary construction disturbance, including the area of the existing pond, surrounding the CRLF ponds, upstream and downstream of the dam embankment, in the wetlands below the existing pond, and at the Haypress Campground and Bettencourt eucalyptus tree removal sites, would be vegetated with a possible combination of seed, sod blocks (blocks of surficial wetland soils salvaged where vegetated marsh plain is disturbed), nursery-grown plants, and willow stakes after final construction grading. Biodegradable erosion control fabric made without any plastic filament (to prevent CRLF entrapment) would be installed where needed to prevent erosion. The NPS would prepare a detailed revegetation plan during project final design.

The NPS would monitor the areas of revegetation and restoration and conduct additional planting, seeding, and non-native plant control in subsequent years, as necessary, based on monitoring results. Post-construction invasive species management would be conducted until dominant native vegetation communities are established.

Site Restoration

All riparian and wetland areas disturbed temporarily by construction access would be restored through revegetation and recontouring to match pre-project conditions. Signs and/or fences would be placed to restrict access to the restoration area during plant establishment.

Construction activities and heavy equipment and truck use of the trail may require additional restoration. Fill from the dam removal would be used post-construction to repair sections of the trail where it currently has an earthen surface The material would be compacted and appropriately graded for safe visitor use. Where the trail has an existing asphalt surface, in the area closer to the trailhead, asphalt would be patched and repaired as needed. Fill from pond construction would be used to repair access routes, if necessary, with minimal compaction to support vegetation establishment. Actions to control erosion after storm events, such as minor fill of rills, or small gullies would be conducted as needed. New groundwater wells would be installed where needed to monitor groundwater elevations of the new CRLF ponds. NPS would prepare a monitoring plan to document and evaluate the evolution of the site post-construction.

2.1.8 Construction Schedule

Project construction would be completed over a three-year period. The general construction schedule is provided in Table 3, below. Construction activities would be timed to occur outside of the CRLF breeding period and during dry months (April–October). The staggered

construction actions would also help ensure completion of activities before winter rains. Eucalyptus would be toppled at least 6 months in advance of installation of grade-control structures.

Table 3 Construction Schedule

Year	Season	Activities	Rationale for timing
Year 1	Winter, by end of January	Topple eucalyptus trees with rootballs attached	Avoid raptor nesting season; allow at least 6 months before placement as grade control
	Summer/fall	Construct CRLF Ponds B and C; install log grade-control and flow deflector structures	Create CRLF breeding habitat and relocation sites prior to dam removal; mobilize across the stream corridor once to minimize construction disturbance
	Summer/fall	Place fill from CRLF ponds in Haypress channel or stockpile	Reuse fill as it is generated
Year 2	Summer/fall	Remove dam; build aprons; fill channel downstream of dam; repair trail adjacent to dam; place earthen grade control upstream of dam	Complete actions in the same area to minimize construction disturbance and minimize impacts on CRLF. Enhance constructability of dam removal and adjacent actions in one season.
	Summer/fall	Use fill from dam to outslope Haypress Road or stockpile material	Reuse fill as it is generated
Year 3 or later	Summer/fall	Construct CRLF Pond D; remove Bettencourt Ranch structures; conduct outstanding actions for restore Haypress wet meadow.	Construct all actions in similar geographic area

Optimally, the beneficial reuse of soil for both the Haypress trail and Haypress channel would occur as downstream material is generated. This could mean that work at the Haypress area is conducted in two separate construction seasons (Year 1 and Year 2) since the dam removal and CRLF pond construction are scheduled to occur in different construction years. Work to restore the Haypress meadow could occur in a separate construction season.

2.1.9 Final Design

Prior to construction, and after approval of a FONSI, the final design process would be completed by NPS. Final design would include development of construction details necessary for the NPS to obtain necessary permits and develop plans and specifications for contractor bidding. The final design would be consistent with the Proposed Action described in this EA.

2.2 No Action Alternative

Under the No Action Alternative, the dam integrity would continue to deteriorate, increasing the public safety risk. NPS would continue to have to close the public trail between the dam and the beach during and after storms until water levels behind the dam subside. Leaving the dam in place would conflict with NPS management policy of providing for visitor safety by removing unnecessary dams. The risk to human health and potential loss of life due to dam failure would remain.

During high flow conditions, the trail at the dam would continue to be closed for safety, limiting beach access. Trail conditions at and below the dam would continue to erode and degrade due to dam overflow. These factors would negatively impact the visitor experience and degrade the natural landscape.

The dam would continue to obstruct transport of sediment to the wetland area downstream of the dam, where aggradation is needed both as a countermeasure to sea level rise and to support the natural process for intermittent lagoon formation. Natural channel and floodplain processes would continue to be obstructed. The channel through the wetland downstream of the dam would persist as an incised feature due to the effect of the culvert in the dam, and the incision would allow the inland encroachment of salt water, converting more of the freshwater wetland to a salt marsh.

Historical imagery has shown a continual decrease in the open water area of the pond as it has filled with sediment and emergent vegetation has become established. The sediment deposition and encroachment of vegetation within the pond would continue under the No Project Alternative, eventually eliminating CRLF breeding habitat.

The Cultural Landscape documents a natural wetland, channel and floodplain landscape. The existing dam is an alteration to the Cultural Landscape. The alteration to the Cultural Landscape would remain and the natural Cultural Landscape would not be returned under the No Action alternative.

NPS would continue facility management by mowing vegetation on the top and downstream face of the dam annually to facilitate inspections of the dam integrity. Dam inspections would continue to be conducted monthly or as needed, particularly during the rainy season. The upstream face of the dam adjacent to the pond is not mowed due to the greater likelihood that CRLF are present in the area. The NPS would continue to conduct rodent monitoring, vegetation removal, and habitat modification at the dam.

In the event of dam failure under the No Action Alternative, NPS would need to conduct emergency response actions to stabilize the area downstream of the dam after the dam failure. The emergency response actions would only include actions to stabilize the area and would not create the long-term environmental benefits of the Proposed Action. A dam failure would likely mean the sudden change in channel gradient would create an incised channel through the pond footprint, drawing down nearby groundwater levels and affecting vegetation communities. In the event of a federal action to address the sudden loss of the dam, NPS would enter into a

consultation with the USFWS to address and mitigate for impacts to the CRLF associated with the federal action.

Due to the above stated conditions, the No Action Alternative would not meet the project's purpose and need.

2.3 Alternatives Considered but Dismissed

Alternatives considered but dismissed are described in the 2020 Feasibility Study (Kamman, 2020). The alternatives listed below were considered but dismissed from further consideration as part of the Feasibility Study because they would not meet the project purpose and need (Kamman, 2020):

- Reduce the dam to a 6-foot-high embankment with minimal pond disturbance
- Stabilize dam with no modification to crest elevation
- Retain the dam and notch a minimum width (15 ft.) spillway
- Retain the dam and notch a creek width (30 ft.) spillway

The alternatives evaluated in the 2020 Feasibility Study that proposed to maintain a dam structure, including reducing it to a 6-foot-tall dam or stabilizing the existing dam, were eliminated from further consideration because maintaining a dam does not comply with DO #40 and would not prevent catastrophic losses due to flood or seismic failure at the dam. Maintaining a dam also does not comply with NPS Management Policies 2006 Section 9.5, which requires NPS to permanently remove obsolete dams that do not contribute to the park's cultural, natural, or recreational resource base or are not a part of the park's water system. The alternatives that involved notching the dam (i.e., 15-foot and 30-foot notch) did not totally avoid the risks of dam failure, and in both scenarios with a notched dam, flood waters would still extend across the valley, with erosive effects on the remnant dam. The notched dam scenarios would thus require reinforcement of the remnant dam, which is contrary to the interest of NPS and project goals.

The NPS evaluated the Proposed Action and removal of the entire dam embankment with options of either filling, or not filling the existing pond through a CBA process. During the CBA process, both alternatives that involved removal of the entire dam embankment were determined to have greater risks and challenges for constructability and would be more expensive to implement than the Proposed Action.

2.4 Mitigation and Best Management Practices

Appendix A contains BMPs that would guide project implementation and a BMP table that summarizes BMPs in the EA. No mitigation measures are proposed in addition to the BMPs included in the project. Construction of the CRLF ponds is included as part of the Proposed Action and NPS would conduct monitoring and adaptive management of the CRLF ponds and restored habitats to ensure that the restored habitats are successful.

3 Affected Environment and Environmental Consequences

NEPA requires that documents address the environmental impacts of a proposed federal action and any adverse environmental effects that cannot be avoided should the project be implemented. This chapter describes the existing environment and the environmental impacts associated with the Proposed Action and No Action alternatives.

A list of resource issues related to the Proposed Action were identified through internal NPS scoping, agency and tribal consultation, and the public communications during conceptual planning. Section 3.1 Resource Issues Considered but Dismissed from Further Analysis lists issues that were dismissed from further analysis and the reason for their dismissal. Section 3.2 Resource Issues Retained for Further Analysis contains the list of resource issues retained for further analysis, which are described in detail in Section 3.3 Affected Environment and Environmental Consequences.

3.1 Resource Issues Considered but Dismissed from Further Analysis

The resource topics listed below are not considered further for analysis because the associated impacts are unlikely to occur, are not potentially significant, or are not a point of public or agency contention. Additionally, the following resource topics are not central to the action, are not of critical importance, or necessary to make a choice between alternatives. Additional resource topics considered under CEQA are considered in Appendix B.

3.1.1 Socioeconomics and Environmental Justice

All proposed actions are contained wholly within the park's boundaries and would not have impacts to local or regional population or housing. No population group would be disproportionately impacted by any alternative.

3.1.2 Indian Trust Resources

No Indian trust resources occur within the action area (area of direct and indirect effects). Therefore, no Indian trust resources would be affected by the Proposed Action.

3.2 Resource Issues Retained for Further Analysis

The following resource issues were retained for further analysis:

- Public safety
- Water resources and quality
- Wetlands
- Floodplains
- Threatened and endangered species
- Vegetation
- Wildlife
- Fisheries

- Historical properties
- Visitor use and experience
- Hazardous materials
- Geology and soils
- Transportation
- Air quality
- Visual resources
- Soundscape
- Utilities and service systems

3.3 Affected Environment and Environmental Consequences

This Section includes a description of the affected environment (existing conditions) for each of the resource issues listed in Section 3.2 Resource Issues Retained for Further Analysis and the environmental consequences (impacts) of the Proposed Action and No Action alternatives for each of the resource issues.

One of the reasons NEPA documents are prepared is to determine whether the potential for significant impacts exists, either adverse or beneficial. Significance is determined by considering the context, duration, and intensity of the impact. Potential impacts associated with the Proposed Action and No Action alternatives are described in terms of type, context, intensity, and duration.

- Type (*beneficial* or *adverse*; *direct* or *indirect*):
    - A *beneficial* impact would improve resource conditions; an *adverse* impact would deplete or negatively alter the appearance or condition of resources.
- Affected Area (*local* or *regional*):
    - A *local* impact is one that occurs within the immediate vicinity of the proposed project areas.
    - A *regional* impact is one that occurs on surrounding lands and/or in adjacent communities.
- Degree (*negligible*, *minor*, *moderate*, or *major*):
    - A *negligible* impact is barely detectable and would have no discernible effect.
    - A *minor* impact is detectable and measurable but would not be expected to have an overall effect.
    - A *moderate* impact is clearly detectable and could have an appreciable effect.
    - A *major* impact is one that has a substantial, highly noticeable effect.
- Duration (*short-term* or *long-term*):
    - A *short-term* impact is temporary, generally lasting for the duration of the project activities or construction period associated with project activities.
    - A *long-term* impact is typically an effect that would last several years or more beyond the date the project is fully implemented.

NEPA also requires consideration of cumulative effects and measures to mitigate impacts. Cumulative impacts consider actions of the past, present, and reasonably foreseeable future, in combination with the direct and indirect effects of the proposed action. There are no other

reasonably foreseeable future actions within the Tennessee Valley watershed. The proposed action is restorative in nature, with project features designed to amend past land use actions in the watershed. Therefore, impacts to watershed resources would not be additive in nature to impacts of past actions. Cumulative effects resulting from the proposed action are not discussed further in this EA because no cumulative effects would occur.

Table 4 Long-term Impact Conclusion Summary

Resource Area	Type
Public Safety	Beneficial, direct
Water Resources and Quality	Beneficial, direct
Wetlands	Beneficial, direct
Floodplains	Beneficial, direct and indirect
Threatened and Endangered Species	Beneficial, direct and indirect
Vegetation	Beneficial, direct
Wildlife	Beneficial, direct and indirect
Fisheries	Beneficial, direct
Historical Properties	No effect
Visitor Use and Experience	Beneficial, direct
Hazardous Materials	Negligible, indirect
Geology and Soils	Beneficial, direct
Transportation	No effect
Air Quality	No effect
Visual Resources	Beneficial, direct
Soundscape	No effect
Utilities and Service Systems	No effect

Impact analyses providing determinations of impact significance associated with CEQA requirements to support subsequent use of this EA as a CEQA equivalent document are included in Appendix B.

3.3.1 Public Safety

Affected Environment

Hydraulic analyses showed that if the dam fails when impounded water elevations are high, the water released to the beach could reach a depth and velocity sufficient to cause an injury or fatality (U.S. Bureau of Reclamation, 2017). The dam has been determined to be a high risk due to its poor condition, with existing erosion patterns and lack of seismic engineering standards (U.S. Bureau of Reclamation, 2017). The dam is subject to a sudden failure due to its lack of seismic engineering. During high-water events, the trail between the dam and the beach is closed, signage is posted and public notices are released stating that the Tennessee Valley trail is closed at the dam and beach access is prohibited. The NPS monitors weather forecasts and would close the trail ahead of storm events for public safety. The signage remains until the NPS determines water levels have returned to a level determined safe for public access and use. In

recent years, closures of the trail have extended for several weeks while the trail was unsafe. The risk of dam failure and flooding of the beach increases over time.

Environmental Consequences

No Action

The No Action Alternative would perpetuate the existing public health and safety risk due to the dam remaining in place. The trail for beach access would continue to be closed for indefinite amounts of time to protect public safety when water levels are high. NPS would continue to conduct monthly inspections and the dam would remain jurisdictional under the NPS Dam Safety program.

No Action Conclusion

The No Action Alternative would result in short-term and long-term, direct, adverse impacts on public safety due to the continued public health and safety risks posed by the potential for dam failure.

Proposed Action

The Proposed Action includes a 3-foot remnant berm at the location of the existing dam. At a maximum 3-foot depth, the impounded water would no longer pose a serious downstream hazard or risk to beachgoers, and the 3-foot berm would not be classified as a dam. If the 3-foot berm were to fail while water was impounded, flows at the beach would be at a depth and velocity below a level that poses a serious risk to visitors (Kamman, 2020). The Proposed Action would provide long-term beneficial impacts to public safety due to the removal of the dam. Dam removal eliminates the hazard and risk associated with the potential for dam failure. The Proposed Action would meet the terms of the project purpose and need to address DO #40 for dam safety. The project would be consistent with NPS public safety goals and would improve safety for visitors.

Due to the use of the main trail as a construction access route, the Proposed Action would result in short-term, minor, adverse impacts to public safety along the trail during construction. The BMPs include development of a Visitor Use Access and Safety Plan (VIS-1, VIS-3, VIS-3 in Appendix A), which would incorporate safety measures to reduce potential safety risks to the public during construction.

Proposed Action Conclusion

The Proposed Action would have a long-term direct beneficial impact to public safety by removing the hazard posed by the dam.

3.3.2 Water Resources and Quality

Affected Environment

Surface water hydrology

Tennessee Valley is a 2.35-square-mile coastal watershed that contains a creek and several perennial and ephemeral tributaries along with numerous springs and seeps. The creek, which is

obstructed by the existing earthen dam, is the primary source of water for the impounded pond. Water flows from the pond through a culvert in the dam to a channel and adjacent wetland area before discharging to the Pacific Ocean.

The pond currently extends over approximately 2.7 acres and impounds approximately 14-acre feet of water (in winter/summer), with depths ranging from 3 to 12 feet (Kamman, 2020). Since the approximate 1960 construction date of the dam, sediment deposition has reduced the total pond area by almost by half of its estimated original size. Much of the area of sediment deposition is now covered by cattails, which provide some stability to the deposits. The dam substantially reduces natural sediment deposition in the downstream wetland area where it would counteract the encroachment of the rising sea level.

Pond monitoring data collected by NPS since October 2014 indicates that water levels remain at or above the dam outfall culvert invert elevation in wet months but are typically below the culvert invert elevation in summer and dry years (i.e., years of below average cumulative rainfall). Typical summer/fall surface baseflow and subsurface groundwater flows reach the dam and maintain full ponding and saturated shallow groundwater conditions around the pond (Kamman, 2020).

The NPS has maintained monitoring gauges to measure stream flow on the creek near the Coastal Trail crossing since January 2016. Winter high flows in the creek exceed the channel top-of-bank elevation on an annual basis and frequently reach the adjacent floodplain terrace. Stream flow is typically perennial; however, during very dry years there has been no flow by late summer. Most years during the summer months the creek generally maintains a depth of 1 foot in the channel pool where the stream gauge is located (Kamman, 2020). The dry season baseflow in the creek is maintained by springs, seeps, and alluvial groundwater.

Water quality

The NPS San Francisco Area Network (SFAN) Inventory and Monitoring Program conducted water quality monitoring at three locations in Tennessee Valley between 2010 and 2020 (Denn & Iwaki, 2021). The analysis was focused primarily on monitoring potential water quality impacts to the creek from the Miwok horse stables and the immediate downstream area, at the upper end of Tennessee Valley and is not relevant to analysis of the Proposed Action. Turbidity is the water quality issue of most concern for the Proposed Action. No measurement of existing turbidity is available at or below the dam and RWQCB does not have established objectives for turbidity in SFAN streams. NPS has conducted some water quality sampling below the dam, focused on salinity measurements. Water quality in the creek at the upper watershed, below the stables is generally considered excellent, except for some occasional exceedances of objectives for dissolved oxygen, pH, nitrate, total coliform, and E. coli. Measured turbidity values peaked in March of each year with spring flows and is lowest in the fall. This pattern is anticipated to be consistent throughout the watershed. Erosion is observed along the trail, at the dam, and in the incised and scoured channel downstream. While no water quality data is available below the dam, the erosion likely causes increased turbidity downstream of the dam.

Groundwater

Most of the groundwater in hillslopes bounding Tennessee Valley is stored close to the surface in fractured and weathered bedrock, which supplies water to local springs. There are numerous springs and seeps within the Tennessee Valley watershed, with flow rates that range from 0 to 10 gallons per minute (Kamman, 2020). Groundwater in the valley bottom is contained underground between rocks and soil, referred to as *valley-fill alluvium* and *colluvium*.

Six groundwater-monitoring wells, called *piezometers*, were installed in Tennessee Valley to investigate groundwater conditions. The three piezometers installed in lower Tennessee Valley indicated that the seasonal water table remains within 2 feet of the ground surface, with periods of standing water during the winter months (Kamman, 2020). This is attributed to the dam maintaining higher groundwater elevations upstream of the dam. The three piezometers installed at the former Bettencourt Ranch locations indicate that the groundwater levels at two of the locations fluctuate between 6 and 10.5 feet below ground surface, while the third location remains at only 2 feet below ground surface (Kamman, 2020).

Environmental Consequences

No Action

Under the No Action Alternative, the dam would remain in place and would continue to impound the surface-water flow and sediment, while maintaining higher groundwater levels. Natural channel and floodplain processes would continue to be obstructed. Downstream of the dam, channel incision would persist, and the downstream wetland would continue to have a deficit of sediment deposits. The trail adjacent to the dam would continue to function as a flow bypass; little added erosion is likely to occur on most of the trail since erosion has extended to bedrock, but the trail cannot be resurfaced without adding pressure of high flows to the dam. Edges of the trail could erode further, however, leading to dam failure. In the event of dam failure, the No Action Alternative would result in the release of the entire volume of water in the pond and sediment at the dam onto the downstream wetlands and beach, which would cause flooding, sediment deposition, and erosion downstream.

No Action Conclusion

The No Action Alternative would result in short-term and long-term, direct and indirect, adverse impacts to water resources and water quality. The No Action Alternative would continue to obstruct natural channel and floodplain processes and sediment transport and would perpetuate downstream channel incision.

Proposed Action

The Proposed Action Alternative would require construction access, vegetation removal and grading, and an increase in motorized traffic on the trail, which could temporarily increase sediment loads to the creek during and immediately following construction until the disturbed areas have been revegetated and achieved stabilization. During construction, minor direct and indirect adverse effects from sediment and increased turbidity would occur for a short duration and at a near distance from the source. Implementation of a Stormwater Pollution Prevention

Plan (SWPPP), sediment and erosion control best management practices, measures to control dewatering (refer to BMPs GENERAL-2 and GENERAL-3, DW-1, DW-4, DW-5, Water-1, and WATER-2 in Appendix A) would reduce and/or minimize potential adverse impacts to water resources and quality during construction. The Proposed Action would result in minor, short-term impacts on water resources and quality. The project design features (aprons and grade-control structures) would also reduce and/or minimize potential adverse impacts to water resources by reducing channel incision.

Based on recent research about common patterns of sediment movement after dam removals, stored sediment is likely to be released in two phases. The first phase of sediment release is the largest and would most likely occur during modest flows in the first winter after construction. The second common phase of sediment release occurs more slowly in subsequent years and is associated with larger flood events (Collins et al., 2017). Some sediment transport may be slowed during modest flows in early years while it is deposited in the deep areas behind the remnant berm, but since flows would routinely overtop the berm, sediment would still be transported downstream. Since downstream deposition is considered beneficial for maintaining freshwater wetlands and an intermittent lagoon impoundment, the added volume of sediment transport, even if turbidity is temporarily high, is a minor impact. In the short-term post-construction, minor increases in sediment loads would be expected while the floodplain is allowed to adjust to a natural flow state with vegetative cover. Project actions, including installation of grade controls and flow diverters, installation of aprons along the 3-foot embankment, and filling of the scour hole downstream of the dam, are specifically designed for erosion control during the watershed transition period. The project actions would promote sheet flow across the floodplain and allow sediment loads to be transported to downstream wetlands. It would eliminate downstream incision and allow the downstream wetlands maintain freshwater conditions which are less subject to salt-water intrusion. Dam removal would cause current groundwater levels to decline in the upstream wetlands and allow levels to return to a more natural seasonal variation. The Proposed Action would also increase floodplain storage of groundwater downstream of the dam. Combined with the return of sediment flows, the increase floodplain storage should help to prevent further saltwater encroachment at the dunes.

Proposed Action Conclusion

The Proposed Action would result in short-term, local, minor adverse impacts on water resources and quality. Long term impacts from dam removal, pond dissipation, and installation of the grade control features, would restore more natural stream channel flow patterns and improve floodplain functions. Repair of the existing incision downstream of the dam would help to prevent new erosion and increase groundwater levels in the adjacent wetlands, which would help to prevent further saltwater intrusion into the freshwater wetland area. Impacts would be directly beneficial over the long term as the Proposed Action would restore a more natural hydrologic setting.

3.3.3 Wetlands

Affected Environment

Wetlands are areas inundated or saturated by water either all year or for varying periods throughout the year, including the growing season. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic hydric soils. Wetlands can store large amounts of water, reducing the severity of flooding during storm events and slowly releasing water during drier times. They also contribute to nutrient cycling, sediment capture, water filtration and purification, and groundwater recharge.

Aquatic resource delineations to identify wetlands and other jurisdictional waters were performed for three study areas within Tennessee Valley where Project actions would occur. The first took place in 2015, covering 26.7 acres of the lower Tennessee Valley from the beach to the Coastal Trail footbridge (Denn, Ryan, & Ward, 2015). Another field investigation was performed in 2021 for 0.35 acre in the Bettencourt area (Denn, Ryan, & Ward, Delineation of Potential Jurisdictional Wetlands and Other Waters, Bettencourt Area, Tennessee Valley, 2021), and the last was in 2022 for approximately 14.8 acres in the Haypress area and meadow (Panorama Environmental, 2022). Table 5 presents acres of wetlands mapped within these areas.

Most of the wetlands within the Project area are *palustrine* (Denn, Ryan, & Ward, 2015). Palustrine systems include all nontidal wetlands dominated by trees, shrubs, persistent emergent vegetation, and/or emergent mosses or lichens and any such areas within tidal systems where ocean-derived salinities are less than 0.05 percent. The most common types are freshwater wetlands and riparian wetlands, reflecting the large wetland-meadow–riparian complex that dominates most of the lower valleys.

Table 5 Existing Wetland Conditions in the Project Area

Habitat type	Total area mapped (acres)[a]
Freshwater wetland	9.92
Riparian wetland	9.05
Scrub-shrub riparian	0.04
TOTAL	**19.01**

Notes:
[a]Includes the Haypress meadow, Bettencourt Ranch site, existing pond area, and downstream of the dam.

In the upper watershed, the stream channel is typically deeply incised, remaining disconnected from the adjacent floodplain even during periods of high runoff. Wetland resources adjacent to the mainstem creek channel are limited in the upper watershed due to the channel incision. Downstream of the Coastal Trail bridge, the valley broadens and stream gradients and channel incision decrease, and it is largely occupied by riparian and freshwater wetland communities (Kamman, 2020). Within the area of dam influence, the valley is more persistently saturated and freshwater wetlands have expanded across the floodplain. The dam creates a backwater that extends upstream beyond the area of impounded water, which varies with low or peak flood

conditions.

The open-water pond area behind the dam varies over a 500-foot reach between wet and dry seasons, and depths can range from 3 to 12 feet deep (Kamman, 2020). The pond is subject to infilling due to increased sedimentation, vegetation encroachment, and accumulation of organic material. The total volume of the pond is declining as the pond fills in with sediment. This successional trend, typical of impoundments with artificially stabilized water levels, includes establishment of marsh areas along the pond fringe dominated by non-native submerged and floating aquatic vegetation.

The densely vegetated freshwater wetlands downstream of the dam extend into the more brackish (slightly salty) back dune marsh. Sea level rise and channel incision downstream of the dam has resulted in causing a gradual conversion of the freshwater wetlands downstream of the dam to brackish marsh over time. Historically, a coastal lagoon formed intermittently in this area. However, beach scour due to sea level rise and large storm events, as well as sediment capture by the dam, likely reduced the size, frequency, and persistence of freshwater lagoon formation (Kamman, 2020).

Environmental Consequences

No Action

Under the No Action Alternative, the earthen dam would not be removed, and the elevation of the dam crest would remain at its current elevation. The dam would continue to keep groundwater elevations in wetlands upstream of the dam elevated, supporting perennial wetlands. The open water habitat created by the impoundment would likely continue to fill with sediment and encroaching non-native aquatic vegetation. No restoration activities would take place to enhance the wet meadows at Haypress or wetland and riparian habitat in the footprint of the existing pond. With sea level rise, storms would be more likely to flood the freshwater marsh and channel downstream of the pond, and the freshwater marsh downstream of the dam would be expected to transition more quickly to a saltwater marsh.

No Action Conclusion

The No Action Alternative would have no short-term impact to wetlands and would maintain high groundwater elevations for perennial wetlands just upstream of the dam, but would have long-term, adverse impacts to wetlands due to the continued displacement of natural wetlands and riparian habitat and the lack of natural sediment deposits downstream of the dam.

Proposed Action

During construction, the Proposed Action would result in short-term, direct, adverse impacts to wetlands due to construction access through wetland habitats and sedimentation in wetland areas due to ground disturbance. All riparian and wetland areas disturbed by construction access would be restored through revegetation and recontouring to match pre-project conditions. Signs and/or fences would be placed if needed to restrict access to the restoration area during plant establishment. All applicable BMPs and “Conditions for Proposed Actions with the Potential to Have Adverse Impacts on Wetlands” in Director’s Order DO #77-1 (Wetland Protection) would

be incorporated into the Proposed Action and are included as BMPs in Appendix A (see WET-1 through WET-4, GENERAL-1, GENERAL-2, and GENERAL-3). Upon project completion, access routes would be replanted with native vegetation and would revert to existing conditions. With implementation of BMPs, construction impacts on wetlands would be short-term and minor.

Post construction, a remnant pond would remain behind the 3-foot berm at the former dam location. As the pond dissipates, it is anticipated that the area would transition from open water to low marsh in the short term and then to seasonally saturated meadow in the long term. Riparian vegetation would take hold at edges and eventually throughout much of the existing pond footprint. The remnant pond behind the berm, as well as the smaller newly constructed frog ponds, could become infested with non-native parrot feather (*Myriophyllum aquaticum*) or other invasive aquatic or emergent vegetation from an increase in shallow ponding and/or from introduction during construction activities. Invasive aquatic weeds would be removed manually as needed to control any infestations and preserve the ponds as valuable habitat.

In general, dam removal with a remnant berm is not expected to result in conversion of wetland to upland because saturated conditions would continue to occur annually (in winter) in the upstream wetlands previously influenced by the dam backwater. Groundwater levels would fluctuate seasonally in a natural pattern similar to what would have occurred before the dam was constructed. Changes in vegetation communities are not expected upstream of the pond's backwater influence. Within the area of existing dam backwater, shifts in the mosaic of wetland communities are anticipated, with the general trend being towards drier communities, from saturated wet meadow to seasonally saturated meadow. Changes in the composition of the robust wetland vegetation communities within the dam's area of influence would depend primarily on the variable duration and extent of dry season saturation. The increase in sediment flow and channel fill downstream of the dam would allow for increased groundwater storage, reducing saltwater intrusion, and benefit wetland communities.

Downstream of the dam, the fill to the incised channel would raise groundwater elevations in the adjacent wetlands and support persistence of freshwater wetland conditions. Fill to the incised Haypress drainage and proposed meadow restoration actions are also expected to increase wetland areas by increasing overbank flooding. Anticipated vegetation community changes post construction, including both short term and long term, are described in Table 6 and shown in Figure 7.

Figure 7. Post-Construction Habitat Types – Long Term (>5 Years)

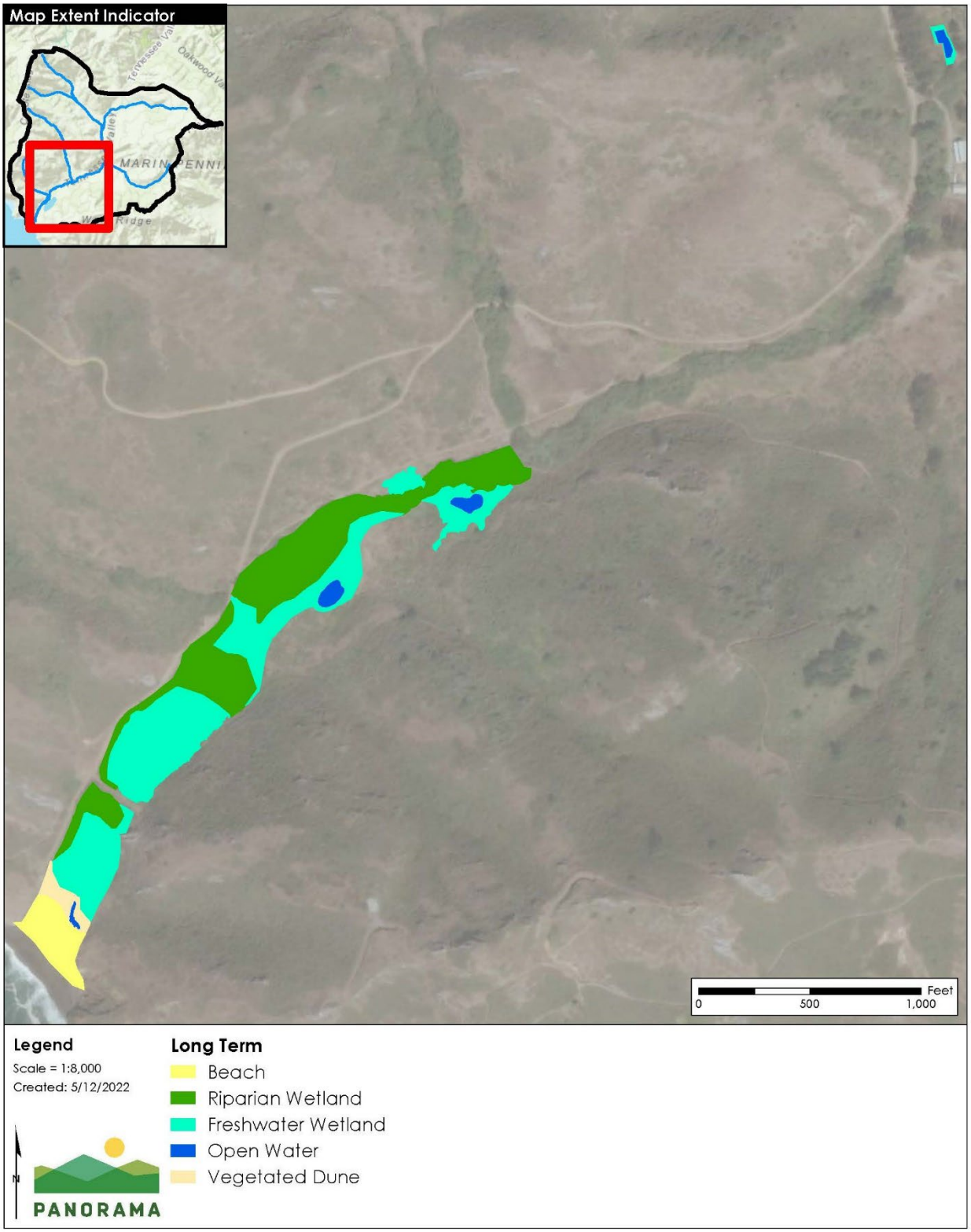


Table 6 Estimated Wetland Vegetation Transitions Within Proposed Action Area of Effect

	Acreage			
Habitat type	**Existing conditions**	**Post construction**	**Short term (< 5 years)**	**Long term (> 5 years)**
Freshwater wetland	9.92	10.52	10.84[a]	9.64
Riparian wetland	9.05	9.05	9.05	10.25
Scrub-shrub riparian	0.04	—	—	—
TOTAL	**19.01**	**19.57**	**19.89**	**19.89**

Notes:
[a]Includes the remnant pond, area downstream of the embankment, lagoon, and emergent marsh portions of proposed CRLF ponds (50% of pond area).

Proposed Action Conclusion

The Proposed Action would result in a short-term, local, adverse impact to wetlands during construction and access in wetland areas. The Proposed Action would have a long-term, direct, beneficial impact to wetlands due to the creation of hydrologic conditions that would support increased wetland habitats, reduction in active channel incision at Haypress, and increased hydrologic connectivity throughout the lower watershed. The proposed fill to the channel downstream of the dam would also promote the long-term sustainability of the freshwater marsh by maintaining more freshwater in the wetland areas with increased overbank flooding of the wetlands.

3.3.4 Floodplains

Affected Environment

The lower Tennessee Valley area, downstream of the Bettencourt Ranch and upstream of the dam in areas where the channel is not excessively incised experiences seasonal, temporary overbanks typical of a natural floodplain. At the dam, the adjacent visitor trail is flooded during periods when flows bypass the dam, and the beach and downstream wetlands can be inundated by storm surge and wave overwash from the ocean. The Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps (FIRM) for Marin County were evaluated and determined to be an incomplete representation due to much of the valley being classified as Zone D, not evaluated. Natural floodplain function is obstructed by the dam. Flooding of the trail adjacent to the dam occurs on a regular basis during the winter season.

Environmental Consequences

No Action

The creek would continue to seasonally flood and access the floodplain at the same frequency as with existing conditions. The dam failure risk and associated flooding hazard and risk to human health and safety would remain. Flood flows would continue to overtop and erode the adjacent trail, and the dam would continue to restrict natural floodplain functions.

No Action Conclusion

The No Action Alternative would result in long-term, adverse impacts to floodplains due to the continued flooding risk at the dam.

Proposed Action

The Proposed Action would allow full floodplain function, and high flow events would still inundate the valley floor and beach; however, the risk of dam breach and associated flooding would be removed. The Proposed Action would restore sheet flow across the lower valley floodplains. The valley would persist as a broad floodplain, with more natural flows. The Proposed Action would eliminate trail erosion adjacent to the dam. Installation of large woody debris, log grade-control structures, and flow diversion structures within the creek would promote floodplain rejuvenation from sediment deposition within and overbank of the channel. The Proposed Action would be expected to result in minor reduction in peak flow rates within the creek due to the wet meadow restoration in the upper watershed around Haypress, which would increase retention in the upper watershed.

Proposed Action Conclusion

The Proposed Action would result in long-term, direct and indirect, beneficial impacts to floodplains by restoring natural channel and floodplain processes. The Proposed Action would result in enhanced floodplain storage and promote sheet flow across the floodplain to reduce peak flow rates. The Proposed Action would also remove the current risk of flooding from dam failure.

3.3.5 Threatened and Endangered Species

Affected Environment

There are two federally listed species with the potential to occur in the project area: California red-legged frog (*Rana draytonii*) and tidewater goby (*Eucyclogobius newberryi*).

California red-legged frog

The CRLF is listed by the USFWS as a threatened species and is also a California species of special concern. USFWS designated critical habitat for this species in 2010; however, no critical habitat overlaps with the Project area (CFR Title 50 Part 17). Habitat for CRLF includes ponds and other permanent slow-moving waterbodies such as lakes, reservoirs, slow streams, marshes, and bogs. Adults require dense, shrubby, or emergent riparian vegetation closely associated with deep (>3 feet) still or slow-moving water.

CRLF is the largest native frog found within GGNRA. All life stages are known to occur in the Tennessee Valley watershed (National Park Service, 2022). The freshwater pond created by the dam supports annual breeding of the CRLF. This is a unique ecological service in the watershed because it may provide the only opportunity for breeding in extended drought and is one of few available breeding sites in the general area (Kamman, 2020). The pond for CRLF breeding is progressively filling with sediment and there is increasing encroachment of non-native wetland and aquatic vegetation. Non-breeding habitat includes drainages and wetlands within 1 mile of

breeding habitat.

GGNRA has been monitoring long-term trends of red-legged frogs at known breeding sites within the park. Monitoring is focused on the number of active breeding locales (occupancy) and the number of egg masses by watershed. Overall, the park's breeding population appears to be increasing since the onset of breeding surveys in 2001. Recent breeding surveys in Winter 2018 documented a dramatic increase in the number of egg masses at the Tennessee Valley pond coincident with the increase in emergent aquatic vegetation (National Park Service, 2022).

Tidewater goby

The tidewater goby is a federally listed endangered species. It is a small benthic fish that occurs in brackish coastal lagoons and lower stream reaches in California. Within the GGNRA, the tidewater goby is known to occur in Rodeo Lagoon in the Marin Headlands and southern Tomales Bay. Surveys for tidewater goby have been infrequently conducted in Tennessee Valley since 2000, with the most recent survey completed in March 2022 (National Park Service, 2022). No tidewater gobies have been detected in any of the surveys, so tidewater gobies are presumed to be either absent or transient in this system. The lagoon at Tennessee Valley provides potential habitat for tidewater goby and is only 1 mile from Rodeo Lagoon. The park has been monitoring salinity and other water quality parameters within the lagoon downstream of the dam (National Park Service, 2022). Salinity is the key determinant for the presence of tidewater goby. The most sensitive life stages are the eggs and larvae. Although adult tidewater gobies have been known to persist in hypersaline conditions, 27 parts per trillion is generally considered the upper threshold for successful spawning. Based on collected water quality data and salinity conditions, there are a total of 750 linear feet of existing slough and lagoon habitat downstream of the dam that serve as potential habitat for tidewater goby. It is possible, under favorable hydrologic events, for gobies from Rodeo Lagoon to be transported and temporarily colonize the slough and lagoon habitat. However, conditions are such that tidewater gobies do not persist. Possible reasons include the presence of non-native mosquitofish (*Gambusia affinis*) and presumed high streamflow velocities during the winter and spring that could wash out poor-swimming tidewater gobies. There is no designated critical habitat for tidewater goby in Tennessee Valley.

Environmental Consequences

No Action

Historical imagery has shown a continual decrease in the open water area of the pond as it has filled with sediment and emergent vegetation has become established. The sediment deposition and encroachment of vegetation within the pond would continue under the No Action Alternative, eventually eliminating CLRF breeding habitat. As a result, CLRF breeding habitat would be at risk in the watershed. There would be no fill of potential tidewater goby habitat. The NPS would continue to conduct vegetation removal, including mowing, and rodent monitoring at the dam, which have a potential to disturb CRLF if they occur in the area of vegetation removal.

No Action Conclusion

The No Action Alternative would result in long-term, indirect, adverse impacts to CRLF. The No Action Alternative would allow the continued sedimentation of the pond and encroachment of emergent vegetation within the impounded pond, resulting in reduced CRLF breeding habitat over time. Potential tidewater goby habitat would not be impacted.

Proposed Action

California red-legged frog

The Proposed Action Alternative would result in short-term, direct and indirect, minor-to-moderate, adverse impacts to the CRLF during construction. Construction activities located in the existing breeding habitat and non-breeding habitat would likely result in direct individual impacts to all life stages of CRLF, and incidental take is expected. Impacts would include potential loss of individuals during excavation and dewatering activities at the dam and during filling of the incised channel downstream of the dam. Heavy equipment used to fill or grade surfaces may harm or kill frogs that are not removed and relocated. Direct impacts are also expected during translocation activities as there may be incidental injury or mortality during capture and relocation of larval, juvenile, and adult frogs. If construction occurs during a drought year, available aquatic habitat for relocation may be limited and may already have high densities of aquatic wildlife. Placing translocated frogs in high-density habitats may reduce individual fitness due to limited food resources and space. As determined by the NPS Biological Assessment (National Park Service, 2022), the Proposed Action "may affect, and is likely to adversely affect" CRLF. Incidental take associated with construction and relocation actions for all life stages is expected. NPS has defined BMPs, including use of a biological monitor, pre-construction surveys, conducting activities in proximity to CRLF breeding habitat outside the breeding season, removing vegetation by hand, use of trained observers during construction, halting activities if CRLF are observed in the area, covering of holes or trenches, and use of loose-weave erosion-control products to address temporary construction impacts on CRLF (refer to BMP GENERAL-1, BIO-1 through BIO-7, and CRLF-1 through CRLF-10 in Appendix A). The proposed BMPs are intended to reduce the severity of construction project impacts. As much as possible, construction would be sequenced to occur during a single season in each geographical area of the site so as to minimize risk of injury, mortality, and rehandling of CRLF. The Proposed Action would have a minor and less-than-significant short-term impact to CRLF.

Post construction, there may be long-term, adverse impacts associated with maintenance activities intended to maintain habitat values. Mechanical removal of invasive aquatic vegetation or treatment with an approved aquatic herbicide may be needed to prevent the breeding ponds from filling in with aquatic vegetation and losing breeding habitat-value. Although the vegetation control activities would be timed to minimize impacts to the larval stage, some unknown number of larvae could be injured or killed.

In the long term, the existing pond is expected to fill with emergent vegetation, resulting in reduced value for consistent breeding approximately 5 years post construction (see Table 7). Though there would be a reduction in the overall acreage of breeding habitat, there would be an increase in the number of breeding sites in the watershed, and the breeding sites would be

Table 7 CRLF Breeding and Non-Breeding Habitat by Construction Year

Evaluation period	Number of breeding sites	Description of breeding sites	Breeding habitat[a]	Modeled non-breeding habitat[d]	Temporary loss of non-breeding habitat	Designated critical habitat
			Acreage			
Existing	1	Impoundment at dam	1.1	104	—	0
Construction year 1	4	Impoundment at dam, new ponds B and C, and Backdoor Pond	1.63	208.4	0.33[f]	0
Construction year 2	3	New ponds B and C and Backdoor Pond[b]	0.53	205.7	0.41[g]	0
Year 3 and post-construction short term (up to 5 years)	4	New ponds B, C and D and remnant of impoundment	0.80	182.1[e]	2.6 to 8.9[h]	0
Post construction (long-term, > 5 years)	3	New ponds, B, C and D	0.48[c]	181.4	0	0

[a]Only the acreage of open water is shown. For new ponds, open water is about 50 percent of the constructed footprint and the rest is emergent vegetation.
[b]The existing pond is not included because it would be dewatered around July of construction year 2.
[c]If the surrounding emergent marsh in the constructed footprint of Ponds B, C and D is added to the open water area, the total area is 0.94 acre.
[d]This includes all areas within 50 m (165 feet) of the associated pond(s), but not the pond(s) themselves, plus all wetland and riparian habitat within 1 mile of the pond(s).
[e]The acreage of non-breeding habitat increases slightly because of the temporary increase in breeding area.
[f]This is based on disturbances to non-breeding habitat in the area just upstream of the existing pond to construct Ponds B and C and install log structures. It includes access routes to new features: 10-foot-wide access routes to new ponds; 10-foot-wide areas around half of the pond perimeters; and 10-foot-wide corridors to 2 log placement locations (an access route for a pond would also function as access route to another log placement location).
[g]This is based on disturbances to non-breeding habitat for dam removal, apron construction, earthen grade-control, and downstream fill placement.
[h]This is based on disturbances to non-breeding habitat in the upper watershed to construct Pond D, remove nearby eucalyptus trees along the channel, and conduct actions along the Haypress drainage. The lower value assumes fill is placed only in a segment of the Haypress drainage. The higher value assumes work is done in most of the drainage along with scraping of the surface of the meadow. Some of these actions may occur in different construction years.

sustainable over the long term with reliable water sources and would not be subject to a sudden blow-out, as the existing impoundment is. Because of the increase in the number of breeding sites, it is expected that the Tennessee Valley population would continue to be self-sustaining. Elements of the project design, such as new breeding ponds within 1 mile of each other, are expected to have long-term, beneficial impacts to the regional population by increasing breeding habitat resilience and connectivity to adjacent watersheds. Project actions would increase the long-term habitat viability for CRLF by diversifying habitat locations and water sources.

Tidewater goby

The Proposed Action would fill 500 linear feet of channel downstream of the dam, which would permanently convert slough habitat downstream of the dam to seasonally flooded, low marsh similar to what is present adjacent the slough now. The existing seasonal, back barrier lagoon would not be filled and would continue to serve as potential transient habitat for tidewater gobies.

Tidewater gobies are not known to occur in Tennessee Valley, or they are transient and do not persist long enough to be detected during surveys. Therefore, even though the Proposed Action would result in loss of potential habitat for tidewater goby due to slough habitat conversion, the existing habitat is considered to be of low value and discountable. It is possible that the Proposed Action may make hydrologic conditions in the lagoon more favorable for future establishment of a small tidewater goby population if the Proposed Action results in lower water velocities in the winter and spring and if the lagoon impoundment intermittently extends over a larger area.

Construction activities are unlikely to result in direct injury or mortality to individual tidewater gobies. The likelihood of their presence in the area at the time of construction is extremely low.

As determined by the NPS Biological Assessment, the proposed action "may affect, but is not likely to adversely affect" the tidewater goby. Direct effects are unlikely to occur based on the absence of tidewater gobies determined from past work. While project actions would reduce the amount of potential available habitat, the existing lagoon would be retained and would serve as transient habitat, as it does now.

Proposed Action Conclusion

The Proposed Action would result in local, short-term, minor-to-moderate, adverse impacts on CRLF as a result of access, dewatering, and removal of CRLF breeding and non-breeding habitat during construction. With implementation of conservation measures and BMPs, the adverse impacts to CRLF would be reduced and would be minor to moderate. The Proposed Action would have a long-term, direct and indirect, beneficial impact to CRLF both locally and regionally. The Proposed Action would increase CRLF resiliency and long-term habitat sustainability by diversifying the breeding habitat locations and water sources. Impacts considered potentially moderate and actions that would potentially result in a "may affect" or "likely to adversely affect" determination are short-term and construction-related, and they would be offset by the long-term benefits to the species from improved habitat features. The Proposed Action is not expected to affect tidewater goby.

3.3.6 Vegetation

Affected Environment

Vegetation communities

Northern coastal scrub and grassland communities comprise a significant proportion of the lower Tennessee Valley (Figure 8). Coastal scrub communities are dominated by coyote brush (*Baccharis pilularis*), California blackberry (*Rubus ursinus*), common yarrow (*Achillea millefolium*), and poison oak (*Toxicodendron diversilobum*). Grasslands include non-native species such as velvet grass (*Holcus lanatus*), oatgrass (*Avena barbata*), ripgut brome (*Bromus diandrus*), and tall fescue (*Festuca arundinacea*) (Denn, Ryan, & Ward, 2015). Grasslands are generally mixed, though velvet grass dominates a significant portion of the mesic grasslands around the edge of wetlands (Kamman, 2020).

The valley bottoms are largely occupied by riparian and freshwater wetland communities (Denn, Ryan, & Ward, 2015). Riparian tree cover is primarily arroyo willow (*Salix lasiolepis*), with a variable understory of slough sedge *(Carex obnupta)*, small-fruited bulrush (*Scirpus microcarpus*), California blackberry, lady fern (*Athyrium filix-femina*), and twinberry (*Lonicera involucrata*).

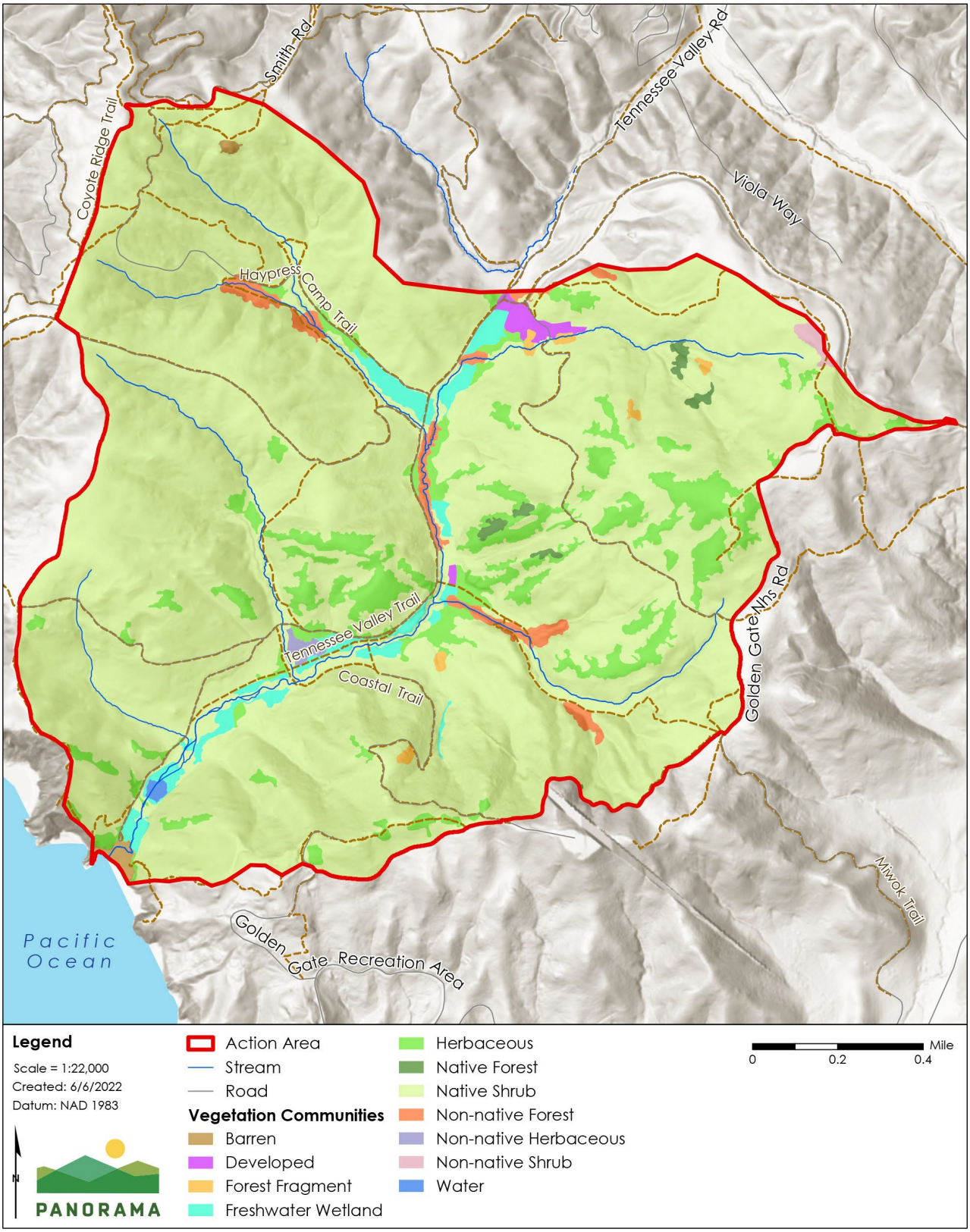
Within the upper watershed, abundant eucalyptus groves (*Eucalyptus globulus*) occupy segments of the valley floor and its riparian woodland corridor, including the Haypress tributary. Shrubs such as California coffeeberry (*Frangula californica*), red elderberry (*Sambucus racemosa*), beaked hazelnut (*Corylus cornuta*), and oceanspray (*Holodiscus discolor*) are also common.

Emergent wetlands throughout the valley bottom are generally dominated by slough sedge *(Carex obnupta)*; however, patches of small-fruited bulrush, common rush (*Juncus effusus*), and salt rush (*Juncus lesueurii*) are also common. Other species commonly found in wetland areas such as water parsley (*Oenanthe sarmentosa*), lady fern (*Athyrium filix-femin*), field horsetail (*Equisetum arvense*), California bee plant (*Scrophularia californica*), and cow parsnip (*Heracleum maximum*) are also present. The wetland-to-upland transition area is often dominated by spreading rush (*Juncus patens*) and tall fescue (*Festuca arundinacea*) (Denn, Ryan, & Ward, 2015).

At the pond, vegetation communities reflect the consistently saturated conditions at and near the surface (Denn, Ryan, & Ward, 2015). The open water portions of the pond are dominated by submerged aquatic vegetation, mainly Brazilian waterweed (*Egeria densa*), and some mats of rooted, floating aquatic vegetation such as large-flower primrose-willow (*Ludwigia hexapetala*) and parrot feather (*Myriophyllum aquaticum)*. Immediately upstream of the pond, areas with up to a few feet of standing water are dominated by broad-leaf cattails (*Typha latifolia)* and hardstem bulrush (*Schoenoplectus acutus*). The open water area at the pond is trending to establishment of emergent vegetation as the pond fills in with sediment over time.

The wetland area immediately below the dam is dominated by a large willow thicket, mostly arroyo willow with some Sitka willow (*Salix sitchensis*) and Pacific bayberry (*Morella californica*). Large patches of slough sedge overgrown with giant vetch (*Vicia gigantea*) occur

Figure 8. Vegetation Communities with the Project Area



downstream, and salt rush growing with common silverweed (*Argentina anserina*) dominate the area towards the mouth of the creek. Salt rush also covers the dune separating the marsh from the ocean. Vegetation communities within the wetland downstream of the dam are trending to becoming dominant with salt tolerant species.

The NPS mows vegetation on the top and downstream face of the dam annually to facilitate inspections of the dam. The upstream face of the dam adjacent to the pond is not mowed due to the greater likelihood that CRLF may be present in the area.

Rare plants

Five rare plant species are known to occur within Tennessee Valley based on surveys conducted from 1999 to 2018. Coast rockcress (*Arabis blepharophylla*), Franciscan thistle (*Cirsium andrewsii*), California bottlebrush (*Elymus californicus*), San Francisco wallflower (*Erysimum franciscanum*), and coastal gumweed (*Grindelia hirsutula var. maritima*) are all documented in the watershed. Most rare plants occur in the upland areas of the watershed; only one, Franciscan thistle, is known to occur in the vicinity of the Proposed Action area. Franciscan thistle has been documented near Bettencourt Ranch. It is endemic to California, where it is known from the coastline of the San Francisco Bay Area, from Marin to San Mateo Counties. It grows in coastal habitats, such as sea bluffs and canyons, and is sometimes found on serpentine soils. The conservation status of Franciscan thistle is California Rare Plant Rank 1B.2, which are species that are rare, threatened, or endangered in California and elsewhere.

Invasive species

The NPS Habitat Restoration Team and volunteers have been conducting restoration activities to combat invasive species in Tennessee Valley for several decades (National Park Service, 2022). NPS manages several species throughout Tennessee Valley, including cape ivy (*Delairea odorata*), French broom (*Genista monspessulana*), oxeye daisy (*Leucanthemum vulgare*), sweet vernal grass (*Anthoxanthum odoratum*) and other problematic perennial grasses (*Ehrharta spp.*), and several ornamental forbs including Mediterranean linseed (*Bellardia trixago*), yellow glandweed (*Parentucellia viscosa*), and harlequin flower (*Sparaxis tricolor*). Tennessee Valley has also benefitted from several Invasive Plant Management Team grants in recent years for projects to address other species and bring their populations down to manageable levels; these include purple pampas grass (*Cortaderia jubata*), invasive conifers (*Pinus radiata*, *Cupressus macrocarpa*), licorice plant (*Helichrysum petiolare*), and cotoneaster (*Cordyline australis*) (National Park Service, 2022). Shallow areas within the existing Tennessee Valley pond have established populations of nonnative parrot feather and Brazilian waterweed. The population of nonnative species within the pond has increased in recent years as the pond has continued to fill in with sediment and the open water area has declined.

The Haypress campground area is managed with regular mowing and has a cover of cultivated non-native grasses and forbs that are sparse or absent within the rest of the valley bottom and adjacent hillsides (Panorama Environmental, 2022). Common species include annual blue grass (*Poa annua*), common chickweed (*Stellaria media*), English plantain (*Plantago lanceolata*), English lawn daisy (*Bellis perennis*), and bristly oxtongue (*Helminthotheca echioides*). The

Haypress meadow proposed for restoration is overgrown by noxious Harding grass (*Phalaris aquatica*).

Environmental Consequences

No Action

The No Action Alternative would include continued vegetation management on the dam and invasive weed management in the watershed. Restoration of native riparian and wetland areas would not occur. Downstream channel incision would continue as would trail erosion, further degrading vegetation communities adjacent the stream. Without restoration, the trail and stream channel may continue to experience erosion and the pond would continue to experience encroachment of invasive species.

No Action Conclusion

The No Action Alternative would result in long-term, minor, indirect, adverse impacts to vegetation due to continued invasive species encroachment at the pond.

Proposed Action

The Proposed Action Alternative would require clearing and grubbing of vegetation within work areas, including vegetation removal in riparian areas, to create access to construction work areas. A total of 284 eucalyptus trees are proposed for removal as part of the Proposed Action (Table 2. Eucalyptus trees have become invasive in California coastal areas and would be removed, with many reused in the restoration as grade control to enhance natural stream and habitat processes. Construction equipment could introduce invasive weeds into the area, and those species could establish in areas of vegetation removal or other soil disturbances. Construction also has the potential to damage or remove Franciscan thistle due to ground disturbance in areas in proximity to a previously documented population at Bettencourt Ranch.

NPS has proposed implementation of several BMPs to protect rare plants, protect plants adjacent disturbance, provide for successful revegetation, and minimize or avoid introduction of invasive species (see GENERAL-3 and BIO-8 through BIO-13 in Appendix A). Areas of temporary construction impacts would be revegetated as part of the Proposed Action to reduce the introduction or spread of invasive weeds. NPS's current invasive weed control actions in the watershed would continue with the Proposed Action.

Proposed Action Conclusion

The removal of riparian and wetland vegetation for construction access would result in short-term, direct, minor, adverse impacts to vegetation. In the long term, the Proposed Action would result in an overall beneficial direct impact to the quality of native plant communities over the broad newly restored channel and floodplain areas and an increase in seasonal wet meadow vegetation, as noted in Table 6. All vegetation removed, including non-native eucalyptus trees, would be replaced with native vegetation.

3.3.7 Wildlife

Affected Environment

Tennessee Valley and the surrounding coastal valley wildlands support a diverse array of native habitats and wildlife communities, extensive freshwater wetlands, and numerous special-status species. Tennessee Valley contains coastal scrub, grasslands, riparian forests, emergent wetlands, open water, and coastal lagoon habitats, all of which provide productive habitats for wildlife species. The Project area has uniquely high ecological values, even when compared to other NPS sites in the vicinity.

The riparian areas provide productive habitats for both breeding and wintering birds as well as numerous mammals, reptiles, and amphibians (Kamman, 2020). The riparian wildlife communities in Tennessee Valley are relatively healthy, with a contiguous corridor that lacks fragmentation or significant dispersal barriers. The valley's close proximity to other protected landscapes and diverse ecological communities within the GGNRA provides natural habitat heterogeneity and benefits to biodiversity.

In 2019, an ecological assessment of Tennessee Valley was completed to identify opportunities and constraints associated with dam removal, including wildlife and wildlife habitat (Kamman, 2020). Various sources consulted identified 219 species of native vertebrates occurring or potentially occurring in the Tennessee Valley watershed, including 26 species of herpetofauna, 167 species of bird, and 26 species of mammal (not including bats). Of these, 26 species were considered special-status species that are listed by federal or State agencies or are locally rare enough to deserve special consideration, including the federally listed threatened CRLF, which is discussed in Section 3.3.5 Threatened and Endangered Species (Avocet Research Associates, LLC, 2020). Special-status species and their potential to occur in the area are listed in Table 8.

Table 8 Special-status Species Known, or with the Potential to, Occur in the Project Area

Species	Status	Potential to Occur	Habitat
Herpetofauna			
Northwestern pond turtle (*Actinemys marmota*)	SSC	Low	Found in still or slow-moving watercourses, with abundant vegetation and either rocky or muddy bottoms, in woodland, forest, and grassland. NPS surveys did not detect any presence in the Project area during 2014 surveys
California giant salamander (*Dicamptodon ensatus*)	SSC	Moderate	Occurs in wet coastal forests in or near-clear, cold, permanent and semi-permanent streams and seepages
California red-legged Frog (*Rana draytonii*)	FT, SSC	Present	Ponds and other permanent slow-moving waterbodies such as lakes, reservoirs, slow streams, marshes, and bogs
Birds			
Common	LR	Low	Inhabits mostly shrubby, open areas in arid

Species	Status	Potential to Occur	Habitat
poorwill (*Phalaenoptilus nuttalli*i)			environments; tends to avoid both grasslands with heavy ground cover and forests
Northern harrier (*Circus hudsonius*)	SSC	High	Found in many kinds of open terrain where there is good ground cover; often found in marshes, especially in nesting season, but sometimes will nest in dry open fields
Northern spotted owl (*Strix occidentalis*)	FT, ST	Low	Found in coniferous forest, including second growth and remnant stands of Douglas fir, bishop pine, coast redwood, and mixed evergreen–hardwood habitats comprised of tanbark oak, coast live oak, and California bay. The Northern spotted owl was not detected during previous surveys of the Project area and no nesting habitat occurs within the project area
Long-eared owl (*Asio otus*)	SSC	Moderate	Prefers dense trees for nesting and roosting, open country for hunting; often found in forest with extensive meadows, groves of conifers or deciduous trees in prairies, or streamside groves in desert
Short-eared owl (*Asio flammeus*)	SSC	Moderate	Found in open country supporting high numbers of small rodents; nests most commonly on tundra, inland and coastal prairies, extensive marshes, farmland; in winter, also found in stubble fields, small meadows, coastal dunes, shrubby areas
Northern saw-whet owl (*Aegolius acadicus*)	LR	Low	Breeds most commonly in coniferous forest; in some places, found in oak woodland or streamside groves in arid country
Common yellowthroat (*Geothlypis trichas*)	SSC	Moderate	Found in swamps, marshes, wet thickets, edges; breeds most abundantly in marshes and other very wet habitats with dense low growth
Yellow warbler (*Setophaga petechia*)	SSC	Moderate	Breeds in a variety of habitat, including woods and thickets along edges of streams, lakes, swamps, and marshes, favoring willows, alders, and other moisture-loving plants
California Clapper Rail *(Rallus longirostris obsoletus)*	E	None	Found California coasts, although there is no salt marsh with tidal channel habitat known in the project area. The species is excluded from evaluation
California Least Tern *(Sterna antillarum brown)*	E	None	Nests on open beaches kept free of vegetation by the tide. The small beach at Tennessee Valley would not support nesting and no breeding records are found within the project area. The species is excluded from evaluation
Marbled Murrelet *(Brachyramphus marmoratus)*	FT	None	Old growth forest for breeding and sheltered waters/open coast for foraging. No breeding records exist in project area or Marin County. Habitat is not

Species	Status	Potential to Occur	Habitat
			present. The species is excluded from evaluation
Western Snowy Plover *(Charadrius nivosus nivosus)*	T	Low	Found on coastal beaches although the small beach at Tennessee Valley would not support wintering or breeding snowy plovers. There is a small possibility that a migrating bird would be on the beach temporarily. The beach is not affected by the project actions, the species is excluded from evaluation
Yellow-billed Cuckoo *(Coccyzus americanus)*	T	None	Nests in riparian willow often mixed with cottonwoods. Rare and not known to nest in Marin County. Habitat not found within the project area; the species is excluded from evaluation
Mammals			
Vagrant shrew (*Sorex sonomae*)	SSC	Moderate	Optimal habitats are valley foothill and montane riparian, aspen, wet meadow, annual and perennial grasslands, and fresh and saline emergent wetlands; also occurs in a variety of chaparral and wooded habitats
Ornate shrew (*Sorex ornatus*)	SSC	Moderate	Mostly found in valley foothill and montane riparian areas; also occurs in a wide variety of woodland, chaparral, grassland, and emergent wetland habitats. NPS does not have documentation of the species being present within the project area.
Western spotted skunk (*Spilogale gracilis*)	LR	Present	Prefers rocky bluffs and brush-bordered canyon stream beds; makes dens in rocky outcrops or hollow logs. These skunks are rare in Marin County; however, one was previously documented at the pond within the project area.
Ringtail (*Bassariscus astutus*)	LR	High	Prefers to live in rocky habitats associated with water; areas can include riparian canyons, caves, and mine shafts; not documented in Tennessee Valley, but habitat is suitable
American badger (*Taxea taxus*)	LR	Low	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils
Salt Mouse Harvest Mouse *(Reithrodontomys ravivenrtis)*	E	None	While found in Marin County, there is no salt marsh habitat known in the project area. The species is excluded from evaluation
Bats			
Yuma myotis *(Myotis yumanensis)*	SSC	Present	Found in cliff crevices, trees, caves, or on modern structures. Known to forage over the pond and has been recorded within the project area
Fringed myotis *(Myotis*	SSC	Present	Found in cliff or rock crevices, large snags, or

Species	Status	Potential to Occur	Habitat
thysanodes)			buildings. Known to forage over the pond and has been recorded within the project area
Insects			
Mission Blue Butterfly	E	None	Known to be in the Marin Headlands, these butterflies are closely tied to known host plants found in grasslands on thin, rocky soils with broader coastal-scrub habitat. While habitat is present, the species has not been observed within the project area and is excluded from evaluation.
Monarch Butterfly	C	Present	Open fields and meadows with milkweed, canyons and riparian areas. Monarchs have been observed in Tennessee Valley since 1990 although the eucalyptus stands present do not provide wind protection necessary for overwintering.
Status Codes: E – Federally Endangered, FT – Federally Threatened, C – Federal Candidate, ST – State Threatened, SSC – California Department of Fish and Wildlife Species of Special Concern, LR – Locally Rare Sources: California Herps; Audubon Society; California Department of Fish and Wildlife			

The existing pond and emergent wetlands provide foraging, nesting, and wintering habitat for numerous species of birds, including waterbirds, shorebirds, and landbirds (Osbourne, 2001). During spring and fall migratory periods, the pond and associated wetlands are visited by an array of other wetland-dependent species. The presence of open fresh water, a relatively rare resource locally, attracts migrating shorebirds. The northern coastal scrub in the uplands forms complex ecotones with adjacent habitat types that support several endemic coastal species that nest in Tennessee Valley.

River otters (*Lontra canadensis*), a furbearing mammal, have been observed using the pond behind the existing dam. Typically, no more than a single otter at a time has been spotted near the dam. However, there was an occurrence of otter breeding at the site in 2014 where two otter pups were observed, and otter pups were observed in the pond again in 2022.

Other notable wildlife in the Tennessee Valley watershed includes bats, which forage over the existing pond. Acoustic monitoring has identified seven species of bats in the area, including two special status species: Yuma myotis (*Myotis yumanensis*) and fringed myotis (*Myotis thysanodes*) (Fellers, 2005). Great horned owls *(Bubo virginianus saturates)* are commonly spotted in the eucalyptus at Haypress Campground. The pond and stream also provide a fresh water source for resident non-avian wildlife, including aquatic gartersnake (*Thamnophis atratus*), California slender salamander (*Batrachoseps attenuatus*), California newt (*Taricha torosa*), Pacific chorus frog (*Pseudacris regilla*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), and possibly mountain lion (*Puma concolor*) (Avocet Research Associates, LLC, 2020).

Environmental Consequences

No Action

Under the No Action Alternative, wildlife use of the area would remain similar to existing conditions. Over time, the open water area at the pond would decrease, reducing the presence of wildlife that use open water habitat.

No Action Conclusion

The No Action Alternative would result in long-term, minor adverse impacts to wildlife as open water habitat decreases over time.

Proposed Action

In the short term, construction activities associated with the Proposed Action would result in noise and temporary loss of habitat that would cause local displacement of species. Birds and other wildlife that are sensitive to noise would generally move away from the active construction area. Some eucalyptus trees proposed for removal may provide nesting bird habitat. Monarch butterflies have not been observed for decades overwintering in the eucalyptus trees that would be removed and impacts to monarch butterflies are not anticipated. The eucalyptus at Tennessee Valley is in linear rows, which does not provide the overwintering wind protection and solar insolation that monarchs need during the winter.

All vegetation and tree removal would be conducted outside of songbird nesting season (March 1–July 31) and, for tall trees, raptor nesting season (Feb 1 to July 31) in accordance with BMP BIO-8 (Appendix A). If vegetation removal is not feasible outside of the nesting season, a biologist would be present during the vegetation removal to monitor for nesting activities and implement avoidance measures during the vegetation removal process to ensure the vegetation removal does not cause the loss of any bird nests or eggs or adversely affect nesting activities until the young have fledged the nest.

Dewatering of the pond behind the Tennessee Valley dam and removal of the dam would displace any otters that are using the area. Activities within the pond and 1 mile of CRLF breeding habitat would be conducted April to October in accordance with BMP CRLF-1, which would avoid construction activities during the otter breeding season. NPS would also monitor for the presence of river otters and implement avoidance measures if river otters are present in accordance with BMP BIO-9. The construction displacement of river otters would be a short-term impact. The dam removal would also result in loss of the pond, which would be a long-term impact due to the loss of habitat. While CRLF ponds would be constructed within the Tennessee Valley watershed, the CRLF ponds would not have a direct surface hydrologic connection to the creek and would not be accessible to river otters except during high flow events. While the Proposed Action would result in loss of river otter habitat, the habitat loss would be a minor adverse effect given that river otters could continue to use other stream and pond habitat in the watershed and in nearby watersheds.

Post-construction, wildlife would be expected to return to the area and use the created habitats, including the additional riparian habitat and constructed ponds. The construction impact to

wildlife would be short-term and minor.

Protection of high value ecological resources present in the vicinity of the Tennessee Valley dam was a primary component in the development of the Proposed Action. Although the Proposed Action focuses on the enhancement and preservation of CRLF habitat, CRLF habitat also serves other wetland and aquatic-dependent species. The increase in mature, native riparian species would be a beneficial enhancement for some of the more sensitive wildlife that currently breed or nest in the valley. The impact from loss of the open water habitat at the pond would be offset by the creation of the new sustainable CRLF breeding ponds in the watershed.

Proposed Action Conclusion

The Proposed Action would result in short term, minor, direct, adverse impacts to wildlife due to the temporary displacement of habitat and noise disturbance during construction. These impacts are considered minor as wildlife are anticipated to utilize similar suitable nearby habitat and return post construction. In the long term, minor-to-moderate beneficial direct and indirect impacts to wildlife would be anticipated due to overall ecological watershed health improvements and added riparian and floodplain habitat connectivity; however, minor adverse impacts to river otters would occur due to loss of the existing pond habitat at the dam.

3.3.8 Fisheries

Affected Environment

Several anadromous fish species are present in the regional area surrounding Tennessee Valley. The lagoon below the dam may serve as valuable nursery habitat for juvenile anadromous fish though no special-status fish are known to occur in the area. The freshwater streams within the region are characterized by naturally limited species diversity. The perennial streams in Tennessee Valley may include resident fish species such as threespine stickleback (*Gasterosteus aculeatus*) and prickly sculpin (*Cottus asper*) (National Park Service, 2014). Past fisheries surveys by the (National Park Service, 2022) have identified non-native fish such as mosquitofish present in the pond and downstream.

Environmental Consequences

No Action

Under the No Action Alternative, existing aquatic habitat conditions in the watershed would remain. If dam failure occurred, there could be a temporary obstruction of habitat until the channel re-established. Water quality would also temporarily decline due to the high sediment load. No fish would be injured or killed from construction activities, and no habitat would be lost.

No Action Conclusion

The No Action Alternative would not impact fisheries.

Proposed Action

The Proposed Action would result in impacts to fish species present in the creek at the lower

Tennessee Valley drainage area. Construction activities, including dewatering of the creek below the dam and dewatering of the pond, would temporarily remove habitat for fish. Relocation of any native aquatic vertebrates to suitable areas to the extent practicable would be required prior to implementing the Proposed Action consistent with BMP DW-3 (Appendix A). Implementation of mitigation measures would reduce potential adverse impacts to fish. Construction impacts to fish would be minor and short-term and would have a less-than-significant impact.

The Proposed Action includes filling the channel downstream of the dam, which would reduce or remove habitat for fish within the channel due to the reduced open water area. Post construction, it would be expected that fish would use the lagoon and could migrate back into the creek in the lower watershed if conditions were suitable. The long-term habitat changes would also include shallow flooded freshwater marsh, which is expected to be used by threespine stickleback. The less than 1 acre of long-term reduction in habitat for common fish species stickleback and prickly sculpin would be minor.

Proposed Action Conclusion

The Proposed Action would result in short term, minor, direct impacts to fisheries due to construction activities and dewatering of areas that contain fish. Post construction, fish species would be expected to return to temporarily impacted waters with no long-term adverse impacts identified. Habitat improvement in the long-term would be a direct beneficial impact to fisheries.

3.3.9 Historical Properties

Affected Environment

Tennessee Valley contains lithic resources; access to the ocean; open, flat, relatively stable terraces; a stream with well-developed riparian habitat; and wetlands, and springs, or seeps. This broad resource base does make this area sensitive for prehistoric exploitation and habitation. The Tennessee Valley watershed is generally undeveloped except for NPS facilities which include parking areas, roads, trails, a comfort station, a stable, and a campground. Other developments that pre-date the NPS include a dam, military harbor defense features, and remnant buildings and fences associated with prior ranch and agricultural uses.

NPS has identified six cultural resources within the larger Tennessee Valley area (PaleoWest, 2022). Prehistoric and historic period resources include four archeological sites (P-21-0037, -00535, -00562, and -02666), one shipwreck (P021-000452, listed on the NR), and one ranch district (P-21-002804, eligible to the NR). Due to the lack of integrity, the Bettencourt Ranch was determined to be ineligible to the NR in a 2006 Determination of Eligibility (State Historic Preservation Office, 2007). The California SHPO concurred with the DOE determination that Bettencourt Ranch is ineligible in 2007 (2007). Additionally, there is a Navy turnaround associated with a mine station at the end of the road near Tennessee beach.

PaleoWest conducted an intensive pedestrian reconnaissance survey of all accessible portions of the APE in October 2021. Exposed ground surface within the APE was examined for the

presence of historical or prehistoric site indicators such as foundations, fence lines, ditches, standing buildings, objects, or structures such as sheds as well as concentrations of materials at least 50 years in age. The APE exhibited a low degree of surface disturbance. No artifacts or indicators of prehistoric cultural activity were observed within the APE. Some isolated, non-diagnostic historic-era artifacts were encountered at Pond D near Bettencourt Ranch.

During soil sampling at the proposed new pond locations, excavated sediments were visually inspected for evidence of archaeological material, sediment stratification, or buried landforms such as old surfaces (paleosols), that could have supported human activity (PaleoWest, 2022). No presence of well-developed buried soils or stable surfaces were observed. The survey suggested that either aggradation was continuous for a period or biological and pedogenic factors have destroyed evidence of any buried soils. These observations suggest that the surface in the Tennessee Valley is relatively stable and only minimally aggraded near the proposed pond sites. On this account, buried sites, if present, would likely be near surface and may have been affected by plowing and agricultural activity.

The NPS has identified direct and indirect APEs for the project. There are no historic resources within the direct APE of ground disturbance which consists of the dam removal area, and the new pond construction areas. The indirect APE contains the one known archaeological site in Tennessee Valley proper (P-21-02666). The resource is not near any anticipated ground disturbance for the project and would not be affected by any project actions. The historic Navy coastal turnaround at the end of the road next to the beach is also outside of the direct APE and would be avoided during construction. Similarly, the ranch district (P-21-02804) would be avoided due to its location well outside of the direct APE. The direct APE also includes two small locations of the Fort Cronkhite/Elk Valley historic landscape, and the indirect APE extends into the larger Fort Cronkhite cultural landscape and is part of the Forts Baker, Barry & Cronkhite historic cultural landscape (National Park Service, 2021). The Cultural Landscape is associated with the Fort Cronkhite coastal defense system developed during World War II.

The NRHP listed S.S. Tennessee (P-21-000452) is located on Tennessee Beach (downstream of the dam to be removed). Parts of the wreck are seasonally covered and uncovered due to fluctuations in the levels and amount of sand present on the beach. These fluctuations are predominantly due to wave and tidal forces. The 1853 wreck predates the 1960 dam. When the dam is removed, the creek flow conditions would be restored to the pre-dam conditions (sea level rise notwithstanding) and the site conditions would be returned to the conditions present during the majority of the time the S.S. Tennessee has been stranded on the beach. There is a possibility of more sediment transport after the dam is removed, which would be beneficial for both the beach and for the S.S. Tennessee site and present no change to the wreck.

Environmental Consequences

No Action

Under the No Action Alternative, there would be no ground disturbance or removal of structures and the restoration activities and removal of the dam would not occur.

No Action Conclusion

No impacts to historic properties would occur under the No Action Alternative. However, the existing dam and pond, which were constructed after World War II, would persist and would continue to modify the cultural landscape associated with Fort Cronkhite.

Proposed Action

The NPS initiated consultation with the State Historical Preservation Officer (SHPO) and Federated Indians of Graton Rancheria in October 2021 (Appendix C). NPS reviewed whether the Proposed Action would affect the historic properties within the APE. Results concluded the Proposed Action would have no adverse effect to the historic properties within the APE. The Proposed Action would also have no adverse effect on the cultural landscape. SHPO concurred with NPS's finding that the project would have no adverse effect to historic properties on October 5, 2022.

While there are no known cultural resources that would be affected by the Proposed Action, the proposed excavation and ground disturbance could unearth cultural resources or human remains and impact those resources. BMPs CR-1 and CR-2 (Appendix A) specify procedures for avoidance of any discovered cultural resources and procedures to follow in case of discovery of human remains. The impact to any cultural resources discovered would be minor with implementation of BMPs.

Proposed Action Conclusion

The Proposed Action would have no impacts to any known historical properties and would have no adverse effect on a cultural landscape. The Proposed Action has the potential for a local impact to unanticipated discoveries of cultural resources during construction activities. BMPs would be implemented to ensure impacts to any discovered cultural resources would be minor.

3.3.10 Visitor Use and Experience

Affected Environment

Tennessee Valley is a popular destination and can often be crowded on weekends. The number of visitors stays fairly consistent throughout the year, with a slight increase during the spring and summer months as well as holidays. According to NPS Visitor Use Statistics (which uses an automated vehicle counter), the average number of visitors per year over the last 3 years is approximately 390,000 (National Park Service, 2022)

Tennessee Valley is used by hikers, bikers, campers, and equestrians and includes a network of trails connecting nearby destinations in the Marin Headlands and Redwood Creek Watershed. Walk-in camping is available at Haypress Meadow, approximately 0.7 mile along Haypress Camp Trail from the parking lot. Tennessee Valley trailhead and parking area includes several accessible elements including parking spaces, picnic area, and parking spaces. The Tennessee Valley trail does not meet Architectural Barriers Act Accessibility Standard (ABAAS) standards for the entire length of the trail from the parking area to the beach. However, the trail is firm and stable and a mix of paved or compacted dirt surface. Creating an (ABAAS) accessible trail to the

beach is not a goal of this project. There are six campsites available from spring through fall. The Tennessee Valley Stables complex is in the upper valley near the main parking lot and the junction of four popular multi-use trails. The stables complex includes a number of buildings that board horses for private use and for public classes provided by a subcontractor, Miwok Livery (Garcia and Associates, 2011).

In addition to the physical recreational activities that are available at Tennessee Valley, viewing flora and fauna and visiting Tennessee Valley beach are important opportunities to visitors. Located where the watershed meets the Pacific Ocean, the beach is approximately 600 feet long and is situated in a scenic cove bound by rocky cliffs. Several hundred visitors use Tennessee Valley beach on busy weekends.

Past the main gate, a paved service road serves as the main trail and is generally accessible for approximately 1 mile, beyond which the road becomes an unpaved trail that leads to Tennessee Valley Beach. "Generally accessible" means that section of trail meets many current accessibility codes, with few barriers, although some visitors with disabilities may need assistance. The entire length of the main trail to the beach is 1.7 miles. At the parking lot there is an accessible vault toilet, accessible parking spaces, and an accessible picnic area with tables. There is an information kiosk at the main entry gate that is accessible as well.

Currently, trail access from the pond to the beach is closed periodically for indefinite amounts of time due to safety reasons water levels are high behind the dam. GGNRA staff reported that in 2021 the trail was closed once for 13 days and once for 3 days (National Park Service, 2022).

Environmental Consequences

No Action

Under the No Action Alternative, the dam would remain in place and its integrity would continue to deteriorate. During high-flow conditions, NPS would continue to close the public trail at the dam for safety reasons, limiting beach access. In the event of dam failure under the No Action Alternative, NPS would need to conduct emergency response actions to stabilize the area after the dam failure, which would also limit public access. Trail conditions at and below the dam would continue to erode and degrade due to dam overflow, and stream channel incision would progress.

No Action Conclusion

The No Action Alternative would result in long-term, indirect, adverse impacts to visitor use and experience. Dam safety and trail closure concerns would continue to adversely impact visitor use and experience and degrading of the natural landscape.

Proposed Action

Segments of the main trail near the beach, the lower footpath, and Haypress trail would be intermittently closed to visitors during construction, but these areas would not necessarily be closed at the same time Work at the dam would require use of the adjacent trail for staging and equipment access and travel. That trail segment would be part of an active work zone. Due to the steepness and narrowness of the valley, there is no alternative route to the beach for visitors, and

that trail segment would be closed continuously during construction (Figure 9).

When the Haypress trail is repaired using fill from the dam, it would be closed to visitors. When trees are removed adjacent to the Haypress Campground, the campground area would function as a staging area and trees would be temporarily stockpiled there. The tree stockpile may displace a limited number of camp sites. Tree removal is expected to take place in a late fall/winter season, when the campground is typically closed. In a subsequent period, when trees are loaded into trucks and transported to downstream work zones, campground use and the Haypress trail would be temporarily closed.

Visitors would be encouraged to use other trails accessible from the main Tennessee Valley trail when access to the beach is closed. Trucks and construction equipment would also use the main trail for access. To maintain safe access for visitors, the construction work would entail the use of traffic management methods such as temporarily dividing the trail between the pedestrian and vehicle lanes, maintaining very low speeds for all vehicles and communication with visitors per a Visitor Use Access and Safety Plan (VIS-1 through VIS-4 in Appendix A). NPS would provide signage and other communications to visitors to inform them periods of construction use on the trails and safety methods.

Proposed Action Conclusion

The Proposed Action would result in short-term, moderate, adverse impacts to visitor use and experience during active construction periods. Adverse impacts would not be significant due to implementation of BMPs VIS-1 through VIS-4. Implementation of the Proposed Action would result in long-term, beneficial impacts to visitor use and experience due to elimination of the flood hazard risk and intermittent beach closures during high-water events. The Proposed Action also includes repairs and improvements to the trail to reduce erosion and maintenance issues.

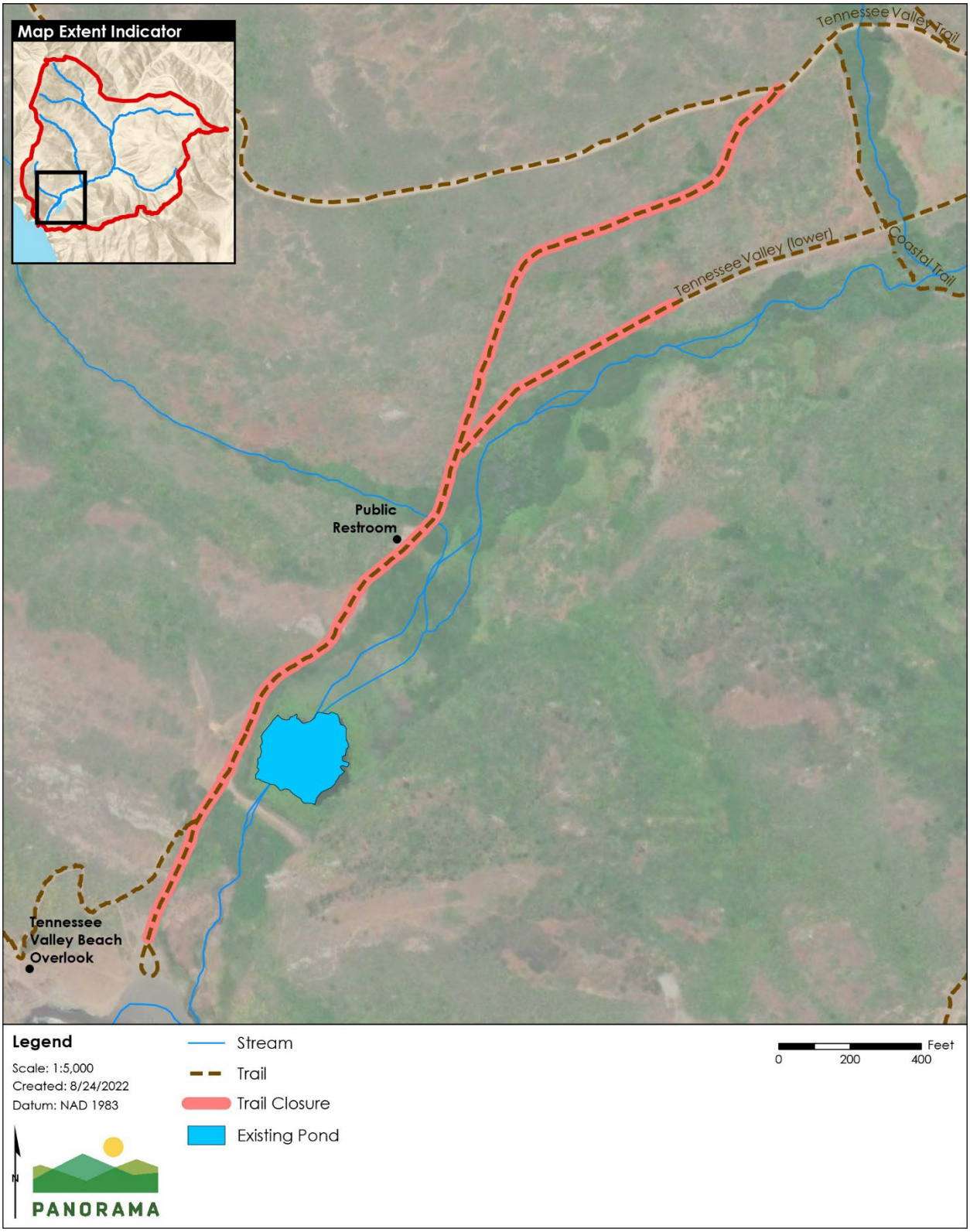
3.3.11 Hazardous Materials

Affected Environment

A search of the Geotracker and EnviroStor database was conducted to determine the location of any sites with known contamination, generators of hazardous waste, or active environmental permits in the area. There are no identified releases, hazardous waste generators, or active environmental permits in the area. In general, there are no facilities with hazardous material usage or identified releases within, or in close proximity to, the area.

Most of Tennessee Valley was historically used for dairy ranching between the mid-1800s and the late 1900s. A full analysis of the potential usage of herbicides or pesticides by the local ranches was performed, and it was discovered that, post-World War II, ranchers began to spray herbicides on grazing areas to prevent the native shrub form overtaking the grasslands (Bennett, 1998).

Figure 9. Areas of Temporary Trail Closure



In 2010, the NPS removed a ranch house located at the former Bettencourt Ranch. An investigation was performed by the Engineering Remediation Resources Group (ERRG) in 2011, which involved the collection of shallow soil samples for lead analysis around the perimeter and within the footprint of the former structures. All sample results were below the residential screening level for lead at the time of the report.

Sediment and soil samples in the existing pond and dam were analyzed in 2016 to evaluate the presence of organochlorine pesticides (OCPs), chlorinated herbicides, and metals. The sediment sampling analysis found metals concentrations consistent with San Francisco Bay Area background levels; herbicides were not detected, and the only detected OCPs were low levels of isomers of dichlorodiphenyltrichloroethane (DDT) and metabolites of DDT (Weiss, 2016). Subsequent analyses of the fate and transport of the sediments factored in dilution and dispersal patterns and found that expected concentrations would meet both the RWQCB's Beneficial Reuse Standards and the NPS standards for the marine environment (Kleinfelder, 2022). Sediment in the pond is not anticipated to flush downstream to the ocean all at once post-construction, and it would be mixed with other clean sediments from the upper watershed when mobilized.

A site investigation of potential pesticide residue and heavy metals was completed in 2022 for soils to be excavated for the CRLF breeding pond sites (Kleinfelder, Inc., 2022). Soils from Ponds B and C were found to meet RWQCB Beneficial Reuse Standards. Pond D had concentrations of organochloride pesticide in the soils to 1.5 feet below ground surface that exceed RWQCB Beneficial Reuse Standards; these soils therefore have restricted uses within the watershed.

Based on Supplemental Site Inspection Report, the soils analyzed would not be classified as a California-regulated or Resource Conservation and Recovery Act (RCRA) hazardous waste and would likely be acceptable at most Class II landfills. However, prior to acceptance, the receiving facility should evaluate the sampling results to determine if they fall within their acceptance criteria and if additional parameters require testing (Kleinfelder, 2022).

Environmental Consequences

No Action

Under the No Action Alternative, no earthwork or construction would occur to remove the dam, restore segments of the lower watershed, or create CRLF habitat ponds. Soils would not be disturbed, and additional contaminants from heavy equipment or other construction related vehicles and materials would not be brought on site.

No Action Conclusion

The No Action Alternative would result in no impacts from hazardous materials as no hazardous materials would be introduced into the area and no hazardous materials would be potentially exposed.

Proposed Action

Construction would require use of fuels, oils, and solvents to operate earth-moving equipment.

Construction staging and equipment and materials storage, including storing possible contaminants, and equipment maintenance in the project area would occur in designated areas specified by the NPS. The risk of accidental release of hazardous or toxic materials poses a potential direct impact during construction. Implementation of BMPs HAZ-1 through HAZ-4 (Appendix A) would reduce the potential accidental release of hazardous materials to waterways and would ensure timely cleanup of any accidental spills. Potential construction impacts from hazardous material spills would be minor.

Prior to removal of the Bettencourt Ranch structures, both the buildings and the surrounding soils would be assessed for potential contaminants. Demolition and material reuse and handling requirements would be developed based on the assessment of potential contaminants. Demolition materials and soils would be handled in accordance with state and federal law.

The Proposed Action Alternative would require earthwork in the areas containing low levels of remnant pesticides and metals. The remnant pesticides and metals in sediments below the existing pond, as analyzed in a sediment transport model, would still meet the RWQCB Beneficial Reuse Standards when transported in realistic scenarios (Kleinfelder, Inc., 2022). Soils in the upper levels of Pond D would not be suitable for reuse on site and, once excavated, would be disposed of offsite. Due to proper handling of sediment from Pond D and low risk from sediment excavated at other locations, the impact from hazardous materials on the environment would be minor.

Proposed Action Conclusion

The Proposed Action would result in short term, local, minor, adverse impacts from use of hazardous materials with heavy equipment operation during construction. Post construction, the Proposed Action would result in negligible indirect adverse impacts to hazardous materials due to increased risk of downstream transport and deposition of soils containing low levels of contaminants until sediment dynamics have stabilized.

3.3.12 Geology and Soils

Affected Environment

The Project area is located within the Coast Range Geomorphic Province of California. The topography of the region is characterized by northwest–southeast trending mountain ridges and intervening valleys that were formed from tectonic activity between the North American Plate and the Pacific Plate. Extensive faulting during the Pliocene Age (1.8–7 million years ago) formed the uneven depression which is now San Francisco Bay. The more recent tectonic activity within the Coast Range Geomorphic Province is concentrated along the San Andreas Fault zone, a complex group of generally parallel faults (Miller Pacific Engineering Group, 2015).

The bedrock geology of Tennessee Valley consists of a diverse array of Franciscan Complex units consisting of sedimentary, igneous, and metamorphic rock that has been folded, faulted, sheared, and altered (Miller Pacific Engineering Group, 2015). The Tennessee Valley straddles

the Marin Headlands terrane (southern half of the valley) and the Franciscan mélange (northern half). The Marin Headlands terrane is a repeating sequence of oceanic basalt/greenstone overlain by chert, which is then overlain by greywacke and shale. The rocks are structurally strong and resistant to sliding and erosion unless weathered. Franciscan mélange is a tectonic mixture of shale and sandstone containing resistant variably sized blocks of intact rocks that survived extensive shearing during the subduction process (Elder, 2001). It weathers readily to a heavy soil rich in swelling clays. Weathered mélange terrane is highly susceptible to landslides and gullying, and a major erosional process is large and small earthflows.

Soils in the area consist of quaternary aged deposits of alluvium, colluvium, and beach and dune sand. Alluvium underlies the flat valley floor along the length of Tennessee Valley and consists of loose sand, gravel, silt, and clay deposited by stream transport of upslope material and rising ocean. The present colluvium (hillslope material in downslope transit) is a discontinuous mantle locally 15 feet to 30 feet thick that fills V-shaped gullies scored into the hillsides, converting these gullies to U-shaped swales (Kamman, 2020). Evidence of sediment transport and storage in Tennessee Valley is apparent by the pronounced alluvial delta that has formed around the pond and expanded over time.

Natural landslides do not pose a threat to the dam or to the public in Tennessee Valley. However, the right abutment slope of the dam consists of cut, loose soils that appear to be a potential landslide area, posing a potential impact to public safety. If this slope were to move, it has the potential to affect the long-term safety of the dam but is not likely to lead to an immediate failure of the dam (U.S. Bureau of Reclamation, 2017).

Environmental Consequences

No Action

Under the No Action Alternative, the dam would be left in place and improvements to the trails and stream channels would not take place. The condition of the earthen dam would continue to deteriorate, and the area would become more unstable over time. Soil erosion would continue along the trails and in the deeply incised stream channels below the dam and in the Haypress tributary.

No Action Conclusion

The No Action Alternative would have long-term, adverse impacts on geology and soils in the watershed due to continued erosion below the dam.

Proposed Action

The Proposed Action Alternative includes excavation and grading for installation of the grade-control structures, removal of the dam, installation of the aprons, construction of CRLF breeding ponds, grading at Haypress meadow, and filling the channel downstream of the dam. The removal of the former Bettencourt Ranch structure would include off-haul of building materials, concrete, and metal with minor excavation of foundations. Additional temporary soil disturbance would be expected at staging sites and along access roads. The preferred construction scenario entails reusing soils in the same construction season when they are generated; however, some

material may also need to be temporarily stored or hauled off site. Use of large excavators and other heavy construction equipment may cause some soil compaction. Temporary access roads and work areas would be de-compacted and revegetated following construction.

Implementation of erosion control BMPs (refer to WATER-1 in Appendix A) would reduce the impacts from temporary soil erosion as a result of ground disturbance. The temporary impact to geology and soils would be minor.

The Proposed Action would remove the existing dam, which is unstable. The resulting 3-foot embankment would meet engineering standards and provide long-term stability of the area to address underlying geologic conditions.

Proposed Action Conclusion

The Proposed Action would result in short-term, minor, direct, adverse impacts to soils due to destabilization as a result of disturbance. The Proposed Action would provide a long-term benefit to geologic stability by removing a dam from an area that is currently unstable.

3.3.13 Transportation

Affected Environment

U.S. Route 101 (US-101) is the main north–south highway in Marin County, and State Route 1 (SR-1) is the main north–south route through Marin County that runs along Pacific coastline. SR-1 provides access to Tennessee Valley Road, which is the only way in or out of the Project area in Tennessee Valley. This access road to the park is a narrow, two-lane paved road that starts from SR-1 and dead ends at the Tennessee Valley parking lot, with a speed limit of 25 mph. Transportation access to Tennessee Valley is predominately by personal vehicle in addition to some bike and foot travel.

Public vehicle access is prohibited beyond the trailhead parking lot. Access further into Tennessee Valley is available via a system of trails, some sections of which are accessible to those with mobility issues. Most of these trails are only accessed by foot, bike, or horse travel. The main trail through Tennessee Valley that provides beach access starts at the parking lot and ends at the beach. This is a paved service road for the first mile, after which it turns to gravel. This is the only access road that provides access to all construction areas. Current conditions of the main trail are poor due to surface erosion occurring during previous storm events when water overtopping the dam flowed along the trail as a dam bypass.

Environmental Consequences

No Action

Under the No Action Alternative, there would be no impact to local highways, park access roads, or parking lots.

No Action Conclusion

No short-term or long-term impacts to transportation would occur.

Proposed Action

The Proposed Action Alternative would utilize the existing trail for construction access and hauling to construction areas. Local roads would experience a minor temporary increase of construction traffic and delay during mobilization and during hauling of excavated material. Excavated material may be reused on site and transported via the temporary access roads to the stockpiling areas or hauled off site for storage or disposal, depending on the soil conditions and opportunities for reuse. Material from the upper horizon of Pond D, approximately 1,400 cubic yards, would likely be off-hauled, requiring approximately 140 truckloads (assuming 10 cubic yards per truckload). When the Bettencourt structures are demolished, all materials would be off-hauled for appropriate disposal. Methods would be used on the main trail to separate visitors from trucks. The Proposed Action would not result in any lane or roadway closures. The minor traffic delays from haul trucks and delivery trucks would be short term, during material delivery and removal. The existing local roadways are capable of handling the anticipated construction traffic. Due to the multiple construction seasons, materials would be delivered and removed over a period of three years, which would reduce the volume of trucks on area roads at any one time. NPS would communicate with the public immediately prior to construction so that the community is aware of the proposed material hauling.

Proposed Action Conclusion

The Proposed Action would result in short-term, minor, adverse impacts to the local roadway transportation system during construction. No long-term impacts to transportation would occur.

3.3.14 Air Quality

Affected Environment

Marin County is located in the northern portion of the San Francisco Bay Area Air Basin, along with eight other counties. The climate throughout Marin County is mainly characterized by warm, dry summers and cool, moist winters; however, this can vary depending on proximity to the Pacific Ocean and San Francisco Bay. The West Coast and southern portions of Marin County are often subject to cool marine air and substantial fog. Prevailing winds throughout the county are generally from the northwest, with wind speeds highest along the west coast. Along the coast and in southern Marin County, clean air from the Pacific Ocean generally helps to keep air pollution to a minimum.

Air quality management and protection responsibilities exist at the federal, State, and local levels. The primary statute that establishes ambient air quality standards and designates regulatory authorities is the federal Clean Air Act (CAA). The CAA and its amendments mandate requirements for managing air quality across the nation by establishing primary and secondary air quality standards. Under the CAA, the EPA has established and continues to update the National Ambient Air Quality Standards (NAAQS) for "criteria" pollutants including ozone (O_3), particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and lead (Pb).

The EPA Green Book provides detailed information about area NAAQS designations,

classifications, and nonattainment status. The San Francisco Bay Area, including Marin County, is designated as an 8-hour Ozone nonattainment area. Nonattainment areas are those where the NAAQS have been exceeded. Established under the CAA, the General Conformity Rule plays an important role in helping states improve air quality in those areas that do not meet the NAAQS. These regulations stipulate that projects in federal nonattainment areas that could be built with funding from a federal agency must demonstrate conformity with the applicable state or local attainment plan.

Air quality in California is governed by regulations more stringent than the federal CAA under the California Clean Air Act, administered by the California Air Resources Board (CARB) at the State level and by the Air Quality Management Districts at the regional and local levels. The Bay Area Air Quality Management District (BAAQMD) regulates air quality at the regional level, which includes nine Bay Area counties (including Marin).

Ozone and $PM_{2.5}$ are the major regional air pollutants of concern in the San Francisco Bay Area Air Basin. Ozone is primarily a problem in the summer, and $PM_{2.5}$ in the winter. Exceedance of air quality standards in any of the nine counties would result in violation of air quality standards in the air basin.

Environmental Consequences

No Action

Under the No Action Alternative, no fugitive dust or other emissions from construction activities would be released. Regional air pollutants would not increase due to proposed project actions.

No Action Conclusion

No short-term or long-term impacts to air quality would occur under the No Action Alternative.

Proposed Action

The Proposed Action would involve grading and ground-disturbing activities, which would result in dust emissions from construction traffic on the unpaved trail as well as soil excavation and transport. BMP AIR-1 (Appendix A) would be implemented to reduce fugitive dust emissions during construction. California Emissions Estimator Model was used to quantify air quality and greenhouse gas emissions that would be generated during construction (Appendix B). The small number of construction vehicles and equipment to be used during construction would produce minimal emissions and would not violate any federal or State standards. The resulting impact to air quality from construction would be negligible. Following construction, soils in the area would be stabilized through the proposed revegetation.

Proposed Action Conclusion

The Proposed Action would result in short-term, minor, adverse impacts to air quality due to ground-disturbing construction activities. There would be no long-term impacts to air quality due to the Proposed Action.

3.3.15 Visual Resources

Affected Environment

Visual resources are generally defined as the natural and built features of the landscape that can be seen. Landforms, water, and vegetation patterns are among the natural landscape features that define an area's visual character whereas buildings, roads, and other structures reflect human modifications to the landscape. These natural and built landscape features are considered visual resources that contribute to the public's experience and appreciation of the environment.

The viewshed of the lower Tennessee Valley contains natural landscape features including grasslands, ocean vistas and beaches, hills and cliffs, ridgelines, dunes, creeks, and wetlands as well as stands of various types of trees and other vegetation (County of Marin Community Development Agency, 2007). The built landscape features include the access road and a parking lot, buildings, power poles, fences and gates, signs, a developed campground, one paved and numerous other gravel trails, and the earthen dam and pond.

Environmental Consequences

No Action

Under the No Action Alternative, there would be no alteration to existing visual resources. In the event of a sudden dam failure, flood damages could negatively alter the vegetation and other landscape features below the dam and at the beach.

No Action Conclusion

The No Action Alternative would have no short-term or long-term impacts to visual resources.

Proposed Action

Construction of the Proposed Action would result temporarily in views of construction equipment and unvegetated areas during active construction activities. Following construction, areas would be revegetated to restore the natural wildlife and landscape views. The construction impacts to visual resources would be short-term and minor as vegetation would establish and develop over a period of a few years.

The Proposed Action would remove the existing pond from the main trail viewshed near the ocean, and that site would transition to wetlands and a riparian area. The wetlands feature would remain scenic and would be consistent with surrounding views within the watershed and the natural landscape of the watershed. A short berm would remain at the dam site, which would be visible from the main trail until vegetation establishes. The eucalyptus removal would also impact the viewshed at Bettencourt Ranch and Haypress Campground as the trees currently screen views of the surrounding hill slopes. The trees would be replaced by native willows, which would enhance the view by contributing to a more open landscape view with native vegetation in the foreground. Removal of the power poles extending from the Miwok Stables to the Bettencourt Ranch and the failing structures would improve the natural aesthetic of the viewshed. The Haypress meadow restoration would replace a field of non-native grasses with a native wet meadow, enhancing the visual experience of hikers on the main trail. The replacement

of willow cover on the Haypress tributary with wetland plants would be an initial visual change that would blend into the landscape as vegetation matures.

Proposed Action Conclusion

The Proposed Action would result in minor, short-term, adverse impacts to the viewshed due to construction and alteration of existing features. The short-term, adverse impacts are temporary, and Project actions would contribute to the overall health of the watershed as a whole. The Proposed Action would involve long-term changes to visual resources as a result of the pond removal and replacement of invasive plants with native riparian and wetland species. The overall impact to visual resources is expected to be beneficial due to the restorative nature of the actions.

3.3.16 Soundscape

Affected Environment

A natural soundscape is an acoustical environment characterized by natural sounds that occur absent the intrusion of sounds caused by humans or human technology. *Natural quiet*, referring to the sounds of nature undisturbed by human-caused noise, is now being recognized as an important and endangered resource in parks and related areas. In particular, human-caused noise can mask the sounds of nature and detract from the quality of the visitor experience. The natural soundscape is viewed as a resource as having value for its presence and as a value to be appreciated by visitors. The sounds made by wind, birds, ocean waves, deer, waterfalls, and many other natural phenomena are perceived by visitors as unique features and resources of parks.

The NPS strives to preserve, to the greatest extent possible, the natural soundscapes of parks (National Park Service, 2006). The NPS created a Natural Sounds Program to help manage soundscapes in parks and has also revised its management policies to address the importance of this resource. The NPS is mandated to restore degraded soundscapes to the natural condition whenever possible and to protect natural soundscapes from degradation due to undesirable human-caused noise (National Park Service, 2006).

Some areas of the GGNRA provide visitors with natural quiet; however, increased air traffic and development near park boundaries are becoming more of a concern (National Park Service, 2015). While much of the park is no longer naturally quiet, it may be critical to wildlife to minimize anthropogenic sound as well as to provide opportunities for solitude for visitors. Aircraft, watercraft, and road traffic outside the park all contribute to noise levels within the park. Noise generated inside the park includes not only visitor noise (such as vehicles, dogs, and voices) but noise generated by park maintenance and operation (vehicles, power equipment, generators, and voices). The current ambient noise environment in the immediate Project area is influenced by motor vehicles traveling on nearby roads, the parking lot, the equestrian stables, visitor activities, and occasional overhead aircraft.

Environmental Consequences

No Action

Under the No Action Alternative, there would be no impacts to the soundscape of Tennessee Valley.

No Action Conclusion

The No Action Alternative would not cause any short-term or long-term impacts to soundscape.

Proposed Action

The Proposed Action includes short-term construction activities that include noise-generating heavy equipment. Heavy equipment used during construction of the Proposed Action would generate noise at a level up to 85 dBA at a distance of 50 feet. The noise from heavy equipment would increase noise levels in proximity to the construction activity during active equipment use. No sensitive receptors, such as residences, are located in the vicinity of construction activities. Some construction activity, such as construction of the CRLF ponds and activities that do not create a hazard to visitors, would occur while the trail and campground is open to visitors. It is not expected that the temporary increase in noise would be at a level that would damage hearing or significantly degrade the visitor experience. Noise generated from heavy equipment and other construction activities could result in short-term impacts on wildlife; however, these activities would generally occur outside of sensitive breeding or migration times to the extent feasible, or with a biologist present to avoid adverse effects on wildlife breeding (see Section 3.3.7). Wildlife sounds and natural sounds in the watershed would continue after construction, and the natural soundscape would be restored.

Proposed Action Conclusion

The Proposed Action would result in short-term, minor, adverse impacts to the soundscape of Tennessee Valley during construction activities and heavy equipment operation. The impact is considered minor due to the lack of sensitive noise receptors in the area and the temporary nature of construction. No long-term impacts to the soundscape would occur.

3.3.17 Utilities and Service Systems

Affected Environment

A Pacific Gas & Electric (PG&E)-owned powerline, associated wiring, meters, and 16 poles extend from the existing Miwok Stables area to the Bettencourt Ranch area. The alignment extends through a small riparian area and along a hillslope dominated by scrub and grassland species. The power service once served a former homestead that has been removed, and the structures at Bettencourt are no longer used for any purpose. The powerline still carries live power.

Environmental Consequences

No Action

Under the No Action Alternative, there would be no removal of powerlines and poles or any

other utilities infrastructure.

No Action Conclusion

The No Project Alternative would have no impact to utilities and service systems.

Proposed Action

The Proposed Action includes removal of the 16 power poles and associated wiring and meters from the Miwok stables to the Bettencourt Ranch area. The Proposed Action also includes removal of the water storage tank and pipes in the Bettencourt area in order to construct Pond D. The powerline has not been live for many years and is no longer needed; therefore, the project would not adversely affect utility service or require a replacement powerline. Utility service would not be required for the proposed action because it would not require electricity or other utilities to function.

Proposed Action Conclusion

The Proposed Action would not impact utilities or service systems as there are no active utilities within the area.

4 SCOPING AND CONSULTATION

4.1 Internal Scoping

Extensive internal scoping regarding the proposed action has taken place. Dozens of meetings and review have taken place among the interdisciplinary team, including Project Review, Project Management Group, Leadership Team, and inter-divisional meetings with NPS's Pacific West Regional Office.

4.2 Public Scoping

The following activities have been conducted to inform the public about the project:

- Tamalpais Valley Community Services Board receives written park updates e when there is information to share. Briefings have been provided on the proposed action with information on other projects in the area.
- Outreach has been focused on informing stakeholders of the parking lot and trailhead rehabilitation project happening in winter of 2021–2022. Communication has described what is ahead, including the dam removal project, why signs are going up, safety conditions at the beach, and next steps.
- Mia Monroe, NPS, conducted meetings in the field with the public every week, beginning January 18, 2022 through March 2022 during the parking lot repaving.
- On September 9, 2021, and November 9, 2021, NPS conducted walks of Tennessee Valley with the Chair of the Community Services District, president of California Native Plant Society, Sierra Club members, Marin Audubon representative, and a local land trust board member. All attendees expressed interest and support for the project.
- Recently, a coyote study was completed, bringing additional attention to that area. Roving patrols shared information on other work being considered in the area, including the dam removal project.
- Visitation soared during pandemic, with a 17-percent increase in visitation in 2020. This fostered constructive dialog with local elected officials, local County staff, and the County sheriff as well as creating a chance to update relationships with recreational stakeholders. In general, the public has appreciated that NPS is proposing the project to address safety issues in the area.
- Zoom nature talks were offered monthly from May 2020 to Fall 2021 to keep in touch with stakeholders, share information about upcoming projects, and listen to concerns during early project planning. The dam removal project was one of the projects that was discussed during these talks.
- NPS staff met with County personnel at the staff level and the elected official level to discuss the project on January 18, 2022.
- NPS staff have provided monthly project updates to the Marin Conservation League. The Project Manager, Carolyn Shoulders, provided an in-depth presentation on the project at a meeting on March 10, 2022. NPS staff provided project updates to Environmental Forum of Marin in May 2022, to the Sierra Club Marin Chapter in the Fall of 2021 and to the

community liaison for Miwok Livery in March 2022.

The issues raised to date during discussions with the public include the following:

- Interest that the area would still be family friendly and that trails are remaining intact with no change in use types (no dogs or horses, and bikes allowed, etc.)
- Area noted for high wildlife value (e.g., CRLF, bird communities, riparian communities); Public communicates the wildlife values are important to maintain.
- General support for the project from all stakeholder groups
- Communication to date that NPS is studying the project right now and that there is no definite plan or timeline for action

Planned future communication includes the following:

- Continuation of general public and stakeholder outreach actions discussed above
- Planned Storywalk in late summer for installation near the trailhead; This creative activity has a robust outreach and engagement component, with one major goal to discuss change; We intend to highlight the project during the walk.
- Planned meeting in summer of 2022 with the interested parties and recreation groups in the area to introduce to Tennessee Valley and the park history for the 50th anniversary and foster engagement for the future
- Convening of County officials and staff to think more holistically about this area, including making road improvements, adding trail linkages, improving trail safety, and expanding stories with the possibility of the project

4.3 Correspondence

Throughout development of the Proposed Action, NPS has been in correspondence with multiple state and federal agencies including USFWS, USACE, State Historical Preservation Officer, RWQCB, and the CCC. Reference to that consultation is provided in Appendix C.

4.3.1 U.S. Fish and Wildlife Service

The GGNRA informally consulted with the USFWS in early 2022 to establish a mutually acceptable approach to species and habitat preservation during and after dam removal. A Biological Assessment was submitted to USFWS on May 23, 2022, starting the formal consultation process under Section 7 of the Endangered Species Act.

4.3.2 U.S. Army Corps of Engineers

NPS met with the USACE in 2020 to discuss the project. The USACE communicated to NPS that the GGNRA Proposed Action is expected to be permittable under NWP 53 for removal of low-head dams and NWP 27 for aquatic habitat restoration, enhancement, and establishment.

4.3.3 California State Historic Preservation Office and the Federated Indians of Graton Rancheria

Pursuant to Section 106 of the National Historic Preservation Act, the NPS initiated consultation with SHPO and the Federated Indians of Graton Rancheria (Tribe) concurrently in October 2021. In the same letter, the NPS identified historic properties and determined the undertaking would have *no adverse effect* to historic buildings and structures, the cultural landscape, or archaeological resources, and requested concurrence from both the SHPO and the Tribe on this determination. On October 5, 2022, SHPO sent a letter concurring with NPS' finding of no adverse effect on historic properties.

4.3.4 Regional Water Quality Control Board

The NPS has consulted with the RWQCB regarding sediment reuse. The beneficial reuse of fill materials included in the Proposed Action is consistent with RWQCB guidance and discussion with NPS. Additionally, the NPS would obtain a Section 401 water quality certification from the RWQCB during final design.

4.3.5 California Coastal Commission

NPS submitted an initial memo documenting the Project's consistency with CCC policies. The NPS and CCC met on site to discuss the project on August 5, 2022. NPS will request a Consistency Determination (CD) from the CCC after publication of the EA.

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Appendix A
Best Management Practices

Best Management Practices Table

BMP Number	Description	Responsible Party	Timing
	General		
GENERAL-1	A training session would be required for all contractors, partners, or any NPS staff engaged in activities in or near T&E habitat. At this training, construction workers and supervisors would be informed about the Endangered Species Act and listed species in the project area, sensitivity of park resources, and of National Park standard values, regulations, and appropriate housekeeping practices. Training sessions will include identification of NPS/partner staff resource contacts; special-status wildlife, in the work area; markings for the limit line of disturbance; thresholds that would trigger a change in implementation techniques or require a halt in project implementation; prohibitions on feeding resident wildlife; and proper disposal of food waste and garbage to discourage feeding by wildlife, including corvids (scavengers, such as ravens), which may increase predation on native wildlife. Upon completion of training, employees or contracting crews will sign a form stating that they attended the training and understand all the avoidance and protection measures. Documentation of the training will be kept on file and available upon request. As needed, the training would be provided in the language of the contractor crews.	Contractor and NPS	Training prior to construction; maintain records throughout construction.
GENERAL-2	Equipment and material staging areas would be located in existing disturbed areas within the construction limits to the extent possible. Construction access routes and staging areas will be limited and clearly marked prior to the beginning of ground disturbing activities. No disturbance would occur beyond these limits. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone (including storage of equipment, materials, soil, etc.). Field workers would be shown exclusion zones to avoid.	Contractor	During construction
GENERAL-3	Other requirements for a contractor on site are as follows: A. The contractor will be required to keep all waste and contaminants contained and remove them daily from the work site. B. All on- and off-road vehicles, equipment, and tools must be power washed to remove soil and plant fragments before entering GGNRA property to avoid spreading pathogens or exotic/invasive species. Equipment must be cleaned if moving from a work zone with aquatic invasive species.	Contractor	During construction

BMP Number	Description	Responsible Party	Timing
	C. Vehicle and equipment washing can occur on site only as needed to prevent the spread of sediment, pathogens, or exotic/invasive species. No runoff from vehicle or equipment washing is allowed to enter water bodies, including channels and storm drains, without being subjected to adequate filtration (e.g., vegetated buffers, hay wattles or bales, and silt screens). D. All boots, equipment, and tools must be disinfected using a 10% bleach solution, 70% isopropyl alcohol, or other NPS-approved disinfectant method prior to entering the site, as well as between work areas, to prevent pathogen spread. E. Vehicles, equipment, and tools may be inspected by GGNRA upon arrival and vehicles/equipment/tools determined to not be clean will be prohibited from accessing the site or continuing operations. F. Contractors would use quiet or noise-dampening technologies for equipment and implement measures to reduce noise to the extent feasible. G. No construction activities will occur at night to minimize impacts on wildlife that are most active during these times, such as the California red-legged frog.		
GENERAL-4	Sourcing rock and soil materials: All soil and rock type materials will be certified weed free and sourced through quarries approved by GGNRA.	Contractor	During construction
GENERAL-5	All tools, equipment, barricades, signs, and surplus materials will be removed from the project area upon completion of the proposed project.	Contractor	During construction
Biological Resources			
BIO-1	A qualified biological monitor will be required to ensure that project actions conform to restrictions developed for species protection.	Contractor and NPS	During construction
BIO-2	A permitted biologist is defined as a person who holds a valid Sec 10 permit for surveys for a particular listed species. A biological monitor is a biologist approved by the Park's Natural Resource Division who has demonstrated abilities to conduct surveys for this species. A trained observer is defined as a person who may not have a biology background but who has attended recent field and office trainings	Contractor and NPS	During construction

BMP Number	Description	Responsible Party	Timing
	provided by the Park's Natural Resource Division or similar to identify the listed species, associated habitats, and construction techniques to avoid impacts to that species.		
BIO-3	The biological monitor will have either a Sec10(a)(1)(A) permit for the listed species or experience in the identification and behavior of special-status plant and wildlife species that could be affected, habitat assessment experience, and knowledge of the avoidance measures of the consultation. This would be documented by GGNRA natural resource specialists. The biological monitor(s) or trained observer(s) will keep a copy of the required avoidance measures and project plans in their possession when onsite. The biological monitor or trained observer would have authority to stop work if necessary to protect biological resources and listed species. The biological monitor or trained observer will complete a daily log summarizing activities and environmental compliance.	Contractor and NPS	During construction
BIO-4	Prior to construction activities within 1 mile of California red-legged frog breeding habitats, access routes and all other areas to be disturbed by restoration activities will be surveyed for the presence of the California red-legged frog. Any feature that provides cover and moist ground conditions would be searched by a trained observer immediately prior to construction to determine presence of CRLF. These efforts will include preconstruction night surveys to capture adult red-legged frogs, pre-construction trapping for tadpoles, and preconstruction daytime surveys for any newly transformed metamorphs. These preconstruction surveys will be conducted within 48 hours of the beginning of ground disturbance and will be planned with a "one step ahead" approach relative to construction activities. All rodent burrows, leaf litter deeper than 2 inches, or other obvious refugia will be surveyed for the presence of the species. Frogs observed in these areas will be relocated per CRLF-4.	Contractor and NPS	During construction
BIO-5	NPS will continue to conduct watershed-wide annual winter breeding surveys counting the number of active breeding sites and egg masses both between construction years and post-construction, per the GGNRA CRLF Management Plan.	NPS	Post-construction
BIO-6	A. All resource protection measures will be clearly stated in the construction specifications, and workers will be instructed to avoid conducting activities outside the project area. B. Construction zones outside of existing disturbed areas will be delineated with flagging, and all surface disturbances confined to the construction zone.	NPS and Contractor	Prior to construction and during construction

BMP Number	Description	Responsible Party	Timing
BIO-7	The contractor will be required to keep all waste and contaminants contained and remove them daily from the work site. Wildlife-proof trash receptacles will be used. Uneaten human food and trash attracts crows, ravens, coyotes, and other predators of the CRLF. A litter control program will be instituted at each project site. All workers will ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. The trash containers will be removed from the project site at the end of each working day.	Contractor	During construction
BIO-8	The following measures will be implemented to minimize potential adverse effects to non-federally listed nesting birds. A. To the extent feasible, tree and other vegetation removal would occur outside the nesting season. B. If vegetation clearing or ground disturbing activities commence between March 1 and July 31, a qualified biologist will conduct a survey for nesting birds within 5 days prior to starting work. If a lapse in project-related work of 1 week or longer occurs, another focused survey will be conducted before project work can be initiated. Surveys will cover a minimum of a 1/4-mile radius around the construction area. C. If nesting birds are found, a buffer will be established around the nest and maintained until the young have fledged. Appropriate buffer widths are 300 feet for non-listed raptors and 100 feet for non-listed passerines. A qualified biologist may identify an alternative buffer based on a site- specific evaluation. Work will not commence within the buffer until fledglings are fully mobile and no longer reliant upon the nest or parental care for survival.	Contractor and NPS	During construction
BIO-9	NPS would monitor the pond for river otters and, if breeding is detected in a year when construction is planned at the pond, methods would be identified to avoid or minimize impacts. Methods to avoid or minimize impacts on river otter could include excluding river otters from the work area and timing activities to allow river otters to vacate the work area prior to construction.	NPS	Prior to construction
BIO-10	Prior to commencement of ground disturbing activities, a qualified botanist will perform surveys for special-status and locally rare plant species within areas that could potentially be disturbed by the Proposed Action. If special-status or locally rare plants are detected within the construction zone or within a 50-foot radius of the construction zone, NPS will adjust the construction footprint or establish an exclusion area to avoid impacts to the plants. Locations of special-status plant populations will be	NPS	Prior to construction

BMP Number	Description	Responsible Party	Timing
	clearly identified in the field by staking, flagging, or fencing prior to the commencement of activities that may cause disturbance. If avoidance is not feasible, NPS will implement measures to minimize the impact on the species. Minimization measures will be evaluated on a case-by-case basis for local rarity and extent of impacts. Minimization measures may include transplanting perennial species, seed collection and dispersal for annual species, and other conservation strategies that will protect the viability of the local population.		
BIO-11	NPS will prepare a detailed plant protection plan based on specific areas potentially impacted by any proposed actions. NPS will thoroughly review areas of likely impact in advance and identify either any sensitive species or native species that will be protected or invasive species that will be controlled. Based on the potential impact and the species, a plan will be made to either (a) avoid the area if necessary to the presence of a sensitive species; (b) salvage plants if they are salvageable; (c) trim branches/leaves if the plants will easily resprout, (d) cover with plywood or other protective materials, or (e) other types of activities. Salvaged plants will be removed either immediately before impact or possibly up to 1 month in advance. They will be stored in area where there will be an easy water source (i.e.: such as the former nursery area) and replanted either immediately after work is completed in a specific zone or during the typical winter planting period.	NPS	Prior to construction
BIO-12	All areas where vegetation is disturbed by project work will be restored following project work with native plants salvaged onsite or propagated in the park nurseries. Revegetation actions would include the removal of invasive plants.	Contractor and NPS	Prior to construction, during construction, and post-construction
BIO-13	NPS will identify invasive plants within the work and access route areas prior to project implementation. Existing topsoil will also be evaluated for invasive, nonnative plant infestations. A qualified vegetation ecologist or botanist will plan treatments to prevent the spread of invasive species, and implementation of these treatments will be under the supervision of a qualified vegetation ecologist or botanist. The location of invasive species and the treatment plan will be documented in a plant protection plan. The final treatment prior to project implementation will occur close to initiation of project work. Topsoil heavily infested with invasive, nonnative plants will be removed. Non-infested topsoil will be salvaged, stored according to soil conservation guidelines, and replaced once construction is complete. Post-project monitoring and treatment for invasive plant species is expected to	NPS	Prior to construction and post-construction

BMP Number	Description	Responsible Party	Timing
	be on-going, with treatments at least 2 to 3 times per year for at least two to three years after construction or longer, as long as funding is available.		
California Red-legged Frog			
CRLF-1	All construction actions within 1-mile of breeding habitat would be conducted during the non-breeding season (April to October). Revegetation activities would be conducted during late fall and winter months.	NPS	Prior to construction and during construction
CRLF-2	Prior to expected start of construction, NPS will notify USFWS about the status of CRLF breeding activity for the year and proposed relocation activities within the watershed and possible transfers to Mountain Lake.	NPS	Prior to construction
CRLF-3	For vegetation clearing within 1 mile of California red-legged frog breeding habitats, when the site presents wet ground conditions, vegetation is dense, and ground is not visible, the vegetation will be hand-cleared to prevent take of frogs prior to entrance of heavy equipment into the area and to prevent occupation during construction. To avoid direct injury to California red-legged frogs, vegetation would be cut horizontally and removed to a height (approx. 12-16 inches) that allows for visual inspection of the ground to avoid direct injury to these animals. Trained observers must use a hard rake or similar hand tool to clear the ground for inspection. Powered hedge trimmers would be used in lieu of other power cutters or unless conditions are not suitable. Once the ground is visible, a visual survey will be conducted by either biological monitor or permitted biologist. Cover features (e.g., downed wood) would be inspected for animals and temporarily removed prior to any ground disturbance activities. Once the monitor determines the area is clear, the equipment will be allowed to enter the area.	NPS and Contractor	Prior to construction, during construction, and post-construction
CRLF-4	During heavy equipment work around the existing pond and downstream of the dam, trained observers will be present during construction activities to inspect for possible presence of CRLF.	NPS and Contractor	During construction
CRLF-5	If a California red-legged frog is observed, activities in the direct vicinity shall cease and the biological monitor or permitted biologist notified. To the extent possible, contact with the California red-legged frog will be avoided and the observed frog will be allowed to leave the site without intervention. If allowing the California red-legged frog to remain in the vicinity would cause injury or harm to the individual, the biological monitor or permitted biologist would capture and release the individual frog	NPS and Contractor	During construction

BMP Number	Description	Responsible Party	Timing
	outside the construction area in similar habitat where it was found. The biological monitor or permitted biologist will complete a log summarizing the activity including collection and translocation locations.		
CRLF-6	For vegetation clearing occurring within 100 meters of red legged frog aquatic breeding habitat, debris bags will be kept upright, and any piled vegetation and debris bags will be inspected before vegetative material is disposed of.	NPS and Contractor	During construction
CRLF-7	To prevent inadvertent entrapment of California red-legged frog during construction, steep-walled holes or trenches more than 2 feet deep will be covered at the close of each working day by plywood or similar materials. If this is infeasible, one or more escape ramps will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals.	NPS and Contractor	During construction
CRLF-8	To prevent entrapment/entanglement of animals in erosion control products, only natural fiber, loose weave, non-welded, movable jointed netting, burlap or non-binded materials (e.g., rice straw) shall be used for erosion control or other purposes. These limitations will be communicated to contractors and designers.	NPS and Contractor	During construction
CRLF-9	Any on-site materials left overnight will be inspected prior to use unless those materials have been outfitted with barriers and elevated above the ground. Areas under parked equipment will be inspected each morning before equipment is turned on.	NPS and Contractor	During construction
CRLF-10	Prior to herbicide application, any feature that provides cover and moist ground conditions within 100m of California red-legged frog breeding site would be searched by a trained observer immediately prior to disturbance to determine presence of CRLF. If conditions dictate, the Park may require a Biological Monitor as the trained observer.	NPS	Post-construction
Dewatering			
DW-1	Dewatering of the pond shall be initiated as late as possible in the summer while still allowing a reasonable period to complete construction activities before the start of the rainy season in late fall.	NPS and Contractor	During construction

BMP Number	Description	Responsible Party	Timing
DW-2	Pump intakes shall be completely screened with wire mesh not larger than five millimeters to prevent aquatic wildlife from entering the pump system. Some redundancy in screening systems will be built into the intake system.	NPS and Contractor	During construction
DW-3	A biomonitor would be present to capture and relocate aquatic life, including fish species, prior to dewatering. The biomonitor will observe the pump intake daily to relocate any species that could be drawn into the screen or the pump.	NPS	Prior to construction
DW-4	If reasonable methods can be identified to limit dewatering while still achieving construction actions, then they shall be used.	NPS and Contractor	During construction
DW-5	Discharge will employ methods to minimize downstream turbidity in the channel. These may include the use of de-siltation devices at the terminal end of the discharge pipe such as temporary settling basins, the use of sandbags or plastic to disperse outflow, sediment filter sacks, or the use of a coffer dam to prevent infiltration in undesirable locations.	NPS and Contractor	During construction
DW-6	If an auxiliary fuel tank is needed for the dewatering pump, NPS will work with the contractor to identify a suitable location and identify site-specific BMPs.	NPS and Contractor	During construction
Water Quality			
WATER-1	SWPPPs and erosion control BMPs will be developed and implemented to minimize any wind- or water- related erosion and will be in compliance with the requirements of USACE. NPS will include provisions in construction contracts for measures to protect sensitive areas and prevent and minimize stormwater and non-stormwater discharges. Protective measures will include, at a minimum, those listed below. A. No discharge of pollutants from vehicle or equipment cleaning will be allowed into any storm drains or water courses. B. Concrete waste and water from curing operations will be collected in washouts and will be disposed of and not allowed into water courses.	NPS and Contractor	During construction

BMP Number	Description	Responsible Party	Timing
	C. Erosion control measures will be implemented that provide for soil stability and prevent movement of soils during rain events (i.e., silt fences and tarps).		
WATER-2	No heavy equipment will operate in a live stream.		
Visitor Use			
VIS-1	A Visitor Use Access and Safety Plan would be developed and include public notification and signage to effectively communicate construction closures and limitations.	NPS	Prior to construction
Hazardous Materials			
HAZ-1	No equipment servicing will be done in the channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps and generators).	NPS and Contractor	During construction
HAZ-2	Spill kits will be maintained on site at all times during construction operations and/or staging or fueling of equipment.	NPS and Contractor	During construction
HAZ-3	If necessary, all servicing of equipment done at the job site will be conducted in a designated, protected area to reduce threats to water quality from vehicle fluid spills. Designated areas will not directly connect to the ground, surface water, or the storm drain system. The service area will be clearly designated with berms, sandbags, or other barriers. Secondary containment, such as a drain pan, to catch spills or leaks will be used when removing or changing fluids. Fluids will be stored in appropriate containers with covers and properly recycled or disposed of offsite.	NPS and Contractor	During construction
HAZ-4	No large fuel storage containers will be allowed. Fuel will be delivered to the site only in pick-up trucks designed for fuel hauling, but it will not be otherwise stored on site. Vehicle and equipment fueling and maintenance operations will be at least 50 feet away from water courses, except at established commercial gas stations or established vehicle maintenance facilities.	NPS and Contractor	During construction
Air Quality			

BMP Number	Description	Responsible Party	Timing
AIR-1	Dust abatement measures include: A. Water all active construction areas with exposed soil surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads that have not been stabilized with soil binder, mulch, gravel, vegetation or other cover) sufficiently to prevent dust from becoming airborne. B. All trucks transporting soil, sand, or other loose material offsite shall be covered. C. Vehicle speeds on unpaved areas shall be limited to 15 miles per hour.	Contractor	During construction
AIR-2	Idling time of equipment when not in use will be avoided and low emission producing equipment will be used when feasible.	Contractor	During construction
Noise			
NOISE-1	The following will be implemented to minimize disturbance from construction noise: A. Contractors will ensure that power equipment (vehicles, heavy equipment, and hand equipment such as chainsaws) are equipped with original manufacturer's sound-control devices. No equipment will be operated with an unmuffled exhaust. B. Except when required for safety or to ensure the integrity of a proposed project component, no work will be conducted on weekends or holidays. The hours specified in the Marin County noise ordinance will be adhered to as general guidance: general construction will be limited to the hours of 7 a.m. to 6 p.m. on Monday through Friday and 9 a.m. to 5 p.m. on Saturdays; loud noise generating equipment operation will be limited to 8 a.m. to 5 p.m. on Monday through Friday. C. Construction equipment will be properly maintained to minimize noise.	Contractor	During construction
Soils			

BMP Number	Description	Responsible Party	Timing
SOIL-1	Minimize disturbance to vegetation and soils.	NPS and Contractor	During construction
SOIL-2	Place protective mats, if necessary, on the haul route to disperse the load.	NPS and Contractor	During construction
SOIL-3	Evaluate compaction both before and after work and de-compact using hand methods, if needed. Aerate any ground surface temporarily disturbed during construction and replant with native vegetation to reduce compaction and prevent erosion.	NPS and Contractor	During construction
Cultural Resources			
CR-1	In the event that potentially significant archaeological materials are encountered during Project-related ground disturbing activities, all work should be halted in the vicinity of the archaeological discovery until a qualified archaeologist can visit the site of discovery and assess the significance of the archaeological resource. Should additional actions be proposed outside the currently defined APE that have the potential for additional subsurface disturbance, further cultural resource management may be required.	NPS and Contractor	During construction
CR-2	In the unlikely event that human remains are discovered during construction activities, all work will stop within 50 feet of the discovery, and the NPS archeologist will be contacted immediately. Furthermore, as required by law, the requirements of California Health and Human Safety Code Section 7050.5 will be followed and the Marin County coroner will be notified. If the human remains are determined to be of Native American origin, NPS will follow the provisions outlined in the Native American Graves Protection and Repatriation Act (1990).	NPS and Contractor	During construction
Wetlands			
WET-1	Pre-construction Preparation a) The boundaries of construction areas will be clearly flagged and/or signed in advance of construction.	NPS and Contractor	Prior to and during construction

BMP Number	Description	Responsible Party	Timing
	b) Trees or shrubs overhanging or encroaching on access roads will be trimmed back to allow vehicles to pass by without going off the road. c) All material stockpiling and staging areas will be located within project right of ways in non-sensitive areas, or at designated disturbed/developed areas outside of design construction zones.		
WET-2	Transportation and Access a) Access to the project area will be restricted to existing access roads and routes identified in the project description and construction documents. b) Vehicle and equipment refueling, and lubrication will only be permitted in designated disturbed developed areas where accidental spills can be immediately contained. No refueling or maintenance will be conducted in the creek or immediately adjacent to the creek. c) All vehicles will carry a suitable fire extinguisher and other protective and preventative gear as required by NPS.	Contractor	During construction
WET-3	Heavy equipment use in wetlands must be avoided if at all possible. Heavy equipment used in wetlands must be placed on mats, or other measures must be taken to minimize soil and plant root disturbance and to preserve preconstruction elevations.	NPS and Contractor	During construction
WET-4	Whenever possible, excavated material must be placed on an upland site. However, when this is not feasible, temporary stockpiling of excavated material in wetlands must be placed on filter cloth, mats, or some other semi-permeable surface, or comparable measures must be taken to ensure that underlying wetland habitat is protected. The material must be stabilized with straw bales, filter cloth, or other appropriate means to prevent reentry into the waterway or wetland. Temporary stockpiles in wetlands must be removed in their entirety as soon as practicable. Wetland areas temporarily disturbed by stockpiling or other activities during construction must be returned to their pre-existing elevations, and soil, hydrology, and native vegetation communities must be restored as soon as practicable. Revegetation of disturbed soil areas should be facilitated by salvaging and storing existing topsoil and reusing it in restoration efforts in accordance with NPS policies and guidance. Topsoil storage must be for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and	NPS and Contractor	During construction

BMP Number	Description	Responsible Party	Timing
	degradation of the soil microbial community. Salvaged topsoil should not be piled taller than 2 feet high and 3 feet wide, and piles should be windrowed to retain viability of the microorganisms.		

Appendix B

CEQA Supporting Information

APPENDIX G

ENVIRONMENTAL CHECKLIST FORM

NOTE: The following is a sample form that may be tailored to satisfy individual agencies' needs and project circumstances. It may be used to meet the requirements for an initial study when the criteria set forth in CEQA Guidelines have been met. Substantial evidence of potential impacts that are not listed on this form must also be considered. The sample questions in this form are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance.

1. Project title: Tennessee Valley Dam Removal and Lower Valley Restortation Project

2. Lead agency name and address:

3. Contact person and phone number: _____

4. Project location: Tennessee Valley Trail, Golden Gate National Recreation Area, Marin County, C

5. Project sponsor's name and address:
National Park Service, Golden Gate NRA, Building 201, Fort Mason, San Francisco, CA 94123

6. General plan designation: _____

7. Zoning: Federal Property

8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

Proposed action includes lowering of the existing Tennessee Valley Dam embankment to remove flood hazard and human health and safety risk. Construction of three new ponds to support California Red Legged Frog habitat displaced by removing the pond behind the existing dam. Install grade control structures in the up and downstream meadows for flood control and floodplain restoration. Repair the eroded public trail adjacent to the existing dam. Recontour and outslope the Haypress Trail. Repair the Haypres tributary drainage to restore the wet meadow adjacent to the tributary. Demolish structures at the former Bettencourt Rranch.

9. Surrounding land uses and setting: (Briefly describe the project's surroundings)

Tennessee Valley is a 2.35 square mile coastal watershed owned and managed by the National Park Service. Once used for ranching and farming, the area is now managed for recreational purposes with grassland hills and riparian areas surrounding wetlands in the valleys.

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

US Fish and Wildlife Service, US Army Corps of Engineers, California Coastal Commission

Regional Water Quality Control Board

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

The NPS has communicated with the local tribe to officially name the unnamed creek in Tennessee Valley. The tribe is in support of the restorative nature of the project.

NOTE: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code section 21080.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code section 21082.3(c) contains provisions specific to confidentiality.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

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

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

DETERMINATION

On the basis of this initial evaluation:

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

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

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

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

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

Signature	*Date*

EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors, as well as general standards (e.g., the project would not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
4. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level.
5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:
    a) Earlier Analyses Used. Identify and state where they are available for review.
    b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
    c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.
9. The explanation of each issue should identify:
    a) the significance criteria or threshold, if any, used to evaluate each question; and
    b) the mitigation measure identified, if any, to reduce the impact to less than significance

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS. Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☑
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☑
c) In nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☑	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☑
II. AGRICULTURE AND FORESTRY RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☑
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☑
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☑
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☑
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☑
III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☑	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☑	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☑	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☑	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☑	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☑	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☑	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☑	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑
V. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?	☐	☐	☑	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☑	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☑	☐
VI. ENERGY. Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☑	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☑	☐
VII. GEOLOGY AND SOILS. Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☑
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☑
ii) Strong seismic ground shaking?	☐	☐	☑	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☑	☐
iv) Landslides?	☐	☐	☐	☑
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☑	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☑	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☑
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☑
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☑	☐
VIII. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☑	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☑
IX. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☑	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☑	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☑
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☑
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☑
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☑
X. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☑	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☑
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	☐	☐	☑	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
i) result in a substantial erosion or siltation on- or off-site;	☐	☐	✔	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	✔
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	✔
iv) impede or redirect flood flows?	☐	☐	✔	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	✔	☐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	✔
XI. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	✔
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	✔
XII. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?	☐	☐	☐	✔
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	✔
XIII. NOISE. Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	✔	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	✔
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	✔
XIV. POPULATION AND HOUSING. Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	✔
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	✔
XV. PUBLIC SERVICES. Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:	☐	☐	☐	✔

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Fire protection?	☐	☐	☐	☑
Police protection?	☐	☐	☐	☑
Schools?	☐	☐	☐	☑
Parks?	☐	☐	☐	☑
Other public facilities?	☐	☐	☐	☑
XVI. RECREATION.				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☑
XVII. TRANSPORTATION. Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☑	☐
b) Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?	☐	☐	☑	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☑	☐
d) Result in inadequate emergency access?	☐	☐	☐	☑
XVIII. TRIBAL CULTURAL RESOURCES.				
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:	☐	☐	☐	☐
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☑
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☑
XIX. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☑

	Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b)	Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☑
c)	Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☑
d)	Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☑
e)	Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☑
XX. WILDFIRE. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:					
a)	Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
b)	Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☑
c)	Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☑
d)	Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☑
XXI. MANDATORY FINDINGS OF SIGNIFICANCE.					
a)	Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☑	☐
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☑	☐
c)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☑	☐

Environmental Checklist Form Attachment 1

CEQA Topic Support Documentation

AESTHETICS

See *Visual Resources*, Section 3.3.15 in the EA.

AGRICULTURE AND FORESTRY RESOURCES

Agriculture and forestry practices have not been implemented within Tennessee Valley for decades. The proposed alternatives would not impact or be impacted by agriculture and forestry resources. See *Agriculture and Forestry Resources*, Section 3.1.2 in the EA.

AIR QUALITY

See *Air Quality*, Section 3.3.14 in the EA. NPS will implement BMP AIR-1 to reduce impacts from emissions of fugitive dust during construction. Impacts would be less than significant. See also CalEEMod attachment.

BIOLOGICAL RESOURCES

See *Threatened and Endangered Species*; Section 3.3.5, *Vegetation,* Section 3.3.6, *Wildlife*, Section 3.3.7; *Fisheries*, Section 3.3.8. NPS will implement BMP GENERAL-3, BIO-6, and BIO-9 through BIO-12 to reduce impacts on special-status plants and riparian areas. NPS will implement BMPs BIO-1 through BIO-6, CRLF -1 through CRLF-10, and DW-1 through DW-6 to minimize impacts on California red-legged frog. NPS will also implement BMPs WET-1 through WET-4 to minimize impacts on wetlands and BMPs BIO-7 and BIO-8 to reduce impacts on nesting birds and raptors. With implementation of the proposed BMPs, impacts on special-status species, wetlands, riparian areas, and migratory birds would be less than significant. The Proposed Action will have a net benefit to wetlands and riparian areas as well as endangered species by restoring native habitats to the area and providing for sustainable transition of habitats. The Proposed Action is not located within a habitat conservation plan or natural communities conservation plan and there are no local policies that apply to the area as the project is located entirely on federally-owned land. Impacts would therefore be less than significant.

CULTURAL RESOURCES

See *Historical Properties*, Section 3.3.9. No significant cultural resources are known to occur in the area of effect. NPS will implement CR-1 and CR-2 to reduce impacts from inadvertent discoveries of cultural resources. Impacts on cultural resources would therefore be less than significant.

ENERGY

Beyond construction, the Proposed Action would not consume or produce any energy, nor impact any energy resources, including renewable resources. Use of energy (e.g., diesel fuel for construction equipment) during construction would not be inefficient or wasteful as construction contractors would use the minimum amount of fuel required to implement the project. No state

or local energy plans would be impacted.

GEOLOGY AND SOILS

See *Geology and Soils,* Section 3.3.12. The Proposed Action would remove the existing dam, which is currently a public safety hazard. The remnant berm would be stabilized as described in the EA.

GREENHOUSE GAS EMISSIONS

GHG emissions were modeled utilizing the California Emissions Estimator Model (CalEEMod) tool developed and administered by the California Air Pollution Control Officers Association. The GHG emissions during construction would be less than significant based on the results of CalEEMod (attached). The Proposed Action would not create any permanent GHG emission sources and would have no GHG impacts during operation. The Proposed Action would also involve replanting of all areas of disturbance. The Proposed Action involves habitat restoration on federal land and would not conflict with any applicable plans for GHG reduction and would not result in loss of carbon sequestration due to the replanting of disturbed areas.

HAZARDS AND HAZARDOUS MATERIALS

See *Hazardous Materials*, Section 3.3.11 and *Transportation*, Section 3.3.13.

HYDROLOGY AND WATER QUALITY

See *Water Resources and Quality,* Section 3.3.2, Wetlands, Section 3.3.3, *Floodplains*, Section 3.3.4. The portion of the project area adjacent to the beach and the pond is within a tsunami zone; however, the project will not introduce pollutants to the area that would affect water quality in the event of a tsunami. The removal of the dam as part of the Proposed Action will reduce the risk of flood inundation from dam failure.

LAND UE AND PLANNING

The entire project area is federally owned and managed by the NPS. The Proposed Action is compatible with the NPS' existing land management policies.

MINERAL RESOURCES

No known mineral resources are available within the project area. The Project would not affect mineral resources.

NOISE

See *Soundscape*, Section 3.3.16.

POPULATION AND HOUSING

See *Population, Housing, and Growth-Inducing Impacts*, Section 3.1.4.

PUBLIC SERVICES

The Proposed Action is located within the Golden Gate National Recreation Area on federally owned land. The Proposed Action would be implemented for public safety and for habitat restoration. The Proposed Action would not impact public services. See *Public Safety*, Section 3.3.9.

RECREATION

See *Visitor Use and Experience*, Section 3.3.10. The Proposed Action would not create any new recreational areas or resources and involves actions to repair trails to reduce erosion.

TRANSPORTATION

See *Transportation*, Section 3.3.13. The Proposed Action would involve a small amount of vehicle trips during construction for worker vehicles but would not create any long-term vehicle miles traveled. Use of the trails for material hauling and worker vehicle travel would create a short-term impact from incompatible uses; however, NPS would implement BMPs for visitor safety as discussed in *Visitor Use and Safety,* Section 3.3.10.

TRIBAL CULTURAL RESOURCES

The NPS has an open dialogue with the Coast Miwok Tribe and is in the process of working with the Tribe to officially name the main creek in Tennessee Valley and has sent letters to the Federated Indians of Graton Rancheria to initiate Section 106 consultation as discussed in Section 1.5.12 and 3.3.9 in the EA. No tribal cultural resources are known to occur in the project area. NPS would also implement BMPs CUL-1 and CUL-2 to minimize impacts on any inadvertent discoveries of tribal cultural resources.

UTILITIES AND SERVICE SYSTEMS

See *Utilities and Service Systems,* Section 3.3.17.

WILDFIRE

The Proposed Action is not in a state responsibility area or an area of high wildlfire risk. See also *Wildfire*, Section 3.1.1.

MANDATORY FINDINGS OF SIGNIFICANCE

The Proposed Action would have no impact on the identified *mandatory findings of significance*. See EA Section 3.1.4 for a discussion of growth inducing impacts. As discussed in the EA, Section 3.3, there are no reasonably foreseeable projects proposed in Tennessee Valley and no cumulative impact would occur.

Tennessee Valley V2 Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Tennessee Valley V2
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.60
Precipitation (days)	34.8
Location	37.84356152337931, -122.5510701280806
County	Marin
City	Unincorporated
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	931
EDFZ	2
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric

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	15.0	Acre	15.0	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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.88	3.27	29.7	29.6	0.06	1.23	10.6	11.6	1.14	3.98	5.10	—	6,798	6,798	0.28	0.06	0.70	6,822
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.15	3.49	32.8	32.2	0.05	1.43	7.83	9.26	1.32	3.98	5.30	—	5,657	5,657	0.23	0.05	0.02	5,678
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.54	0.45	4.03	4.26	0.01	0.17	0.73	0.89	0.15	0.27	0.42	—	967	967	0.04	0.01	0.04	970
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.10	0.08	0.74	0.78	< 0.005	0.03	0.13	0.16	0.03	0.05	0.08	—	160	160	0.01	< 0.005	0.01	161

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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	3.88	3.27	29.7	29.1	0.06	1.23	3.75	4.99	1.14	1.46	2.60	—	6,771	6,771	0.27	0.06	0.70	6,797
2026	3.62	3.04	27.2	27.6	0.06	1.12	3.74	4.87	1.03	1.46	2.50	—	6,599	6,599	0.27	0.05	—	6,621

2027	3.75	3.15	28.9	29.6	0.06	1.22	10.6	11.6	1.12	3.98	5.10	—	6,798	6,798	0.28	0.06	—	6,822
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	4.15	3.49	32.8	32.2	0.05	1.43	7.83	9.26	1.32	3.98	5.30	—	5,657	5,657	0.23	0.05	0.02	5,678
2026	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
2027	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.52	0.44	4.03	3.94	0.01	0.17	0.56	0.73	0.15	0.23	0.39	—	892	892	0.04	0.01	0.04	896
2026	0.45	0.38	3.36	3.40	0.01	0.14	0.46	0.60	0.13	0.18	0.31	—	814	814	0.03	0.01	—	816
2027	0.54	0.45	3.99	4.26	0.01	0.16	0.73	0.89	0.15	0.27	0.42	—	967	967	0.04	0.01	—	970
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.10	0.08	0.74	0.72	< 0.005	0.03	0.10	0.13	0.03	0.04	0.07	—	148	148	0.01	< 0.005	0.01	148
2026	0.08	0.07	0.61	0.62	< 0.005	0.03	0.08	0.11	0.02	0.03	0.06	—	135	135	0.01	< 0.005	—	135
2027	0.10	0.08	0.73	0.78	< 0.005	0.03	0.13	0.16	0.03	0.05	0.08	—	160	160	0.01	< 0.005	—	161

2.4. Operations 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70	0.07	0.00	0.00	2.43
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70	0.07	0.00	0.00	2.43

Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70	0.07	0.00	0.00	2.43
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12	0.01	0.00	0.00	0.40

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Waste	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70	0.07	0.00	0.00	2.43
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Area	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Waste	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70	0.07	0.00	0.00	2.43

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Waste	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70	0.07	0.00	0.00	2.43
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Waste	—	—	—	—	—	—	—	—	—	—	—	0.12	0.00	0.12	0.01	0.00	—	0.40
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12	0.01	0.00	0.00	0.40

3. Construction Emissions Details

3.1. Demolition (2027) - 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.06	2.57	23.0	23.4	0.04	0.95	—	0.95	0.87	—	0.87	—	4,164	4,164	0.17	0.03	—	4,178
Demolition	—	—	—	—	—	—	9.16	9.16	—	1.39	1.39	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.32	0.32	< 0.005	0.01	—	0.01	0.01	—	0.01	—	57.0	57.0	< 0.005	< 0.005	—	57.2
Demolition	—	—	—	—	—	—	0.13	0.13	—	0.02	0.02	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	9.44	9.44	< 0.005	< 0.005	—	9.48
Demolition	—	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

3.3. Site Preparation (2025) - 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.07	3.42	32.7	31.5	0.05	1.43	—	1.43	1.32	—	1.32	—	5,496	5,496	0.22	0.04	—	5,515
Dust From Material Movement	—	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.45	0.43	< 0.005	0.02	—	0.02	0.02	—	0.02	—	75.3	75.3	< 0.005	< 0.005	—	75.5
Dust From Material Movement	—	—	—	—	—	—	0.11	0.11	—	0.05	0.05	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.5	12.5	< 0.005	< 0.005	—	12.5
Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.07	0.06	0.70	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	161	161	< 0.005	0.01	0.02	163
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	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	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	2.21	2.21	< 0.005	< 0.005	< 0.005	2.25
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	0.37	0.37	< 0.005	< 0.005	< 0.005	0.37
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Site Preparation (2027) - 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.75	3.15	28.9	29.6	0.05	1.22	—	1.22	1.12	—	1.12	—	5,498	5,498	0.22	0.04	—	5,517
Dust From Material Movement	—	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.48	0.49	< 0.005	0.02	—	0.02	0.02	—	0.02	—	90.4	90.4	< 0.005	< 0.005	—	90.7
Dust From Material Movement	—	—	—	—	—	—	0.13	0.13	—	0.06	0.06	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.09	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	15.0	15.0	< 0.005	< 0.005	—	15.0
Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—	—
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

3.7. Grading (2027) - 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.62	3.04	26.5	28.6	0.06	1.09	—	1.09	1.01	—	1.01	—	6,798	6,798	0.28	0.06	—	6,822
Dust From Material Movement	—	—	—	—	—	—	3.59	3.59	—	1.42	1.42	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	0.37	3.20	3.45	0.01	0.13	—	0.13	0.12	—	0.12	—	820	820	0.03	0.01	—	822
Dust From Material Movement	—	—	—	—	—	—	0.43	0.43	—	0.17	0.17	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	0.58	0.63	< 0.005	0.02	—	0.02	0.02	—	0.02	—	136	136	0.01	< 0.005	—	136
Dust From Material Movement	—	—	—	—	—	—	0.08	0.08	—	0.03	0.03	—	—	—	—	—	—	—
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

3.9. Grading (2025) - 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.80	3.20	29.7	28.3	0.06	1.23	—	1.23	1.14	—	1.14	—	6,599	6,599	0.27	0.05	—	6,622
Dust From Material Movement	—	—	—	—	—	—	3.59	3.59	—	1.42	1.42	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.46	0.39	3.58	3.41	0.01	0.15	—	0.15	0.14	—	0.14	—	795	795	0.03	0.01	—	798
Dust From Material Movement	—	—	—	—	—	—	0.43	0.43	—	0.17	0.17	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	0.65	0.62	< 0.005	0.03	—	0.03	0.02	—	0.02	—	132	132	0.01	< 0.005	—	132

Dust From Material Movement	—	—	—	—	—	—	0.08	0.08	—	0.03	0.03	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.05	0.78	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	172	172	< 0.005	0.01	0.70	175
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	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	0.08	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	19.5	19.5	< 0.005	< 0.005	0.04	19.8
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	3.22	3.22	< 0.005	< 0.005	0.01	3.27
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Grading (2026) - 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	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.62	3.04	27.2	27.6	0.06	1.12	—	1.12	1.03	—	1.03	—	6,599	6,599	0.27	0.05	—	6,621
Dust From Material Movement	—	—	—	—	—	—	3.59	3.59	—	1.42	1.42	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.45	0.38	3.36	3.40	0.01	0.14	—	0.14	0.13	—	0.13	—	814	814	0.03	0.01	—	816
Dust From Material Movement	—	—	—	—	—	—	0.44	0.44	—	0.18	0.18	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	0.61	0.62	< 0.005	0.03	—	0.03	0.02	—	0.02	—	135	135	0.01	< 0.005	—	135
Dust From Material Movement	—	—	—	—	—	—	0.08	0.08	—	0.03	0.03	—	—	—	—	—	—	—
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.3. Area Emissions by Source

4.3.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Landscape	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Total	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Total	—	—	—	—	—	—	—	—	—	—	—	0.70	0.00	0.70	0.07	0.00	—	2.43
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

City Park	—	—	—	—	—	—	—	—	—	—	—	0.12	0.00	0.12	0.01	0.00	—	0.40
Total	—	—	—	—	—	—	—	—	—	—	—	0.12	0.00	0.12	0.01	0.00	—	0.40

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	6/1/2027	6/7/2027	5.00	5.00	Demolition of Bettencourt Ranch

Year 1 - Eucalyptus Removal	Site Preparation	1/1/2025	1/7/2025	5.00	5.00	Topple Eucalyptus at Upper Watershed
Year 3 - Eucalyptus removal	Site Preparation	6/8/2027	6/15/2027	5.00	6.00	—
Year 3 Actions	Grading	6/16/2027	7/31/2027	5.00	44.0	Upper Watershed - Bettencourt Area: Construct CRLF Pond D.
Year 1 Actions	Grading	6/1/2025	7/31/2025	5.00	44.0	Lower Watershed - upstream of existing pond: Construct new CRLF Ponds A and B. Install Log Grade Control and Flow Deflector Structures Upper Watershed - Haypress Drainage: Place fill from CRLF Ponds and B in the Haypress drainage or stockpile until used.
Year 2 Actions	Grading	06/1/2026	7/31/2026	5.00	45.0	Lower Watershed - Dam Area: Remove dam, build apron, fill downstream channel, repair trail, place earthen grade control upstream of dam. Upper Watershed - Haypress Drainage: Use fill from dam to outslope Haypress Road or stockpile until used.

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
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Demolition	Excavators	Diesel	Average	3.00	8.00	36.0	0.38

Demolition	Rubber Tired Dozers	Diesel	Average	2.00	8.00	367	0.40
Year 1 - Eucalyptus Removal	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Year 1 - Eucalyptus Removal	Tractors/Loaders/Backhoes	Diesel	Average	4.00	8.00	84.0	0.37
Year 1 Actions	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Year 1 Actions	Graders	Diesel	Average	1.00	8.00	148	0.41
Year 1 Actions	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Year 1 Actions	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Year 1 Actions	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Year 3 - Eucalyptus removal	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Year 3 - Eucalyptus removal	Tractors/Loaders/Backhoes	Diesel	Average	4.00	8.00	84.0	0.37
Year 3 Actions	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Year 3 Actions	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Year 2 Actions	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Year 2 Actions	Graders	Diesel	Average	1.00	8.00	148	0.41
Year 2 Actions	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Year 2 Actions	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Year 2 Actions	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Demolition	Graders	Diesel	Average	1.00	5.00	148	0.41
Demolition	Other Construction Equipment	Diesel	Average	1.00	5.00	82.0	0.42
Demolition	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	84.0	0.37
Year 1 - Eucalyptus Removal	Other Construction Equipment	Diesel	Average	1.00	5.00	82.0	0.42

Year 3 - Eucalyptus removal	Other Construction Equipment	Diesel	Average	1.00	5.00	82.0	0.42
Year 3 Actions	Other Construction Equipment	Diesel	Average	1.00	5.00	82.0	0.42
Year 3 Actions	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Year 3 Actions	Graders	Diesel	Average	1.00	8.00	148	0.41
Year 3 Actions	Scrapers	Diesel	Average	2.00	8.00	423	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	22.5	11.7	LDA,LDT1,LDT2
Demolition	Vendor	—	8.40	HHDT,MHDT
Demolition	Hauling	99.0	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Year 1 - Eucalyptus Removal	—	—	—	—
Year 1 - Eucalyptus Removal	Worker	20.0	11.7	LDA,LDT1,LDT2
Year 1 - Eucalyptus Removal	Vendor	—	8.40	HHDT,MHDT
Year 1 - Eucalyptus Removal	Hauling	0.00	20.0	HHDT
Year 1 - Eucalyptus Removal	Onsite truck	—	—	HHDT
Year 1 Actions	—	—	—	—
Year 1 Actions	Worker	20.0	11.7	LDA,LDT1,LDT2
Year 1 Actions	Vendor	—	8.40	HHDT,MHDT
Year 1 Actions	Hauling	0.00	20.0	HHDT
Year 1 Actions	Onsite truck	—	—	HHDT
Year 3 - Eucalyptus removal	—	—	—	—

Year 3 - Eucalyptus removal	Worker	20.0	11.7	LDA,LDT1,LDT2
Year 3 - Eucalyptus removal	Vendor	—	8.40	HHDT,MHDT
Year 3 - Eucalyptus removal	Hauling	0.00	20.0	HHDT
Year 3 - Eucalyptus removal	Onsite truck	—	—	HHDT
Year 3 Actions	—	—	—	—
Year 3 Actions	Worker	22.5	11.7	LDA,LDT1,LDT2
Year 3 Actions	Vendor	—	8.40	HHDT,MHDT
Year 3 Actions	Hauling	0.00	20.0	HHDT
Year 3 Actions	Onsite truck	—	—	HHDT
Year 2 Actions	—	—	—	—
Year 2 Actions	Worker	20.0	11.7	LDA,LDT1,LDT2
Year 2 Actions	Vendor	—	8.40	HHDT,MHDT
Year 2 Actions	Hauling	0.00	20.0	HHDT
Year 2 Actions	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Water unpaved roads twice daily	55%	55%
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%
Sweep paved roads once per month	9%	9%

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

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 (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	43,000	—
Year 1 - Eucalyptus Removal	0.00	0.00	7.50	0.00	—
Year 3 - Eucalyptus removal	—	—	9.00	0.00	—
Year 3 Actions	—	—	132	0.00	—
Year 1 Actions	—	—	132	0.00	—
Year 2 Actions	—	—	135	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%

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
2025	0.00	204	0.03	< 0.005
2026	0.00	204	0.03	< 0.005
2027	0.00	204	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Total all Land Uses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
City Park	0.00	204	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
City Park	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
City Park	1.29	0.00

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type
—	—

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	9.19	annual days of extreme heat
Extreme Precipitation	9.95	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	9.25	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	3	0	0	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack	N/A	N/A	N/A	N/A
Air Quality	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	3	1	1	3
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack	N/A	N/A	N/A	N/A
Air Quality	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	3.91

AQ-PM	13.5
AQ-DPM	4.83
Drinking Water	36.5
Lead Risk Housing	29.9
Pesticides	0.00
Toxic Releases	41.9
Traffic	75.4
Effect Indicators	—
CleanUp Sites	86.7
Groundwater	35.0
Haz Waste Facilities/Generators	35.6
Impaired Water Bodies	93.4
Solid Waste	22.1
Sensitive Population	—
Asthma	9.90
Cardio-vascular	5.16
Low Birth Weights	99.5
Socioeconomic Factor Indicators	—
Education	0.84
Housing	—
Linguistic	17.3
Poverty	25.7
Unemployment	9.72

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract

Economic	—
Above Poverty	—
Employed	—
Education	—
Bachelor's or higher	—
High school enrollment	—
Preschool enrollment	—
Transportation	—
Auto Access	—
Active commuting	—
Social	—
2-parent households	—
Voting	—
Neighborhood	—
Alcohol availability	—
Park access	—
Retail density	—
Supermarket access	—
Tree canopy	—
Housing	—
Homeownership	—
Housing habitability	—
Low-inc homeowner severe housing cost burden	—
Low-inc renter severe housing cost burden	—
Uncrowded housing	—
Health Outcomes	—
Insured adults	—

Arthritis	0.0
Asthma ER Admissions	83.6
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	0.0
Cognitively Disabled	84.2
Physically Disabled	80.2
Heart Attack ER Admissions	96.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	0.0
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	13.9
SLR Inundation Area	45.1
Children	95.4
Elderly	12.0

English Speaking	0.0
Foreign-born	0.0
Outdoor Workers	49.8
Climate Change Adaptive Capacity	—
Impervious Surface Cover	96.9
Traffic Density	0.0
Traffic Access	46.6
Other Indices	—
Hardship	0.0
Other Decision Support	—
2016 Voting	0.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	17.0
Healthy Places Index Score for Project Location (b)	—
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health and Equity Evaluation Scorecard not completed.

8. User Changes to Default Data

Screen	Justification
Characteristics: Project Details	no changes
Construction: Construction Phases	no changes
Construction: Off-Road Equipment	no changes
Operations: Road Dust	part of the roads used for bathroom maintenance at the bottom of the valley/watershed will remain unpaved
Operations: Architectural Coatings	none
Operations: Refrigerants	none

Appendix C

Section 106 Consultation

United States Department of the Interior

NATIONAL PARK SERVICE
Golden Gate National Recreation Area, Interior Region 10
Building 201, Fort Mason
San Francisco, CA 94123-0022

IN REPLY REFER TO:
1.A.2 (GOGA-CRMM)

October 19, 2021

Ms. Julianne Polanco
State Historic Preservation Officer
Attn: Mr. Mark Beason
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95816

Subject: Initiating Consultation, Identifying Area of Potential Effect and Historic Properties and Assessing Affects for the Tennessee Valley Dam Removal Project

Dear Ms. Polanco:

The National Park Service, Golden Gate National Recreation Area (NPS), in accordance with the regulations at 36 CFR 800, is initiating Section 106 consultation under the National Historic Preservation Act (NHPA) with the State Historic Preservation Officer (SHPO) regarding the Tennessee Valley Dam Removal project. The NPS owns Tennessee Valley, which is located in Marin County (see Attachment 1). The NPS is the lead federal agency proposing this project and will be reviewing this project under the National Environmental Policy Act (NEPA). The purpose of this federal undertaking (Undertaking) is to remove the Tennessee Valley Dam, which has been identified by the U.S. Bureau of Reclamation (USBR) as having multiple risks of sudden failure, which could result in injury or fatalities to visitors on the beach adjacent to the dam. The 2-acre pond that is impounded by the dam currently provides the only known breeding habitat in Tennessee Valley for the federally threatened California red-legged frog (CRLF). The NPS needs to provide up to three new, smaller alternative breeding ponds for this species to maintain the necessary breeding habit and is considering up to four possible locations, depending on the results of archeological and hazardous materials surveys, elsewhere in the Tennessee Valley watershed (see Attachment 2).

The NPS is initiating Section 106 consultation for this project because two of the new possible frog pond locations are in the Forts Baker, Barry & Cronkhite historic district (Historic District). In this letter, the NPS is initiating consultation (Step 1), identifying the potential area of effect (APE) and the historic properties within the APE (Step 2), and assessing the project's affects on the historic resources (Step 3). The NPS finds that this project has *no adverse effect* on the historic resources and requests your concurrence. The NPS recognizes that the SHPO review time for this letter, per 36 CFR 800, will be 90 days (30 days per each Section 106 step).

Project Description

The Tennessee Valley Dam, constructed in 1960 by a private landowner as a waterfowl hunting source, is a non-historic feature and does not contribute to the Historic District. The 2014 *Golden Gate National Recreation Area General Management Plan* called for the removal of the dam and the restoration of the lower valley, prior to the USBR's identification of the hazard. In 2017, the USBR classified the earthen dam as a high hazard per the NPS Director's Order 40 and recommended its immediate removal. The USBR evaluation found there is a very high risk of failure due to either erosion during storm events, erosion at the toe of the dam where a culvert discharges water, or during a seismic event. Until the dam is removed, NPS closes the visitor trail between the dam and the beach when water elevations behind the dam are high.

After removing the earthen dam, the NPS will manage the transition back to a natural channel and wetland function near the dam through a series of actions to prevent channel incision. For example, grade control structures (consisting of Eucalyptus logs removed from the upper watershed Haypress Camp area) will be placed and an incised channel downstream of the dam will be filled. In addition, where the dam is lowered or removed, new, low spillways consisting of compacted dam material will be added to create a gentle gradient for flows. These spillways are expected to erode over time but will help prevent incision while vegetation becomes established in the pond area. Fill may be placed in the existing pond footprint to create a natural wetland or fill may just be placed at the edges to create a floodplain terrace. The NPS will repair an eroded segment of the main trail adjacent to the dam by using dam material. Additional trails will be resurfaced if fill is available.

The NPS is exploring four possible new frog pond locations that would provide adequate breeding conditions for the CRLF. Their locations were identified based on the proximity to known springs, a manageable depth to groundwater for pond construction, a reasonable distance from the existing channel and a preference to have ponds distributed in the watershed to protect long-term habitat function (see Attachment 3). The ponds' dimensions range from 0.2 acres to 0.5 acres and, because groundwater will be the water source for breeding habitat, they would be excavated to 6 to 8 feet deep, depending on the location. To avoid archeological resources and potential hazardous materials, the NPS is considering more locations than needed and will be conducting both archeological and hazardous material testing to gain more information about the best location choices.

To provide logs for grade control structures, the NPS will remove about 60 Eucalyptus trees along a tributary near the Haypress Campground (located in upper Tennessee Valley, about 2.1 miles north of the dam area). These trees will be toppled, rather than cut, to generate logs with rootballs attached so they will be heavy enough to resist movement in high flows. Toppling a tree to uproot its rootball would disturb an estimated 42 to 50 square feet per tree. Each tree, or area of ground disturbance, is scattered along about 600 linear feet of a drainage area. Other trees in the grove may also be cut as a restoration action allowing for willows to reoccupy this segment of the drainage. The Eucalyptus logs would be placed flat across parts of the channel and floodplain just upstream of the dam to prevent the creek from incising (eroding) after the dam is removed. Some will be partially keyed into the ground surface or stabilized with vertically installed pieces. The logs will distribute high flows, so as to dissipate energy that could erode the channel. The archeological consultants will survey the Haypress area for archeological resources, prior to any tree toppling. If any of the areas around the designated trees are found to contain archeological resources, the NPS will not topple those trees and instead identify others where resources do not occur. With the four possible ponds, the tree removal at Haypress Camp and the dam removal, the total potential ground disturbance for this project is up to approximately 1.95 to 2.37 acres (see chart below.). However, the total area of disturbed ground is likely to be less than this total since not all four pond areas to be surveyed are expected to be constructed.

Proposed Ground Disturbance			

	Proposed Pond A	0.26 acres	inside Historic District
	Proposed Pond B	0.38 acres	inside Historic District
	Proposed Pond C	0.35 acres	outside Historic District
	Proposed Pond D	0.21 acres	outside Historic District
	Tree Removal at Haypress Camp	0.07 acres	outside Historic District
	New spillways	0.08 to 0.5 acres	Inside Historic District; final area of disturbance will depend on final engineering
TOTAL Potential Ground Disturbance		1.96 to 2.37 acres	

Consultation with Federated Indians of Graton Rancheria to-date

On 3/22/21, NPS Archeologist Peter Gavette emailed Buffy McQuillen, Tribal Preservation Office for the Federated Indians of Graton Rancheria (FIGR), to inform her of the project. Mr. Gavette explained the need for a subsurface archeological survey at the frog pond locations to determine the presence or absence of archeological materials and a geoarchaeological assessment of the potential for buried prehistoric sties and surfaces within the areas identified for mitigation ponds. He stated that the area was surveyed in 1979 (with no sites located) but will be resurveyed in the pond locations. He also identified the Elk Valley Site in Tennessee Valley (P-21-002666) which is over 250 meters from the nearest proposed frog pond. Ms. McQuillen responded, asking about the Undertaking's time frame and expressed interest in having a Native American monitor for the upcoming archeological survey work. On 3/26/21, Ms. McQuillen, Mr. Gavette and Gordon White, NPS Chief of Cultural Resources, had a phone conversation and confirmed FIGR's request for Native American monitoring for the upcoming archeological survey work.

On 5/5/21, NPS Natural Resources Specialist Carolyn Shoulders and NPS Cultural Resources Section 106 Coordinator and Tribal Liaison Bob Holloway met with FIGR representatives Matthew Johnson and Daniel Rossi for a site visit to Tennessee Valley. In addition to other Tennessee Valley related work, the NPS staff showed Mr. Johnson and Mr. Rossi the possible new frog pond locations and discussed the upcoming archeological work. Mr. Johnson confirmed again that FIGR is requesting a monitor be present during the archeology field work. The NPS stated their intent that in Summer 2021, they would hire an archaeological firm to conduct this survey and will hire FIGR as a subcontractor. At the time of this letter, the NPS has awarded the archeological survey contract and the work will be conducted this fall. Any of the proposed locations for CRLF ponds which are found to contain archaeological resources will not be considered for construction of breeding ponds.

Identifying the Area of Potential Effect

Direct APE:
The Undertaking's direct APE includes the dam area, the four small areas identified by the NPS as possible suitable locations for the new frog breeding ponds and the Haypress Camp tree removal area (see Attachment

4). The most direct effects of the project will be the removal of the non-historic dam and the construction of frog ponds for mitigation of habitat loss for the CRLF. The removal of the dam will restore the creek to its pre-dam natural riparian state. The dam footprint would be over-excavated, with a small amount of material replaced in the dam footprint as compacted fill to act as channel grade control (to prevent erosion). An estimated 7,000 cubic yards of dam removal material may be used to recontour trails in the valley and add material to other locations. The frog ponds will be excavated within previously undisturbed areas and up to 6 to 8 feet deep.

Indirect APE:
The Undertaking's indirect APE includes the six direct APE sites, the Tennessee Valley area immediately around the Tennessee Creek, up to the boundaries of the Historic District and up to the Haypress Campground (see Attachment 4). The Historic District includes the Fort Cronkhite military reservation, the Fort Cronkhite outlying areas, Tennessee Valley Point, Townsley Hill Defenses, Wolf Ridge Defenses, SF-87L and SF- 87C Nike Missile Launch Site) (see Attachment 5). We seek your concurrence on the Undertaking's area of potential effect.

Identifying Historic Properties in the Area of Potential Effect

Historic Properties within the Direct APE:
Within the direct APE areas, there are no historic buildings or structures.

Within the direct APE areas, there are two small locations of the Fort Cronkhite/ Elk Valley historic landscape, represented by Frog Pond A and Frog Pond B.

Within the direct APE areas, based on a 1979 archeological survey, there are no known archeological resources. Because the 1979 survey is considered inadequate, the NPS has determined that the project may have an effect on unknown properties eligible for inclusion in the National Register of Historic Places (NRHP) and that archaeological investigations are necessary to locate any significant archaeological resources within the direct APE. The following is an excerpt from the advertised archeological survey scope of work that identifies the efforts to be performed in support of NHPA Section 106, 36 CFR Part 800.4(b) to identify historic properties within the APE for the Tennessee Valley Dam Removal Project.

> *The four locations considered for up to three new ponds are within the Elk Creek floodplain and are potentially highly sensitive for buried archaeological resources based on the depositional nature of this setting. Geologic mapping indicates that the Elk Creek floodplain is composed of Holocene-age alluvium (Witter et al. 2006). Therefore, archaeological examination will be conducted before any excavation for the proposed mitigation ponds. The purpose of the investigation is to identify the presence or absence of archaeological materials and a geoarchaeological assessment of the potential for buried prehistoric sites and surfaces within the areas identified for mitigation ponds. Both a surface survey and a subsurface survey of these areas will be conducted for this purpose*.

As previously stated, the NPS has awarded the archeological survey contract and the work will be conducted this fall. There was consideration given to the potential impact in the removal of the dam materials at that location, but due to the difficulty of testing the location of a functioning dam and potential to compromise the integrity of the dam, testing was ruled out in that location in favor of the ability to monitor the removal of dam materials during construction.

Historic Properties within the Indirect APE:

The Undertaking's indirect APE area in Tennessee Valley contains historic buildings, landscape features and archeology resources (see Attachment 6)

- Within the Tennessee Valley indirect APE area, there are historic buildings and structures. On 9/17/08, the SHPO concurred that Ranches A/B (Miwok Stables) were eligible for the NRHP (see Attachment 7). On 5/17/07, the SHPO concurred that Ranches C/D (also known as the Lewis and Sequeira Ranch & the Bettencourt Ranch) were not eligible for the NRHP and the NPS removed one of these non-eligible buildings in 2010.

- Within the Tennessee Valley indirect APE area, there are historic landscapes resources. The larger Fort Cronkhite cultural landscape extends into Tennessee Valley and is part of the Forts Baker, Barry & Cronkhite historic cultural landscape. Tennessee Valley and Fort Cronkhite are physically and visually separated by a steep ridge.

- Within the Tennessee Valley indirect APE area, there are archeology resources. The Elk Valley Site (Primary # P-21-002666, Trinomial CA-MRN-686) and the nationally significant NRHP listed *S.S. Tennessee* shipwreck site and remains (CA-MRN-506H) are both located within the indirect APE.

The Undertaking's indirect APE area in Fort Cronkite contains historic buildings, historic landscapes and archeology resources and are identified in the *Forts Baker, Barry & Cronkhite Cultural Landscape Report, Vol. II* (see Attachment 8). We seek your concurrence on the identification of historic properties within the direct and indirect APE.

Assessment of Affect

The criteria of adverse effect have been applied to historic properties within the APE, with consideration given to all qualifying characteristics of a historic property. The criteria of adverse effect are used as a threshold for determining whether the preferred alternative would have an 'adverse effect" or "no adverse effect" on historic properties. The Advisory Council on Historic Preservation regulations define adverse effect to a historic property as one that may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's locations, design, setting, materials, workmanship, feeling, or association. Consideration is given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the preferred alternative that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). After applying these criteria to the Undertaking, the NPS has found the Undertaking has *no adverse effect* to any of the historic properties.

Affect on Historic Buildings and Structures:
The Undertaking will have *no adverse effect* to the historic buildings and structures within the APE. While two of the new proposed frog ponds are located within the Historic District, their scale, function and character as vegetated wetlands will blend in with the existing surrounding rural wetlands landscape. The creation of these frog ponds will not change the character or integrity of the Historic District's historic buildings and structures. The proposed frog ponds will not diminish, directly or indirectly, the location, design, setting, materials, workmanship, feeling or association of these properties. We seek your concurrence of no adverse effect on historic buildings.

Affect on Historic Landscapes:
The Undertaking will have *no adverse effect* to the cultural landscape. The proposed ponds are extremely small within the context of rural Tennessee Valley/Elk Valley and almost undetectable within the context of the larger Historic District. The scale, coupled with the locations that are surrounded by native wetland and riparian

vegetation important for red-legged frog habitat, will obscure the pond from any of the former ranch roads or existing trails. One of the four ponds, if constructed, would be adjacent to a trail area, but its cover with emergent wetland species would appear very similar to the wetland vegetation that currently occurs at that location. The proposed frog ponds will not impact the historic landscape features associated with this area. It is worth noting that the recently completed *Forts Baker, Barry and Cronkhite Cultural Landscape Report* concluded that in the time since the transfer from the military to the NPS, the aspect of feeling has been diminished. This project does not further impair the aspect of feeling. The proposed frog pond will not diminish, directly or indirectly, the cultural landscape in any of the seven aspects of integrity: location, design, setting, materials, workmanship, feeling or association. We seek your concurrence of no adverse effect on historic landscapes.

Affect on Archeology:
The Undertaking will have *no adverse effect* to the archeological resources. As previously stated, any of the proposed locations for CRLF ponds which are found to contain archaeological resources will not be considered for construction of CRLF ponds. Also as previously stated, if the area adjacent to the Haypress Eucalyptus that are designated for removal are found to contain archeological resources, the NPS will not topple those trees and would identify other trees instead where resources do not occur.

The indirect APE contains the one known archaeological site in Tennessee Valley, the Elk Valley site, a multi-component site comprised of a prehistoric shell midden and historic-era material culture (P-21-002666, Baber, 2009). The boundaries of this known resource is not in any way adjacent to the anticipated ground disturbance required for the ponds so this resource will not be impacted by the removal of the dam or the construction of frog ponds or the removal of the Eucalyptus trees at the Haypress camp.

The indirect APE also contains the NRHP listed *S.S. Tennessee,* located on Tennessee Beach (downstream of the dam to be removed). Parts of the wreck are seasonally covered and uncovered due to fluctuations in the levels and amount of sand present on the beach. These fluctuations are predominantly due to wave and tidal forces. The 1853 wreck predates the 1960 dam. When the dam is removed, the creek flow conditions will be restored to the pre-dam conditions (sea level rise notwithstanding) and the site conditions will be returned to the conditions present during the majority of the time the *S.S. Tennessee* has been stranded on the beach. There is a possibility of more sediment transport after the dam is removed, which will be beneficial for both the beach and for the *S.S. Tennessee* site and present no change to the wreck. We seek your concurrence of no adverse effect on archeology.

Next Steps
We look forward to continuing this Section 106 consultation with your office. If you have any questions regarding this project, please contact Kristin Baron, architectural historian, at kristin_baron@nps.gov.
Sincerely,

Laura E. Joss
General Superintendent

Enclosures:

Attachment 1: Tennessee Valley Location Map

Attachment 2: Tennessee Valley Dam Removal Project Photos

Attachment 3: Proposed Frog Pond Location Map

Attachment 4: Tennessee Valley Dam Project APE Map

Attachment 5: Fort Cronkhite Historic District Map

Attachment 5: Indirect APE Historic Properties in Tennessee Valley

Attachment 6: Ranches A/B (Miwok Stables) NRHP Determination of Eligibility Report

Attachment 7: Indirect APE Historic Properties in Fort Cronkhite

cc: Ms. Buffy McQuillen, Tribal Heritage Preservation Officer

DEPARTMENT OF PARKS AND RECREATION Armando Quintero, *Director*
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October 5, 2022

VIA Email

In reply, refer to: NPS_2021_1021_001

Laura E. Joss, Superintendent
Golden Gate National Recreational Area
Fort Mason
San Francisco, CA 94123

Subject: Tennessee Valley Dam Removal Project, 1.A.2 (GOGA-CRMM)

Dear Ms. Joss:

The California State Historic Preservation Officer (SHPO) has received correspondence initiating consultation regarding an undertaking in Golden Gate National Recreation Area. The National Park Service (NPS) is consulting with the SHPO to comply with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. §306108), as amended, and its implementing regulations at 36 CFR Part 800.

The undertaking, as described, involves removing the earthen Tennessee Valley Dam, after which NPS will manage the transition back to a natural channel and wetland function through a series of actions to prevent channel incision. For example, grade control structures (consisting of Eucalyptus logs removed from the upper watershed Haypress Camp area) will be placed and an incised channel downstream of the dam will be filled. In addition, where the dam is lowered or removed, new, low spillways consisting of compacted dam material will be added to create a gentle gradient for flows. These spillways are expected to erode over time but will help prevent incision while vegetation becomes established in the pond area. Fill may be placed in the existing pond footprint to create a natural wetland or fill may just be placed at the edges to create a floodplain terrace. NPS will repair an eroded segment of the main trail adjacent to the dam by using dam material. Additional trails will be resurfaced if fill is available.

The NPS is exploring four possible new frog pond locations that would provide adequate breeding conditions for the California Red-Legged Frog. Their locations were identified based on the proximity to known springs, a manageable depth to groundwater for pond construction, a reasonable distance from the existing channel and a preference to have ponds distributed in the watershed to protect long-term habitat function. The ponds' dimensions range from 0.2 acres to 0.5 acres and, because groundwater will be

the water source for breeding habitat, they would be excavated to 6 to 8 feet deep, depending on the location.

NPS identified an Area of Potential Effect (APE) includes the six project sites, the Tennessee Valley area immediately around the Tennessee Creek up to the boundaries of the Fort Cronkhite Historic District and up to the Haypress Campground. The Historic District includes the Fort Cronkhite military reservation, the Fort Cronkhite outlying areas, Tennessee Valley Point, Townsley Hill Defenses, Wolf Ridge Defenses, SF-87L and SF- 87C Nike Missile Launch Site). Tennessee Valley Dam does not contribute to the significance of the historic district.

According to a 1979 survey, no known archaeological resources are located within the project locations. However, the Elk Valley Site (Primary # P-21-002666, Trinomial CA-MRN-686) and the nationally significant NRHP listed S.S. Tennessee shipwreck site and remains (CA-MRN-506H) are both located within the APE. NPS intends to conduct archaeological surveys of each of the four potential new pond sites and eucalyptus tree felling sites and will avoid any of these locations where archeological resources are found. NPS conducted Tribal consultation with the Federated Indians of Graton Rancheria, during which the Tribe requested archaeological and Tribal monitoring during the archaeological survey, and NPS agreed to this request.

NPS determined that none of the built environment resources within the APE would be adversely affected by the undertaking. NPS also determined that the survey, avoidance, and monitoring plan will assist in avoiding adverse effects on archaeological resources. Therefore, NPS determined the undertaking would have No Adverse Effect on historic properties. After reviewing the information submitted by NPS, the SHPO offers the following comments.

- The proposed project constitutes an undertaking with the potential to affect historic properties.
- The APE appears to be sufficient to take direct and indirect effects into account.
- Property identification and evaluation efforts are sufficient.
- The SHPO has no objection to the proposed Finding of No Adverse Effect.
- Please be advised that under certain circumstances, such as unanticipated discovery or a change in project description, NPS may have additional future responsibilities for this undertaking under 36 CFR Part 800.

If you have any questions or concerns, please contact Mark Beason, State Historian, at (916) 445-7047 or at mark.beason@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer