

Chapter 1

Introduction

In accordance with Section 102(2)(c) of NEPA (42 U.S. Code [USC] 4321 et seq.), CEQA (California Public Resources Code Section 21000 et seq.) and the State CEQA Guidelines (14 CCR 15000 et seq.), NPS, GGNRA, and the County have prepared a joint Final EIS/EIR to identify and assess potential impacts associated with the Big Lagoon Project.

Organization of the Final EIS/EIR

This Final EIS/EIR is organized as follows:

- **Executive Summary**—A summary of the project alternatives, a description of issues of concern, and a summary of environmental impacts are provided.
- **Chapter 1, *Introduction***—This chapter describes the project background, purpose and need, the preparation, review, and approval process under NEPA and CEQA, impact topics and those dismissed from further analysis, subsequent approvals for which the Final EIS/EIR will be used, and organization of the Final EIS/EIR.
- **Chapter 2, *Alternatives Description***—Chapter 2 describes the alternatives formulation process, presents the alternatives, including those considered but dismissed from detailed study, and the preferred alternative.
- **Chapter 3, *Affected Environment***—Chapter 3 describes the setting related to physical, biological, cultural and social resources. The chapter contains multiple subchapters that each address a specific environmental issue area (e.g., water resources, air quality, traffic).
- **Chapter 4, *Environmental Consequences***—Chapter 4 describes the impacts of the alternatives. Similar to the Affected Environment chapter, this chapter contains subchapters to address each specific environmental issue area—each describes the relevant regulations and policies, methodology, and thresholds for impact analysis; discusses environmental impacts associated with alternative construction and operation that relate to that topic; and identifies mitigation measures for adverse impacts.
- **Chapter 5, *Other Statutory Considerations***—Chapter 5 discusses growth-inducing impacts of the alternatives, and issues relating to sustainability and long-term management of the environment.

- **Chapter 6, *Responses to Comments***—Chapter 6 contains a copy of all comments received on the Draft EIS/EIR during the public review process. Each comment letter, including e-mails and response cards, are presented, followed by NPS’s responses to each comment.
- **Chapter 7, *Consultation and Coordination***—Chapter 7 describes the history of public involvement, and provides a list of preparers and list of Final EIS/EIR recipients.
- **Chapter 8, *References***—Chapter 7 provides a list of printed references and persons consulted during the preparation of this Final EIS/EIR.
- **Chapter 9, *Additional Reference Material***—Chapter 9 includes a list of species (identifying common and scientific names), a glossary, a list of acronyms, and an index of key words in the Final EIS/EIR.
- **Appendices**—The appendices consist of the Notice of Preparation (NOP) and Notice of Intent (NOI), comments received during the NOP and NOI review period, the draft Mitigation Monitoring and Reporting Program, and technical background reports and data.

Project Overview

Background

Redwood Creek is a coastal stream located in Marin County, California. The Redwood Creek watershed encompasses a 8.9 square mile area beginning on the southwest slopes of Mt. Tamalpais (elevation 2,571 feet), extending through Muir Woods National Monument, and flowing into the Pacific Ocean at Muir Beach (see Figure 1-1). The larger tributaries to Redwood Creek include Bootjack, Rattlesnake, Spike Buck, Kent Canyon, and Fern Creeks. Green Gulch Creek enters just above the Redwood Creek mouth and accounts for 1.2 square miles of the total watershed area. Streamflow in Redwood Creek is perennial in most reaches, with very low flow in summer and early fall, and higher winter base flows.

The Redwood Creek watershed is unique among watersheds of similar size along the California coastline because it is largely undeveloped and protected as part of county, state, and federal land. Agencies that manage watershed lands include the Marin Municipal Water District, California Department of Parks and Recreation (Mt. Tamalpais State Park), and the NPS (GGNRA and Muir Woods National Monument). Three private communities also reside in the watershed—the community of Muir Beach at the mouth of Redwood Creek, Muir Woods Park, and Green Gulch Farm. The watershed is home to old growth coast redwoods, native coho salmon and steelhead, spotted owls, and the CRLF, as well as many other special-status plants and animals. The creek supports what may be the most southerly run of coastal coho salmon found in the United States, and provides valuable habitat for other threatened species. More than a million people visit the watershed each year to hike the extensive trail system and enjoy its natural beauty and cultural resources.

The project site encompasses the lower reach of Redwood Creek just downstream from where the creek passes underneath Hwy 1, to its mouth at the Pacific Ocean approximately 2,800 feet downstream, at Big Lagoon (Figure 1-1). Big Lagoon itself is a tiny intermittently tidal lagoon with an open water surface area that fluctuates between 0.1 and 1.7 acres annually (Philip Williams & Associates et al. 2003). This is a fraction of the historic extent of open water habitat on the site. The 1853 Coast Survey Map, one of the earliest maps of the area, showed an extensive open water brackish lagoon fringed by emergent vegetation in this reach. Since that time, the area has been extensively modified and the brackish lagoon has filled in; details regarding site modification and related issues are discussed under “Project Need” below.

Planning Area

The project is located at Muir Beach, on the coast of Marin County, California (see Figure 1-1). The project area includes 38 coastal acres at Muir Beach, where Redwood Creek drains into the Pacific Ocean (see Figures 1-2 and 1-3). The project area includes Muir Beach, the intermittent tidal lagoon at the beach, and the entire wetland and creek area extending from just downstream of Hwy 1 to the beach. A wooded area upstream of Pacific Way is also included in the project area.

The San Francisco Zen Center owns about 15 acres of the site; NPS owns the rest of the site with the exception of the alignment of the Marin County–owned Pacific Way, which traverses through the project area. As indicated in Figures 1-2 and 1-3, the Green Gulch Pasture, horse ring, and horse paddock (owned by the SFZC) is bound by the levee road to the west, Pacific Way to the north, and Hwy 1 to the east. The project area west of the levee road and south of Pacific Way, including the parking lot, is owned by NPS. The project area also surrounds the privately owned Pelican Inn property, including an undeveloped fill pad northeast of the inn. Other private parcels are located northeast of the site (such as homes on Pacific Way and Lagoon Drive).

General Description of Project

The project involves three components: (1) ecological restoration, (2) public access upgrades, including a reconfiguration of the existing parking lot, and (3) replacement of the Pacific Way Bridge. All components are designed to improve ecological function.

The ecological restoration component includes alternatives ranging from re-creation of the brackish lagoon that was historically found at the site to restoring the existing creek/riparian system. It also involves enhancement and expansion of the tidal backbeach lagoon, dune restoration activities, invasive species removal, construction of new emergent wetlands, and removal of the levee road and other constructed features on the site. All Restoration Alternatives focus on returning improved and sustainable ecological function at the site.

The public access component includes alternative sizes, locations and configurations of the visitor parking lot to improve the floodplain function in the lower part of the site. As part of the parking lot reconfiguration, the visitor facilities at the beach (restrooms, picnic area, trail and bridge to the beach) would be relocated, and vegetated swales would be installed between the parking lot bays. Other public access amenities that would be constructed include a new pedestrian trail from Hwy 1 to the parking lot, and new interpretive displays and trails.

The Bridge Alternatives consider various designs for a replacement bridge on Pacific Way. Under all alternatives, the new bridge would be higher and longer than the existing bridge to reduce flooding and provide vehicular access. Bridge alternatives vary in length, the height of the roadway approach, and their long-term accommodation of potential channel migration.

The project also involves flood reduction measures that would be completed in the interim period over the next few years while the larger restoration project is being designed and constructed. These measures would include dredging of the Redwood Creek channel upstream and downstream of the Pacific Way Bridge up to two times prior to completion of the project, as needed, because the creek at the bridge already has reduced capacity to convey high flows, and sediment is expected to continue to build up at the bridge each winter. Removal of accumulated sediment from the box culvert underneath the bridge, as well as clearing of debris jams, would also be conducted, if needed. The goal of this effort is to increase the hydraulic conveyance capacity of Redwood Creek such that out-of-bank flows would be less frequent and the risk of channel avulsion is reduced.

Construction would occur during the dry season over a 3- to 4-year period. During that time, vehicular access would be maintained for local residents at all times, and visitor access to and parking at Muir Beach would be maintained to the greatest extent possible, particularly on weekends.

Project Purpose and Need

Project Purpose

The purpose of the proposed action is to restore a functional, self-sustaining ecosystem, including wetland, riparian, and aquatic components and to conduct the restoration in a manner that will re-create habitat for sustainable populations of special-status species, reduce flooding on Pacific Way, and provide a compatible visitor experience.

Project Need

Loss of Natural Creek Function

Human modifications in the project area are so extensive that not only does its most prominent original landscape feature—a big lagoon—no longer exist, but Redwood Creek and its associated floodplains, wetlands, and aquatic habitat have steadily lost their natural function. In particular, the ability of the creek to convey high flows to the ocean, carry sediment loads, support rearing habitat for federally-listed salmonids, and flow naturally on floodplains is severely diminished. The landscape once defined by a lagoon that stretched from today's Hwy 1 to the beach is now highly fragmented, both visually and functionally. Redwood Creek is confined by a levee, a public road, a small bridge, and a parking lot, and its natural processes are limited by structures in the floodplain. Landowners installed these features between the 1920s and the 1980s to improve the land for agriculture, recreation, residential access, and commercial enterprises, but the cumulative effect is that the creek in its altered state functions poorly for even its most fundamental purpose of conveying routine winter flows and transporting sediment loads. The most visible consequence of the diminished natural function is the increased frequency of flooding on Pacific Way, which causes road closures at least annually. This project is needed to restore a functional, resilient ecosystem while also providing habitat for special-status species and reducing flooding on Pacific Way.

Hydraulic Obstruction from Parking Lot and Levee

Muir Beach is a very popular coastal attraction for San Francisco Bay Area residents, but its convenient parking lot is a notable obstruction to a functional creek system. The NPS parking lot and adjoining picnic area, serving about ~~260,000~~^{440,000} visitors per year, are built on a fill pad three to four feet higher than the adjacent floodplain. The 500 foot-long fill pad extends prominently across the valley, leaving only about 50 feet of width for the creek and its floodplain. High winter flows from an 8.9-square mile watershed from the top of Mt. Tamalpais must wash through this remnant narrow passage to reach the natural end point at the ocean, but the passage is too restrictive, particularly because the opposite side of the creek is also confined by a levee built during the 1960s agricultural era.

In the approximately 25 years since the parking lot fill pad was built, high flows have been obstructed routinely upstream of the parking lot, causing deposition of large loads of sediment that would have otherwise been carried to the ocean. The creek upstream of the parking lot filled with such large volumes of sediment that it lost its channel definition; excess fine sediment buried the whole floodplain between the parking lot and levee road. Fences installed in the 1960s are buried in sediment up to the top of the fence posts. This rapid sedimentation of the creek

¹ The total annual visitors to Muir Beach presented in the Draft EIS/EIR did not reflect the most recent annual visitation survey completed in 2003 (Bignardi pers comm.).

upstream of the parking lot has raised portions of the creekbed to elevations higher than the adjacent Green Gulch pasture. This is a geomorphologically unstable condition with a high risk for channel avulsion, which could cause a sudden migration of the stream channel into the lowest position in the valley. Because it is a substantial hydraulic obstruction, the current parking lot configuration is not compatible with a functional fluvial system. Yet, with a high demand for public access, the project is needed to provide for public access and a visitor experience that is compatible with ecosystem restoration.

Diminished Habitat for Salmonids

Redwood Creek is the southernmost stream in the United States with a healthy population of coho salmon, but its numbers are significantly lower than those of historic populations. Coho in the central coast of California are now formally listed by both the state and federal governments as endangered, and resident steelhead trout are listed as threatened. The habitat in the project area has been diminished both in its areal extent and its quality, with the loss of historic creek and floodplain habitat through landscape modifications. Floodplains are known to provide important habitat for outmigrant coho to feed and build body mass, thereby increasing their chance of survival upon returning to the ocean. Fish passage from the project area's biggest floodplain is often obstructed, however, because a 1,300 foot-long levee across the site provides only two culverts back to the mainstem channel, one of which routinely fills with sediment and requires maintenance. Large woody debris that naturally falls in the main channel and maintains pools with cover is currently removed periodically to facilitate sediment passage and reduce flooding impacts on human development, and sediment has been periodically excavated from the channel. The existing channel conditions led to this conflict between managing for protection of natural resources and managing for flood reduction. This project is needed to regain vital habitat, particularly winter rearing habitat, for federally listed salmonids.

Flooding on Pacific Way

Muir Beach residents and GGNRA visitors access the site via Pacific Way, a Marin County road with a small bridge spanning Redwood Creek. However, water flows over the road routinely each winter, even when other County roads in low lying areas remain passable. Water depths on the road can reach 2 to 3 feet in moderate rain events. This problem has grown noticeably worse in the past two decades as the confined creek has accumulated sediment and lost conveyance capacity. The creek upstream of the Pacific Way Bridge was measured to be about five feet deeper ten years ago; today's shallower creek causes more water to wash over the floodplain and across the road during even minor flood events.

The problem, however, is not a matter of keeping the creek deep enough to pass high flows; the problem is that the road is on a floodplain that will always flood under some events and residents now depend on the road for year-round access. The road was originally built across the floodplain in the 1920s, with a small

bridge over the creek, which was apparently repositioned to the side of the valley. The road sits atop an area that was underwater—a part of the “big lagoon”—in the 1853 U.S. Coast Survey map, and it was remapped in 1892 as a marsh with multiple drainage channels. The road was originally not intended for year-round use, but for access to a tavern and cottages for summer use. The next road upstream from the project area (Hwy 1, to the north) was also built across the floodplain and was also inundated periodically until Caltrans raised the road elevation in the 1970s. The Caltrans solution of raising the road across the entire floodplain cannot be applied to Pacific Way, because structures are now built in the floodplain very close to the road. A higher road all the way across the floodplain, with a small bridge only at one end, would effectively dam the creek during higher flows, and cause an increase in flood elevations at the structures. Some of these structures, such as the Pelican Inn and AT&T utility boxes, sit on fill pads that have collectively reduced the available floodplain width by about 40%, or by about 200 feet out of a maximum of about 475 feet of floodplain width. Although the history of development has had an impact on creek and natural function, the dependency on the road for residential access has created the necessity of reducing flooding on Pacific Way, but this project is needed to provide public access in a manner that is compatible with a natural, resilient fluvial system.

Unsustainable Frog Habitat

CRLFs occur at the project site in a habitat that is maintained by the same structures that make the overall creek system dysfunctional. The 1,300 foot-long levee built in the 1960s to confine the creek also allows water to pond in the Green Gulch pasture. Emergent vegetation grows in the ponded water, providing suitable breeding habitat for the frogs. However, the ponding is dependent on NPS maintaining flashboards on a culvert under the levee each spring and managing it to make sure that water stays ponded long enough to allow successful CRLF reproduction. The number of frogs at the site is so low that their continued existence is in jeopardy, and yet their current habitat is reliant on both human management and a constructed levee that contributes substantially to larger ecosystem dysfunction. There are no other known populations of CRLFs in the Redwood Creek watershed, and as such there is an urgent need to provide hydrologically sustainable habitat for CRLFs in this watershed.

Summary

This project is needed to address the extensive loss of natural function for channel conveyance, sediment transport, channel stability, and diminished habitat for federally endangered coho and federally threatened steelhead; the increased flooding on Pacific Way; and the critical need for sustainable habitat for the CRLF. With many of the impacts resulting from facilities that have accommodated public and residential access, public access is needed in a manner that is compatible with ecosystem function.

Project Goals, Objectives, and Indicators

Goals represent the overarching vision for the project. This project will conduct ecological restoration and public access improvements at Big Lagoon to meet the following goals:

- Restore a functional, self-sustaining ecosystem, including wetland, aquatic and riparian components.
- Develop a restoration design that (1) functions in the context of the watershed and other pertinent regional boundaries, and (2) identifies and, to the extent possible, mitigates factors that reduce the site's full restoration potential.
- Consistent with restoring a functional ecosystem, recreate and maintain habitat adequate to support sustainable populations of special status species.
- Reduce flooding on Pacific Way and in the Muir Beach community caused by human modifications to the ecosystem, and work with Marin County to ensure that vehicle access is provided to the Muir Beach community.
- Provide a visitor experience, public access, links to key locations, and resource interpretation that are compatible with the ecosystem restoration and historic preservation.
- Work with the Federated Indians of Graton Rancheria to incorporate cultural values and indigenous archaeological sites resources into the restoration design, visitor experience, and site stewardship.
- Provide opportunities for public education and community-based restoration, including engaging local and broader communities in restoration planning and site stewardship.
- Coordinate with local transportation planning efforts to identify project features that are compatible with transportation improvements and consistent with the ecosystem restoration.

Project objectives represent specific tasks, milestones, or methods for achieving project goals. To the extent feasible, the alternative restoration approaches strive to satisfy all project objectives. However, certain objectives may be in conflict with each other to some extent—for example, ecological and human use objectives—and thus it may be difficult or impossible to achieve all objectives through a single design approach. With this in mind, conceptual design alternatives were developed with the intent of satisfying as many different objectives as possible.

Project indicators represent simple metrics that can be used to evaluate, either quantitatively or qualitatively, the degree to which each project objective is met. Table 1-1 shows the project indicators identified for each project objective. The same set of project indicators will be used for each action alternative. Note that certain indicators provided below may be too specific to be evaluated at the current conceptual level of restoration design development; some will also require further development as design proceeds. However, all indicators

identified to date are presented here, because they are expected to provide important guidance during future implementation design phases and long-term monitoring and adaptive management. The project objectives and indicators were developed collaboratively by NPS and technical consultants, and were finalized after receiving public comment at Big Lagoon Working Group meetings in 2003.

Table 1-1. Project Objectives and Indicators for Big Lagoon Restoration

Objective	Indicators
<i>Geomorphology/Hydrology</i>	
1. Remove constraints to natural geomorphic processes, such as sediment transport, channel migration, channel-floodplain interaction, and seasonal and long-term beach change.	<ul style="list-style-type: none"> • Degree that human structures (e.g., bridges, culverts, trails, parking lot, etc.) disrupt sediment transport, limit channel migration, and contribute to flooding. • Width of corridor available for lateral channel migration. • Areal extent of connected 1.5- to 2-year floodplain. • Areal extent of connected 50-year floodplain. • Width of active beach.
2. Rely on geomorphic processes to maintain and support the restoration.	<ul style="list-style-type: none"> • Anticipated extent of future maintenance required (such as sediment removal, infrastructure maintenance, etc.).
3. Accommodate future watershed sediment delivery.	<ul style="list-style-type: none"> • Extent that future watershed sediment delivery equals sediment discharge. • The rate of sediment delivery, deposition, and transport is within acceptable ranges (i.e., does not diminish the performance of the restoration project).
4. Restore natural beach processes.	<ul style="list-style-type: none"> • Capacity of the creek to transport coarse sediment to replenish the beach. • Areal extent of re-created active dune fields. • Extent that the design impacts littoral transport, local littoral sediment budget, and nearshore habitat. • Extent that the design accommodates beach recession due to future sea level rise over the 50-year planning horizon. • Extent that the design accommodates seasonal beach changes and infrequent extreme storm events (e.g., El Niño winter).
5. Accommodate physical disturbance (i.e., extreme hydrologic event, storm surge, sediment pulse, fires, earthquakes, etc.).	<ul style="list-style-type: none"> • Channel conveyance capacity. • Width of riparian corridor. • Width of active beach. • Ability to accommodate LWD.
6. Restore physical complexity of creek channel.	<ul style="list-style-type: none"> • Ability to accommodate sudden, large-scale shifts in channel location. • Potential for LWD recruitment. • Channel sinuosity or length of connected channels. • Width of corridor available for lateral migration.

Objective	Indicators
Ecology	
7. Improve coho salmon and steelhead winter rearing habitat.	<ul style="list-style-type: none"> • Areal extent and quality of low velocity habitats (e.g., instream wood as flow refuge, pools, backwaters, side channels and floodplains). • Complex woody debris or other types of hiding cover from predation.
8. Provide a migration corridor for steelhead and coho salmon.	<ul style="list-style-type: none"> • Lack of potential barriers (physical barriers, water quality and temperature, water depth and velocity) from estuary to upstream project limit. • Availability of pools for adult holding habitat. • Continuity in landscape configuration during and immediately after implementation that allows migration.
9. Maintain or improve breeding and rearing habitat for CRLF (<i>Rana aurora draytonii</i>).	<ul style="list-style-type: none"> • Areal extent of slow-moving or standing water (10–100 centimeters [cm] deep) within emergent and submergent wetland vegetation during December–March to encourage oviposition (i.e., laying of eggs). • Sufficient water at breeding locations should be available in normal to wet years to allow for successful metamorphosis of tadpoles.
10. Re-establish natural lateral and longitudinal connectivity among channel, floodplain, riparian, and upland habitats.	<ul style="list-style-type: none"> • Length of transition zones between adjacent habitat types (e.g., channel-riparian, riparian-upland, channel-wetland, wetland-upland, wetland-riparian, dune-wetland) unimpaired by artificial structures or barriers. • Length of riparian corridor (including wetlands) in different width categories (e.g., <10 meters [m], 10–60 m, >60 m).
11. Enhance bird diversity.	<ul style="list-style-type: none"> • Diversity of types of habitat provided (seasonal wetlands, early successional riparian habitat, mature riparian forest, intertidal wetlands).
12. Provide quality (e.g., high reproductive success) habitat for riparian/wetland-associated birds (particularly neotropical migrants).	<ul style="list-style-type: none"> • Extent of a wide (60–130 m) riparian corridor (including wetlands). • Floristic and structural habitat diversity. • Presence of natural disturbance events (e.g., winter out-of-bank flows). • Reduction in nest predation pressure.
13. Enhance native dune processes and increase diversity of native dune communities.	<ul style="list-style-type: none"> • Area of contiguous dune habitat undivided by trails. • Range of dune processes and dune habitat types that will be sustained (including the active foredunes co-formed with particular native plant species, and the more stable backdune formation, characterized by a different assemblage of native plant and animal species).
14. Enhance native wetland and riparian plant assemblages.	<ul style="list-style-type: none"> • The degree to which the wetland and riparian plant communities are supported by natural surface water, groundwater, and geomorphic processes. • Natural gradient of habitat types (e.g., seasonal wetlands,

Objective	Indicators
	<p>to non-tidal perennial wetlands, to tidal marsh, etc.).</p> <ul style="list-style-type: none"> • Plant community diversity within and among habitat types (e.g., shaded riparian, seasonal wetlands, perennial wetlands, etc.) that provides native plant propagules for revegetation of patches created by natural disturbance events. • Hydrologic conditions that will support appropriate disturbance regimes to promote habitat-type, age-class and plant diversity as well as structural complexity of vegetation, such as floodplain inundation at an interval appropriate to balance conditions necessary for recruitment of riparian species and also prevent early die-off due to prolonged inundation. • Sedimentation in wetland areas at a rate appropriate to sustain the natural gradient of wetland types. • Area of contiguous wetland and riparian communities undivided by trails, roads or other human structures.
15. Provide a diversity of estuarine habitats	<ul style="list-style-type: none"> • Diversity of aquatic habitat types (saltwater, brackish, freshwater, shallow water, deeper water, open water, submerged aquatic vegetation, emergent vegetation, intertidal habitats, etc.)
Visitor and Resident Access/Experience	
16. Engage visitors in the natural ecosystem and cultural heritage of the site.	<ul style="list-style-type: none"> • Character and sequence of experience from vehicle to destination facilities. • Character and potential of interpretive opportunities.
17. Incorporate a broad spectrum of appropriate visitor experiences compatible with resources of the site.	<ul style="list-style-type: none"> • Variety and range of compatible (i.e., with project) visitor experiences offered. • Relation of potential facilities with resources.
18. Provide convenient access to public use facilities for people of all ages and abilities.	<ul style="list-style-type: none"> • Relative distance from parking to resource. • Relationship of access route to sensitive resources • Extent of compliance with ADA guidelines. • Extent project exceeds ADA guidelines for special needs visitors. • Number of parking spaces.
19. Provide safe pedestrian access from parking/drop-off areas to public use destinations.	<ul style="list-style-type: none"> • Number and character of road crossings. • Relative amount of pedestrian traffic on Hwy 1. • Extent of trail separated from roadways. • Size and character of multi-use trails.
20. Provide safe and continuous linkages between currently disconnected trails for all user groups.	<ul style="list-style-type: none"> • Extent that linkages are provided. • Number and character of road crossings. • Extent of trail separation from roadways. • Size and character of multi-use trails.

Objective	Indicators
21. Provide safe vehicular access to the visitor resources.	<ul style="list-style-type: none"> • Intersection function/safety. • Proximity of parking access roads to intersection and view obstructions. • Reduction in need or potential to park on Hwy. • Number of vehicular circulation decision points.
22. Minimize access conflicts between public visitors and residential users.	<ul style="list-style-type: none"> • Projected traffic volume on Pacific Way at residential and commercial intersections. • Extent of pedestrian separation from Pacific Way. • Proximity of parking to residential areas.
23. Minimize land use conflicts between visitor access and adjacent uses.	<ul style="list-style-type: none"> • Compatibility of adjacent uses. • Proximity of parking. • Character of linkages between uses.
24. Minimize conflicts between access and use of facilities and the natural function of the ecosystem.	<ul style="list-style-type: none"> • Number and type of stream crossings. • Proximity of sensitive habitats to access routes and use facilities. • Extent of habitat connectivity and fragmentation. • Extent that multi-use (pedestrian, bicycle, equestrian, etc.) trails are expected to cause erosion and sediment generation (due to steepness, use in the wet season, etc.).
25. Provide emergency access through site.	<ul style="list-style-type: none"> • Ease of access to Coastal Trail south of site. • Travel distance for emergency vehicles. • Potential for congestion along emergency access routes. • Ease of emergency vehicle access to beach.
26. Provide improved access for Muir Beach residents.	<ul style="list-style-type: none"> • Degree that flooding (water depth, frequency and duration) is reduced on Pacific Way and Lagoon Way.
27. Reduce noise and aesthetic/visual distraction of parking and maintain “rustic character.”	<ul style="list-style-type: none"> • Distance of parking from residents. • Amount of shading/screening of parking. • Size of parking bays.
28. Avoid adverse impacts to upstream properties that could result from channel adjustment.	<ul style="list-style-type: none"> • Potential for private properties to be impacted by channel migration and/or bank erosion.
29. Do not increase flood hazards to private property.	<ul style="list-style-type: none"> • Depth of freeboard between flood elevations for individual homes and estimated peak (100-year) flood levels and storm surge run-up. • Potential for private properties to be impacted by channel migration and/or bank erosion.

Objective	Indicators
Constructability	
30. Provide a restoration approach that can be implemented in a feasible manner.	<ul style="list-style-type: none"> • Ability to schedule key construction activities to avoid or minimize impacts to fish and wildlife (i.e., work outside of breeding seasons, etc.). • Ability to phase construction so that ample habitat for special-status species is available throughout the construction period. • The degree to which on-site and off-site construction impacts to the community (e.g., traffic, noise, closure of access roads) are minimized. • The degree to which construction impacts to park visitors (i.e., traffic, noise, parking and trail closures, etc.) are minimized. • The degree to which off-site ecological impacts (e.g., due to off-site soil disposal, parking, etc.) are minimized. • For phased implementation, the degree to which maintenance actions (e.g., for roads, emergency access, bridges, trails, visitor access or ecological function) will not be required during interim phases.
31. Develop a restoration plan that can be implemented in a cost effective manner.	<ul style="list-style-type: none"> • Ability to balance cut and fill volume for earthwork. • Order of magnitude costs for new/relocated infrastructure (Pacific Way Bridge, access roads, parking lot, interpretive and recreational facilities, etc.). • Order of magnitude costs for adaptive management activities (including monitoring).
Cultural Resources	
32. Preserve, undisturbed, indigenous archeological sites in the project area.	<ul style="list-style-type: none"> • Distance of ground disturbances from the archaeological sites. • Degree to which archaeological sites are covered and armored to prevent erosion. • Distance of potential erosion sources from archaeological sites.
33. In addition to the principle of ecological restoration, the landscape design will be informed by the traditional ecological knowledge of the indigenous peoples of the Central California Culture Area.	<ul style="list-style-type: none"> • The extent the design and operational management of the restoration employs native plants with traditional cultural uses, and native practices of land management. • Extent to which the Federated Indians of Graton Rancheria, if they so desire, are permitted to tend and gather plant materials for traditional and interpretive uses under a special use arrangement. • Extent of support by the Federated Indians of the Graton Rancheria for cultural aspects of the project design.
34. Make the project area an important focal point of interpretation of history and culture of the Coast Miwok.	<ul style="list-style-type: none"> • Visitor experiences (e.g., visitor contact station, wayside panels, programs) that are devoted to Coast Miwok history and use of this area.

Project Strategy

NPS has adopted the following project strategy to guide restoration and public access improvements at Big Lagoon.

To develop a management and restoration program that allows for the natural evolution of the landscape through geomorphic processes by anticipating and directing the seasonal and interannual patterns of flooding, sedimentation, erosion, wind-blown sand, wave action and saltwater mixing, thereby minimizing the need for human intervention, except to reconcile conflicts with desirable human activities.

In taking advantage of the natural geomorphic evolution of the site, we anticipate that we will provide the greatest opportunities to recreate native biodiversity within the ecosystem, as well as specifically provide suitable habitat for focal species within the planning horizon. Most of the habitat objectives... rely on natural processes, driven by natural geomorphic evolution, to provide the desired diversity and function of individual habitat types.

This strategy recognizes that there is a broad spectrum of visitor experiences compatible with the natural and cultural resources of the site that can be developed coincident with the re-establishment of natural geomorphic processes. The restoration approach will provide visitors and residents with opportunities to access natural areas in a manner that is harmonious with the long-term ecological goals of the restoration project. This will be accomplished by developing facilities that serve educational and recreational purposes appropriate to the natural and cultural setting and complementary to a healthy natural environment.

The strategy also seeks to reduce existing flooding by allowing natural geomorphic processes to shape the landscape and by modifying infrastructure to accommodate these processes. Reducing flooding will improve the quality of the visitor and resident experience.

Project Review Process

Overview of the National Environmental Policy Act and the California Environmental Quality Act

When a project² is subject to review under both NEPA and CEQA, state and local agencies are encouraged to cooperate with federal agencies in the environmental review process and to prepare a joint environmental document. NPS and the County have determined that the proposed Big Lagoon project could significantly affect the environment and have therefore prepared this joint Final EIS/EIR.

NEPA (42 USC 4321; 40 Code of Federal Regulations [CFR] 1500.1) is the nation's broadest environmental law. It provides an interdisciplinary framework

² The term *project* used in this EIR/EIS refers explicitly to the term as defined under CEQ's regulations for NEPA and the State CEQA Guidelines: "the entirety of an action which has a potential for resulting in a physical change in the environment."

for federal agencies to prevent environmental damage and contains action-forcing procedures to ensure that federal agency decision makers take environmental factors into account. NEPA applies to all federal agencies and to most of the activities they manage, regulate, or fund that affect the environment. It requires all agencies to consider and to publicly disclose the environmental implications of their proposed actions through the preparation of appropriate documents. The President's Council on Environmental Quality (CEQ) has adopted regulations and other guidance that provide detailed procedures that federal agencies must follow to implement NEPA. NEPA requires that every federal agency prepare an EIS for proposed legislation or other major federal actions "significantly affecting the quality of the human environment" (42 USC 4332; 40 CFR 1501). This Final EIS/EIR was prepared to comply with the requirements of NEPA and its relevant implementing regulations. NPS is the lead agency under NEPA.

CEQA (Public Resources Code [Pub. Res. Code], Division 13, Section 21000 et seq.) requires state and local agencies to estimate and evaluate the environmental implications of their actions and aims to prevent adverse environmental impacts of those actions by requiring those agencies, when feasible, to avoid or reduce significant environmental impacts. CEQA requires that the lead agency prepare an EIR when the lead agency determines that a project may have a significant effect on the environment. Marin County is the lead agency under CEQA.

Role of Lead Agencies

This project has two lead agency sponsors—the County and NPS. Although it is a joint project, the County and NPS each play a unique role in the project. The County's role is limited to actions related to improvements to Pacific Way and the Pacific Way Bridge. All other actions are the responsibility of NPS. All components of the project are related and necessary to achieve the overall goals and objectives of the project; for this reason, they have been included as the whole of the project.

Public Involvement and Scoping

The intent of both NEPA and CEQA is to establish opportunities for the public to review and comment on projects that may affect the environment. Both NEPA and CEQA provide for public participation through:

- project scoping,
- publication of project NOI to prepare an environmental impact statement/NOP to prepare an environmental impact report,
- public review of environmental documents, and
- public hearings.

NEPA and CEQA also require that a final EIS/EIR include responses to all comments received from the public regarding the draft EIS/EIR. The following sections provide additional information on public involvement in the environmental review process.

Notice of Intent and Notice of Preparation

The purpose of the NOI and NOP is to solicit participation from responsible and coordinating federal, state, and local agencies and from the public in determining the scope of an EIS and EIR. The scoping process was formally initiated under NEPA on December 3, 2002 with the publication of the NOI in the Federal Register (Volume 67, Number 232, Page 71983-71984). The scoping process was formally initiated under CEQA on April 27, 2004 with the submittal of the NOP to the California State Clearinghouse in compliance with CEQA. A copy of the NOI and NOP is included as Appendix A. Comments on the NOI and NOP were provided by a number of agencies, organizations, and members of the public.

Project Scoping

Scoping refers to the process used to determine the focus and content of an EIS/EIR. Scoping solicits input on the potential topics to be addressed in an EIS/EIR, the range of project alternatives, and possible mitigation measures. Scoping is also helpful in establishing methods of assessment and in selecting the environmental effects to be considered in detail. The tools used in scoping this EIS/EIR included a number of public meetings, informal stakeholder and interagency consultation, public scoping meetings, and publication of the project NOI/NOP. The scoping process is described in more detail in Chapter 7, Consultation and Coordination. A scoping summary is provided in Appendix B.

Public Review of the Draft EIS/EIR

The Draft EIS/EIR was circulated to local, state, and federal agencies and to interested organizations and individuals to review and comment on the report. Its publication marked the beginning of a 75-day public review period, beginning on December 22, 2006, the date of EPA's notice of filing published in the Federal Register. Following release of the Draft EIS/EIR, NPS and Marin County held two public meetings to present the project to interested parties and to answer questions about the project. These meetings were held on January 18 and 31, 2007. NPS and Marin County also conducted a public hearing at the Marin County Planning Commission in San Rafael, California, on February 26, 2007, to receive comments on the draft document.

Final EIS/EIR

As stated above, NEPA and CEQA require that a final EIS/EIR include responses to comments received regarding the draft EIS/EIR. This Final EIS/EIR therefore includes Chapter 6, *Responses to Comments*, which includes written responses to substantive issues raised in written and oral comments received during the review period for the Draft EIS/EIR. In addition, revisions to the Draft EIS/ EIR are shown throughout the Final EIS/ EIR as follows: text that has been deleted is shown in ~~strikeout~~, and text that has been inserted is underlined. After review of the project and the final EIS/EIR, County staff will recommend to the Marin County Board of Supervisors whether to approve or deny the portions of the project for which they are responsible. This governing body will then review the project, the final EIS/EIR, staff recommendations, and public testimony before deciding whether to certify the final EIS/EIR and authorize the portions of the project for which they are responsible.

Following NEPA guidelines, NPS will file a ROD in the Federal Register which documents their approval of the action. Review and approval of the EIS/EIR and ROD is handled by the NPS Regional Director. The ROD documents the choice of an alternative, mitigation measures, and the decision rationale. According to the CEQ requirements, the ROD contains: (1) a summary description of all the alternatives analyzed, (2) the environmentally preferable alternative, (3) the decision rationale, (4) a description of which mitigation measures will be implemented, (5) a summary of any monitoring or other enforcement programs or plans, and (6) a statement of whether all practical means to avoid or minimize environmental harm from the selected alternative have been adopted, and if not, why not.

Under CEQA guidelines, if the project is approved and there are significant impacts identified by the EIS/EIR that cannot be mitigated, the County must include a Statement of Overriding Considerations in the record of the project approval and mentioned in the Notice of Determination (14 California Code of Regulations [CCR] 15093[c]).

Public Review of the Final EIS/EIR

This Final EIS/EIR will be circulated to local, state, and federal agencies and to interested organizations and individuals who may want to review and comment on the report. Its publication marks the beginning of a ~~45~~30-day public review period, beginning on the date of EPA's notice of filing published in the Federal Register.

Written comments will be accepted online at <http://parkplanning.nps.gov/goga> (click the project title and follow instructions). Written comments may also be sent to:

Superintendent
Golden Gate National Recreation Area
Fort Mason, Building 201
San Francisco, CA 94123
Attn: Wetland and Creek Restoration at Muir Beach

All documents mentioned herein or related to this project can be reviewed any Marin County business day between the hours of 8:30 a.m. and 4:00 p.m. at the Marin County Development Agency, located at the following address:

3501 Civic Center Drive, Room 308
San Rafael, CA 94903

Mitigation Monitoring and Reporting

CEQA requires that lead agencies "...adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment" (13 Pub. Res. Code 21002). Throughout the Final EIS/EIR, mitigation measures have been clearly identified and presented in language that would facilitate establishment of a monitoring and reporting program. Any mitigation measures adopted by NPS and the County as conditions for approval of the project would be included in a monitoring and reporting program to verify compliance. The mitigation monitoring and reporting program for the proposed project has been included in Appendix C.

NPS will document the mitigation measures that it is adopting in the ROD, as described above.

Impact Topics

Impact topics are the resources or values of concern that could be affected, either beneficially or adversely, by the alternatives. The impact topics were identified on the basis of federal, state, and local laws, regulations, orders, *National Park Service Management Policies* (National Park Service 2006a), scoping, and GGNRA/County staff concerns or knowledge. The impact topics include:

- Watershed Processes;
- Water Quality;
- Water Supply;
- Air Quality;
- Vegetation Communities and Wetlands;
- Wildlife and Wildlife Habitat;
- Fisheries;

- Cultural Resources;
- Recreation and Visitor Experience;
- Traffic and Circulation;
- Aesthetics;
- Energy, Public Services, Utilities, and Service Systems;
- Human Health and Safety;
- Land Use Planning and Agriculture; and
- Noise.

Impact Topics Dismissed from Further Analysis

The topics listed below would either not be affected or would be affected negligibly by the alternatives. Negligible effects are those that are localized and immeasurable at the lowest level of detection. Therefore, these topics have been dismissed from detailed analysis.

Night Sky

Because Muir Beach is not open after dark, there are no lights at the parking area and traffic on Pacific Way is generally limited to residents of the Muir Beach community. None of the project alternatives that are proposed as part of this plan would increase or decrease night traffic. Nor are any streetlights or other sources of new light pollution proposed as part of this plan. Construction efforts would not adversely affect night views because construction activities would be limited to daylight hours between 8:00 a.m. to 5:00 p.m. Therefore, this topic was dismissed.

Wilderness Values

The Wilderness Act of 1964 (16 USC 1131 et seq.) established a national wilderness preservation system. Within the study area, there are no designated wilderness areas and therefore, this topic was dismissed.

Indian Trust Resources

Indian trust assets are owned by Native Americans, but are held in trust by the United States. Secretarial Order 3175 (“Identification, Conservation and Protection of Indian Trust Assets”) requires that any anticipated impacts to Indian trust resources due to a proposed project or action by agencies within the Department of the Interior be explicitly addressed in environmental documents. Because the lands within the park boundaries are not held in trust by the

Secretary of the Interior for the benefit of Indians due to their status as Indians, this topic was dismissed.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 established the National Wild and Scenic River System to protect the nation's highest quality natural rivers. There are no designated wild and scenic rivers within the study area, therefore this topic was dismissed.

Mineral and Paleontologic Resources

The project area does not contain any known mineral or paleontologic resources. For this reason, this topic was dismissed.

Environmental Justice

Executive Order (EO) 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations") requires that all federal agencies incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. According to the U.S. Environmental Protection Agency (EPA), environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Because there are no minority or low-income populations or communities at or adjacent to the project site, and the visitors to Muir Beach consist of a broad spectrum of demographic and economic groups, the alternatives would not have disproportionate health or environmental effects on minorities or low-income populations or communities as defined by the EPA, this topic was dismissed.

Population/Housing

CEQA requires consideration of whether the project would displace housing or people, necessitating the construction of replacement housing elsewhere. Because the project would not result in these effects, they have not been considered further, and this topic was dismissed.

Intended Uses of Final EIS/EIR

As indicated above, the Final EIS/EIR is an information document for decision-makers. CEQA and NEPA require that the decision-makers review and consider the Final EIS/EIR in their consideration of this project. GGNRA and the County are the lead agencies under NEPA and CEQA, respectively. Agencies with subsequent permit review or approval authority over the project are summarized in Table 1-2. These are responsible agencies under CEQA and will use the Final EIS/EIR as the environmental basis of their decisions.

Table 1-2. Summary of Local, State, and Federal Discretionary Actions

Agency	Permit/Review Required
GGNRA	<ul style="list-style-type: none"> ▪ NEPA Lead Agency—project approval
County of Marin	<ul style="list-style-type: none"> ▪ CEQA Lead Agency—project approval ▪ Encroachment Permit for NPS work in County right-of-way ▪ Grading Permit, if NPS earthwork occurs on private property (e.g., SFZC property) ▪ Creek Permit, if creek restoration activities occur on private property
California Department of Fish and Game (DFG)	<ul style="list-style-type: none"> ▪ Incidental take permit, if state-listed species is affected ▪ Streambed Alteration Agreement, if activities occur within the stream zone on private property
Caltrans	<ul style="list-style-type: none"> ▪ Encroachment Permit (if in Hwy 1 right-of-way)
Regional Water Quality Control Board (RWQCB)/ State Water Resources Control Board (SWRCB)	<ul style="list-style-type: none"> ▪ National Pollutant Discharge Elimination System Construction Activities Stormwater General Permit ▪ Dewatering Permit (if needed) ▪ Federal Clean Water Act Section 401 Water Quality Certification
USACE	<ul style="list-style-type: none"> ▪ Permit under Section 404 of the federal Clean Water Act (CWA) and Section 10 of the federal Rivers and Harbors Act
U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS)	<ul style="list-style-type: none"> ▪ Consultation under Section 7 of the federal Endangered Species Act ▪ Authorization for work below mean high tide (i.e., within the Gulf of the Farallones National Marine Sanctuary) (NMFS)
State Historic Preservation Office (SHPO)	<ul style="list-style-type: none"> ▪ Compliance with Section 106 of the National Historic Preservation Act
California Coastal Commission (CCC)	<ul style="list-style-type: none"> ▪ Coastal Development Permit (County actions on non-federal land); Consistency Determination (NPS)

