

## Chapter 5

# Other Statutory Considerations

This chapter discusses other impact analyses required by NEPA and CEQA. It includes discussions regarding the potential for cumulative impacts, growth-inducing impacts, irreversible and/or irretrievable commitments of resources, the relationship between short-term uses and long-term productivity of the environment, and significant and unavoidable impacts.

## Cumulative Impacts

### Methodology

Both CEQA and NEPA require the Final EIS/EIR to identify and analyze cumulative impacts. NEPA Section 1508.7 states that a cumulative impact can occur in a project area as a result of “individually minor but collectively significant actions taking place over a period of time.” This impact can occur “when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.”

To meet the adequacy standard established by Section 15130 of the CEQA Guidelines, an analysis of cumulative impacts must contain the following elements.

- Analysis of related future projects or planned development that could affect resources in the project area similar to those affected by the proposed project.
- Summary of environmental effects expected to result from those projects, with specific reference to additional information stating where that information is available.
- Reasonable analysis of the combined (cumulative) impacts of the relevant projects.

The analysis of cumulative impacts must also evaluate the proposed project’s potential to contribute to the significant cumulative impacts identified and discuss feasible options for mitigating or avoiding any contributions assessed as cumulatively considerable.

The discussion of cumulative impacts is not required to provide as much detail as the discussion of the project’s *individual impacts*, or the effects attributable to the

project alone. Rather, the level of detail should be guided by what is practical and reasonable.

Lead agencies may use a “projection” approach or a “list” approach to identify related projects for the cumulative analysis, or both. The projection approach bases the identification of cumulative impacts on a summary of projections in an adopted general plan or related planning document (CEQA Guidelines Sec. 15130[b]). For this document, both approaches were used, as described below.

The analysis of cumulative impacts uses the same concepts of type, duration, timing, and intensity as described for individual impacts in Section 4.2 above.

## **Projections Used to Evaluate Cumulative Impacts**

### **Marin Countywide Plan**

The Marin Countywide Plan (Countywide Plan; adopted 1994) provides for the long-range direction and development of land within the County. The Countywide Plan is in the process of being updated; a draft of the updated plan was released in early 2004, with an updated draft released in mid 2005. The new plan is expected to be adopted in 2006 or 2007. Land use projections for the project area have not changed substantially since the 1994 Countywide Plan.

### **Comprehensive Transportation Management Plan**

The CTMP is no longer planned for implementation; however, as part of the CTMP process, detailed traffic projections were developed for Hwy 1 in the vicinity of Muir Beach. These projections are used in this cumulative traffic analysis. The CTMP for Parklands in Southwestern Marin was a joint effort between Marin County, NPS California State Parks, Caltrans, other participating agencies, and the public in southern Marin to identify and evaluate the development of recreational travel model options to reduce traffic impacts of visitors on gateway communities and the parks. The CTMP was engaged in active planning during 2003 and 2004, but is no longer actively planning transportation projects. Heavy volumes of traffic and parking impacts on roadways leading to National Park areas in GGNRA and Mt. Tamalpais State Park resulted in a need to evaluate alternative access to the parks other than continued reliance on automobile. The CTMP project area included the parkland areas along Hwy 1 and Panoramic Highway, including Muir Woods National Monument, Mt. Tamalpais State Park, Muir Beach, Stinson Beach, Tennessee Valley, and the trails and other roads leading to these recreation attractions. The study area also included the developed area along Hwy 1 east of the parkland areas in Tamalpais Valley between the Manzanita park and ride and the intersection of Hwy 1 and Panoramic Highway. Finally, the study area included the identified locations of a possible transportation intercept facility (TIF) at Manzanita and at Rodeo Avenue.

## List of Projects Potentially Contributing to Cumulative Impacts

Table 5-1 lists the projects that were considered in the evaluation of cumulative impacts. This list was developed based on input from NPS (Shoulders pers. comm.) and the Marin County January 2006 Semi-Annual Proposed Development Survey (PROPDEV-41) (Marin County 2006).

In reviewing PROPDEV-41, none of the County projects listed in the survey were found to be located in close enough proximity to the project site that they could contribute to cumulative impacts. The exception would be County projects in areas such as Tam Junction, Olema, and Point Reyes Station that could have minor traffic impacts along the Hwy 1 corridor; however, traffic projections developed for the CTMP, described above, are considered most representative of future traffic conditions in the project area, and were used in lieu of PROPDEV-41 for the analysis of cumulative traffic impacts. Other than these projects, the primary focus of this cumulative assessment has been on reasonably foreseeable future projects within the Redwood Creek watershed.

**Table 5-1.** List of Reasonably Foreseeable Future Projects

Project Name	Planning Jurisdiction	Project Characteristics	Schedule
Vegetation Stewardship	GGNRA	Management of non-native plants and trees within the GGNRA, including the Redwood Creek watershed. This has included the removal of eucalyptus trees and cape ivy along Redwood Creek.	Ongoing
Fire Management Plan	GGNRA	Various approaches to manage fire in GGNRA, including both mechanical fuels treatments and prescribed fire. Measures will be implemented to protect natural and cultural resource values.	ROD signed, 2006
Dias Ridge/Redwood Creek Trail realignment	GGNRA/CA State Parks	Realign trail from Panoramic Highway to route users to Muir Beach at Pacific Way.	EA released April 2007; Decision in Fall 2007; Construction planned 2008. Scoping completed; EA expected mid 2006
Floodplain and Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site	GGNRA	Reconnect floodplain, enhance habitat in upper channel by using LWD and expanding the terraced floodplain, and reduce sediment transport downstream by expanding the available floodplain for deposition and by removing unstable channel banks in the upper channel. Create new ponds with emergent vegetation for future CRLF habitat.	Completed, 2007. Planning underway; installation to occur in 2007

Project Name	Planning Jurisdiction	Project Characteristics	Schedule
Floodplain and Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site	GGNRA	In the first project at this site, 1,800 linear feet of channel were reconnected with approximately 6 acres of historic floodplain by removing berms and installing log structures to enhance juvenile salmonid habitat in a formerly channelized reach. Allows sediment deposition in the floodplain.	Completed, 2003
<u>Floodplain and Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site</u>	<u>GGNRA, Marin County DPW</u>	<u>GGNRA and DPW would work together to raise 600 linear feet of Muir Woods Road at the intersection of Highway 1, thereby allowing berms to be removed along 900 linear feet of Redwood Creek and creating a new 8-acre floodplain for both salmonid habitat and flood storage</u>	<u>Not scheduled.</u>
Negotiated Rulemaking for Dog Management	GGNRA	Dog management throughout GGNRA is being evaluated through an ongoing federally sanctioned Negotiated Rulemaking process and concurrent NPS environmental analysis. The outcome of these processes will determine how dogs will be managed on lands under NPS jurisdiction within the project area.	Scoping completed April 2006; <u>Negotiated Rulemaking Committee concluded its work in October 2007</u> ; EIS in preparation.
Fern Creek Riparian Fencing	GGNRA	Installation of fencing and locally native plants to prevent human trampling of vegetation along Fern Creek, a tributary of Redwood Creek that supports coho and steelhead. A boardwalk was also installed along Redwood Creek where pavement was removed to limit visitors to trails and prevent impacts on redwoods in the riparian area.	1996
LWD Recruitment	GGNRA	Past practices of removing large woody debris from the Muir Woods' portion of Redwood Creek was discontinued in the 1990s. Large woody materials have been added into the creek in the late 1990s in the Muir Woods' portion of Redwood Creek to create pool habitat.	1990s
<del>Road Restoration</del>	<del>GGNRA</del>	<del>NPS abandoned road restoration in Muir Woods to reduce sediment inputs.</del>	<del>Completed.</del>
Southern Marin Equestrian Plan	GGNRA	Identify options for the future use of three Marin County stables located on GGNRA land, including site and facility needs/improvements, and protection of important resources at and surrounding the sites. Identify and enhance the public outreach and equestrian programs.	Scoping completed June 2006; EA in preparation.

Project Name	Planning Jurisdiction	Project Characteristics	Schedule
Muir Woods Road Decommissioning	GGNRA	Reduce sediment contribution to Redwood Creek by decommissioning <u>500 linear feet of an old road</u> on a hillside at Muir Woods National Monument at a location where one landslide had occurred and a stream crossing was blown out. <u>Prevented about 989 cubic yards of sediment delivery.</u> Natural contours of the hillside were re-established, and the natural contour of an ephemeral drainage were recreated, with all infrastructure such as culverts and retaining walls removed.	Completed, 2003
Lower Redwood Creek Interim Flood Reduction Measures and Floodplain / Channel Restoration	GGNRA	Measures to reduce flooding on Pacific Way. Included excavation of sediment up- and downstream of Pacific Way Bridge; removal of woody debris and sediment between the Pacific Way Bridge and the NPS parking lot; removal of dead trees at risk of falling into the channel in the reaches described above; excavation of a 10 foot-wide pilot channel through the willow-alder grove downstream of the NPS parking lot and pedestrian bridge; installation of two armored dips in the levee road; removal of the flapgate on the more downstream culvert in the levee road; installation of willow mattresses at two floodplain channel inverts upstream of the Pacific Way Bridge; and excavation of a small trench at the low point on Pacific Way east of the Pacific Way Bridge.	Completed, 2002
2004 Interim Flood Reduction Measures	GGNRA	Excavated 300 Linear feet of channel near the Muir Beach parking lot when the channel was dry, and removed two log jams. Actions allowed the right fork channel to become the main channel again.	Completed, 2004
2005 Interim Flood Reduction Measures	GGNRA	Removed the lower end of picnic area to increase cross-section area available for high flows, and removed one log jam that was not in the low-flow channel.	Completed, 2005
<u>Concession Contract at Muir Woods National Monument</u>	<u>GGNRA</u>	<u>Picnic lunches will be sold to the visitors at the Muir Woods National Monument. However, these lunches will not be consumed within the park. Picnickers will be directed to Muir Beach, Tennessee Valley, Muir Beach Overlook, or Stinson Beach to consume food purchased at the Muir Woods National Monument concession stand.</u>	<u>2007–2008</u>
2006 Interim Flood Reduction Measures	Marin County DPW/SFZC	SFZC cut drainage channel south of Pacific Way <u>through Green Gulch Pasture.</u> DPW <u>installedis installing</u> a culvert under Pacific Way.	Fall 2006

Project Name	Planning Jurisdiction	Project Characteristics	Schedule
Hwy 1 Intelligent Transportation System	GGRNA, Marin County, and Caltrans	The Intelligent Transportation System (ITS) notifies Hwy 1 motorists of traffic and parking conditions at south Marin recreational destinations. Consists of two portable electronic message signs on US 101. Messages also available by dialing 511. Operates between May and September. Not currently operated for Muir Beach but may be expanded.	Ongoing
Green Gulch Farm Residential Addition	Marin County	Construction of additional residential facilities.	2005
Green Gulch Farm Country Store	Marin County	Possible operation of a fruit stand or country store at the intersection of Hwy 1 and Pacific Way.	Not scheduled.
Green Gulch Farm Concrete Lining Removal	Marin County	Possible removal of concrete lining from Green Gulch tributary.	Not scheduled.
Muir Woods Road Fencing	Marin County	Fencing installed along Muir Woods Road to prevent roadside parking in some locations; intended to reduce sediment delivery from these locations.	Completed, March 2006
Muir Woods Shuttle Program	Marin County	Summer shuttle to Muir Woods National Monument from the Manzanita Park and Ride and Marin City on weekends and holidays. Pilot shuttle program is expected to operate in summer 2006 and summer 2007. Marin County is working with Caltrans and GGNRA to address several transportation issues in this area, one of which are the upgrade of Hwy 1 bus stops in Muir Beach, so they can be served by the shuttle.	Through 2007 <u>and possibly beyond.</u>
Kent Canyon Culvert Replacement	Marin County Department of Public Works	Installation of a new culvert connecting Kent Canyon and the mainstem of Redwood Creek to improve fish passage. Coho spawn upstream in Kent Canyon, but a culvert under the county-owned Muir Woods Road is sized and installed in a manner that impedes fish passage due to increased water velocities.	<u>Completed, 2007.</u>
Recontouring of West Peak of Mt. Tamalpais	MMWD	MMWD has assumed management of the West Peak of Mt. Tamalpais and may recontour existing airstrip.	Not scheduled
Vegetation Management and Trail Plans	MMWD	Trails and roads maintenance, erosion control, fuels management, and invasive species control in the Mt. Tamalpais watershed.	Ongoing
Deer Park Fire Road Regarding Project	Mt. Tamalpais State Park	Regraded the Deer Park Fire road to encourage improved run-off that would reduce sediment delivery downstream.	2004–2005
MBCSD Water Storage Tank	MBCSD	Possible construction of a new water storage tank to reduce the need for groundwater pumping during periods of low flow in Redwood Creek.	Not scheduled.
Pirates Cove Trail Realignment	GGNRA	Realign route of trail to reduce erosion and enhance native vegetation.	October 2006

Project Name	Planning Jurisdiction	Project Characteristics	Schedule
MBCSD Storage Shed Relocation	MBCSD	Relocate storage shed adjacent to Redwood Creek further from the creek.	2007–08
Public Transit Drop-off at Hwy 1 and Pacific Way	Marin County and Caltrans	Construct a disabled-accessible drop-off for shuttles and buses.	Not scheduled
Improve Pedestrian Crossing at Hwy 1 and Pacific Way	Marin County and Caltrans	No specific designs.	Not scheduled
Reconstruction of Camino del Canyon Road	National Park Service	Reconstruct road following damage after landslide in winter 2005.	July 2006
One-way Traffic on Muir Woods Road	Marin County DPW	Lane closures at two points on upper Muir Woods Road following landslide at edge of road in winter 2005.	Repaired
Repair of Upper Muir Woods Road	Marin County DPW	Repair of road and re-routing of drainage following landslide in winter 2005.	Fall 2006
Hamilton Wetland Restoration Project	U.S. Army Corps of Engineers and California Coastal Conservancy	Wetland restoration of between 900 and 2,300 acres near Novato	Ongoing
<u>Sediment Reduction on Roads and Trails</u>	<u>MMWD</u>	<u>Road-related erosion control measures implemented at fourteen sites in the upper Redwood Creek Watershed, including Old Railroad Grade and Gravity Car Road, to prevent an estimated 5,100 cubic yards of sediment from entering Redwood Creek. Installed rolling dips, outsloped roads, replaced culverts with larger culverts, and installed an armoured crossing.</u>	<u>Completed.</u>

## Cumulative Impact Analysis

### Watershed Processes

Implementation of the Big Lagoon project would not create any significant adverse watershed process-related cumulative impacts and would result in cumulatively beneficial impacts. Restoration Alternatives 2–4 would result in beneficial impacts including: reducing the potential for channel avulsion; improving Redwood Creek's ability to accommodate sediment loads and transport sediments to the Pacific Ocean; and maintaining an equilibrium channel form. In contrast, Restoration Alternative 1 would result in cumulatively adverse

impacts because no actions would be taken and the potential for channel avulsion, reduced sediment load transport, and maintenance of channel equilibrium would not occur. Other projects in the watershed (including the Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site, the Floodplain and Salmonid Habitat Restoration on Redwood Creek at the Banducci Site, the MBCSD Water Storage Tank project, the Muir Woods Road Decommissioning, the Lower Redwood Creek Interim Flood Reduction Measures and Floodplain/Channel Restoration, and multiple Interim Flood Reduction Measures) would result in beneficial impacts on watershed processes. The potential beneficial impacts of Restoration Alternatives 2–4, in addition to the potential beneficial impacts of other projects in the watershed, would cumulatively restore and/or improve the natural watershed processes (hydrology, flooding, geology/soils/geohazards, and geomorphology) and would be a cumulatively beneficial impact.

All Public Access Alternatives of the project contribute to cumulatively beneficial flooding impacts in the watershed. The Bridge Alternatives would generally have negligible or beneficial impacts on flooding, except for Bridge Alternative BR1. Bridge Alternative BR1 would present an impediment to flows, which would be considered a significant and unavoidable adverse consequence of this Bridge Alternative. The Fill Disposal Alternatives are not anticipated to have effects on watershed processes.

Overall, the cumulative impact of the project with respect to Watershed Processes, considering other past, present and reasonably foreseeable future projects, is considered beneficial.

There is no watershed processes cumulative nexus between the project and other projects outside of the watershed.

## Water Quality

Implementation of the project, including all action restoration, public access, bridge, and Fill Disposal Alternatives, would result in short-term adverse construction-related impacts on water quality. However, these impacts would be less than significant following implementation of the designated mitigation measures and would not contribute to a cumulatively significant adverse water quality impact.

Restoration Alternatives 2–4 would result in beneficial impacts to water quality over the lifetime of the project. These would help offset some known sources of impairment to the watershed, including elevated levels of nutrients and bacteria. In addition, the improved ability of the project to store/pass sediment to the ocean would provide benefits related to the cumulative conditions leading to excess sediment entering the system (e.g., development in the watershed, legacy of land uses).

Public Access Alternatives B1–B5 and C would also contribute to improving water quality by providing additional water quality treatment of non-point source runoff and/or reducing vehicle-related non-point source pollution. Bridge and Fill Disposal Alternatives would not result in any water quality impacts following construction.

Other projects in the project area that would benefit water quality include the Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site, the Floodplain and Salmonid Habitat Restoration on Redwood Creek at the Banducci Site, the Muir Woods Road Decommissioning, the Lower Redwood Creek Interim Flood Reduction Measures and Floodplain/Channel Restoration, Deer Park Fire Road Project, Muir Woods Road Fencing, Vegetation Management and Trail Plans, Pirates Cove Trail Realignment, and Repair of Upper Muir Woods Road. These projects would benefit water quality by reducing erosion and sediment transport, restoring Redwood Creek to provide additional water quality treatment, and by restoring natural drainage patterns. The beneficial impacts of the project would be beneficial when considered with other projects in the watershed that also reduce sediment and nutrient transport and generally enhance the watershed's water quality.

There is no water quality cumulative nexus between the project and other projects outside of the watershed.

## Water Supply

The project (all Restoration, Public Access, Bridge, and Fill Disposal Alternatives) would not result in any cumulative impacts on water supply. Restoration Alternatives 1–4 would have negligible impacts on groundwater levels at the MBCSD well or at Green Gulch Farm well. In addition, Public Access Alternatives B1–B5 and C, and all Fill Disposal Alternatives would not affect water supply quantities or water service to residents in the project area. The potential for disruption of water supply as a result of the need to relocate MSCSD water lines on the project site is discussed in Section 4.3.4.4, *Energy, Public Services, Utilities, and Service Systems*, under Impact PS-R4, and is mitigated to less than significant. None of the Bridge Alternatives would involve other activities that could affect water supply.

Other projects with potential to affect water supply include the Green Gulch Farm Residential Addition of five homes, which would generate some water demand. The potential MBCSD Water Storage Tank project would improve water supplies and reduce the need for groundwater pumping during dry periods by constructing a water storage tank. Therefore, cumulative impacts of the project and other projects in the area on water supplies would be less than significant.

## Air Quality

The project would not result in significant cumulative air quality impacts. Restoration Alternative 1 would have negligible impacts on air quality because it would involve infrequent limited construction activities. Restoration Alternatives 2 and 3 would have less-than-significant impacts on air quality during construction activities with implementation of mitigation measures. Although Restoration Alternative 4 would also implement mitigation measures, the short-term air quality impacts of this alternative would be significant because the NO<sub>x</sub> emissions would still exceed the significance threshold of 80 ppd. The Public Access Alternatives, Bridge Alternatives, and Fill Disposal Alternatives would have negligible or less-than-significant air quality impacts as a result of the construction and/or fill disposal activities, with implementation of mitigation measures.

Short-term air quality impacts could potentially result from construction activities related to most of the listed reasonably foreseeable future projects. However, it is expected that those projects would implement mitigation measures to reduce impacts and that construction activities for the projects would not all occur at the same time as evident by the listed schedule dates. In addition, some projects would protect or improve the long-term air quality by reducing fire fuels and/or by reducing the number of vehicle trips through the implementation of a shuttle program. These beneficial projects would be the Fire Management Plan and the Muir Woods Shuttle Program.

Emissions of air quality pollutants during construction of the project, in addition to pollutant emissions from other projects, would contribute to a short-term significant cumulative adverse air quality impact. Following the construction activities, the project would not contribute any air quality pollutants. This impact is considered a less-than-significant cumulative adverse impact.

## Vegetation Communities and Wetlands

Cumulative impacts of the project would generally be beneficial. Some portions of the native vegetation communities in the project area would be disrupted or removed during construction of the project's Restoration Alternatives. Because it is likely that the construction of other projects could also remove native vegetation, the project's short-term impacts on vegetation communities would be cumulatively adverse. Emergent wetland communities would be adversely affected by Restoration Alternatives 2–4 and could be cumulatively adversely affected. However, Restoration Alternatives 2–4 would provide significant beneficial impacts, particularly in the long-term, on the extent and quality of riparian wetland habitat, open water habitat, dune habitat, decreases in noxious weed populations, the extent and quality of Corps-jurisdictional wetlands and other waters, and habitat changes for special-status plant species.

Bridge Alternatives BR1–BR4 would have small impacts on the extent and quality of riparian habitat. Public Access Alternatives B1–B5 and C would generally have either slightly beneficial or slightly adverse impacts on the extent and quality of riparian habitat. Fill Disposal Alternatives would generally have less-than-significant impacts on vegetation communities during construction and noxious weed populations through implementation of mitigation measures.

Other projects near the project area that could contribute to a cumulative beneficial impact would include the following projects: Vegetation Stewardship, Fire Management Plan, Negotiated Rulemaking for Dog Management, Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site, Vegetation Management and Trail Plans, Pirates Cove Trail Realignment, and Hamilton Wetland Restoration Project. These other projects would beneficially impact vegetation communities by reducing human and pet impacts on native vegetation, restoring emergent vegetation, and managing nonnative plants. While the project could have short-term adverse effects, these are not considered cumulative due to their short duration. The overall benefits of the project, when considered with the potential benefits of the other projects, result in a determination of a beneficial impact on vegetation communities and wetlands.

## Wildlife and Wildlife Habitat

The project's Restoration Alternatives could have cumulatively effects on wildlife and wildlife habitat, specifically regarding CRLF. Habitat fragmentation, increased predation of CRLF by fish, and construction activities could affect the population of the CRLF. Restoration Alternative 2 would have numerous benefits, as well as some adverse effects, and overall is anticipated to have negligible impacts on CRLF. However, the remaining three Restoration Alternatives would have significant, adverse impacts on CRLF. All of the Restoration Alternatives would have negligible or less-than-significant impacts on other wildlife species or their habitat.

The Public Access and Bridge Alternatives would all have negligible or less than significant impacts on other wildlife species. Fill Disposal Alternatives Unused Reservoir Pit, Upper Banducci Field, and Coastal Trail would have less-than-significant impacts on nesting birds from the vegetation cutting and removal actions.

Other projects that would or may benefit CRLF include: Green Gulch Farm's possible removal of concrete lining from Green Gulch tributary, Vegetation Stewardship, and Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site. These projects would benefit CRLF by constructing new ponds with emergent vegetation for future CRLF habitat, restoring natural stream conditions, and by removing invasive plant species.

Although impacts on local CRLF and their habitat in the project area would be mitigated to minimize potential impacts and impacts of other projects in the area would be beneficial, any additional impacts on this species that is federally

threatened and a state-listed special status species of concern would be considered cumulatively, adversely significant. Overall, Restoration Alternative 2 and the various Public Access, Bridge and Fill Disposal Alternatives would not contribute to a cumulative impact on CRLF; Restoration Alternatives 3 and 4, however, would have a cumulative adverse effect on CRLF.

## Fisheries

Fisheries would experience cumulatively beneficial impacts as a result of the project, specifically the Restoration Alternatives 2–4. While construction activities would have the potential to adversely affect fisheries immediately during or following construction activities, these would be short term. Implementation of the defined mitigation measures would reduce the significance of these potential adverse impacts and minimize potentially significant cumulative impacts. In addition, the Restoration Alternatives 2–4 would have many beneficial impacts on fisheries including: improved fish passage, reduced potential for fish entrapment, provision of additional deep pool refuge, increased summer-rearing habitat, and increased winter rearing habitat. The Public Access Alternatives would not be expected to affect fisheries, except potentially during construction when impacts would be less than significant. Bridge Alternatives BR1 and BR2, both with a 50-foot span, would have impacts on fisheries by increasing flow velocity under the bridge, and potentially affecting fish. Bridge Alternatives BR3 and BR4 would allow for flood flows to spread out from the channel in a more natural manner, providing low flow refuge in the flood margins. The Fill Disposal Alternatives would not affect fisheries.

Fisheries have benefited or would also be benefited from numerous other past and proposed projects that include: Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site, Floodplain and Salmonid Habitat Restoration on Redwood Creek at the Banducci Site, Green Gulch Farm's removal of concrete lining from tributary, Lower Redwood Creek Interim Flood Reduction Measures and Floodplain/Channel Restoration, the MBCSD Water Storage Tank, Kent Canyon Culvert Replacement, Deer Park Fire Road Project, and Pirates Cove Trail Realignment. These projects would improve water quality by reducing sediment inputs, prevent the trampling of vegetation, remove invasive riparian plants, improve fish passage, create pool habitat, and removed artificial bank protection. The 2003 and 2007 projects on Redwood Creek at the Banducci site have direct benefits for salmonids by expanding and enhancing available winter and summer rearing habitat. Therefore, the beneficial impacts of the project, considered with the beneficial impacts of other local projects, would be cumulatively beneficial.

## Cultural

None of the past, present, or reasonably foreseeable projects described in the list potentially are believed to contribute to degradation of the cultural resources at

the Big Lagoon site. This, in combination with the fact that the Big Lagoon project does not involve activities that would degrade cultural resources, results in the determination that there are no cumulative impacts with respect to Cultural Resources.

## Recreation

Other projects would beneficially impact recreation by connecting trails, particularly the Dias Ridge trail, which would also then be connected to the Redwood Creek Trail and the Coast View Trail. The new trail through the site allows an easy connection from these trails to the Coastal Trail, as shown in Figure 5-1. In recontouring the Dias Ridge Trail and the Coast View Trail in more sustainable locations on hillsides, there will be a cumulative benefit in the visitor experience of trails that are more park-like and less like old ranch roads. In addition, other past and future projects near the project area could increase the ability of the public to access local recreation sites by implementing a shuttle service, and by constructing a disabled-accessible drop-off for shuttles and buses. Concession contracts at Muir Woods National Monument could direct recreationists to consume purchased lunches at Muir Beach, thus increasing visitation and picnic area availability at Muir Beach. The Southern Marin Equestrian Plan will identify options for the future use of three Marin County stables, including the Golden Gate Dairy, including facility needs/improvements and identifying and enhancing public outreach and equestrian programs. That plan will address any potential cumulative recreational impacts on equestrian use.

Generally, the project would be cumulatively beneficial from the standpoint of recreation and visitor experience. The short-term adverse recreation-related impacts are not thought to be significant from a cumulative standpoint, because of the wealth of other recreational opportunities in the near vicinity. Public Access Alternatives that reduce the amount of available parking would have cumulatively significant recreational impacts by redirecting recreationists to other recreational outlets that also have capacity issues.

## Traffic

Project construction could result in a variety of traffic impacts, both on site (related to parking capacity etc.) and off-site (fill hauling, equipment mobilization). Over the long term, local traffic flow will be improved by the Pacific Way Bridge. Public Access Alternatives may have either a beneficial or adverse effect, depending upon whether they change the capacity from that of the existing lot; reductions in parking would have adverse effects on regional intersections and roadways. Parking lot alternatives B1, B2 and C would contribute to cumulative adverse impacts by degrading level of service in areas where it is already severely degraded.

During construction, Restoration Alternatives 3 and 4 would contribute to cumulative adverse impacts by generating a large number of fill hauling trips along already congested roadways. The Hamilton Fill Disposal Alternative would share these impacts, since it would need to be used to accommodate the fill generated from these two alternatives.

Construction activities for other projects in the area could result in short-term traffic impacts; however, most impacts on traffic resulting from other projects in the area would be beneficial. The Hwy 1 Intelligent Transportation System, Public Transit Drop-off at Hwy 1 and Pacific Way, the Improve Pedestrian Crossing at Hwy 1 and Pacific Way, the Muir Woods Shuttle Program, and the reconstruction of Camino Del Canyon Road and Upper Muir Woods Road would have beneficial impacts on traffic. If the shuttle continues its link with ferry service from San Francisco to Sausalito, a public transit stop at Hwy 1, combined with the proposed ADA path to the beach, would allow recreationists from San Francisco to visit Muir Beach by ferry and bus, without the need for a personal vehicle. The Muir Woods Road Fencing, and a possible Green Gulch Farm fruit stand or country store project, along with possible future Hwy 1 construction due to landslides, could adversely affect traffic.

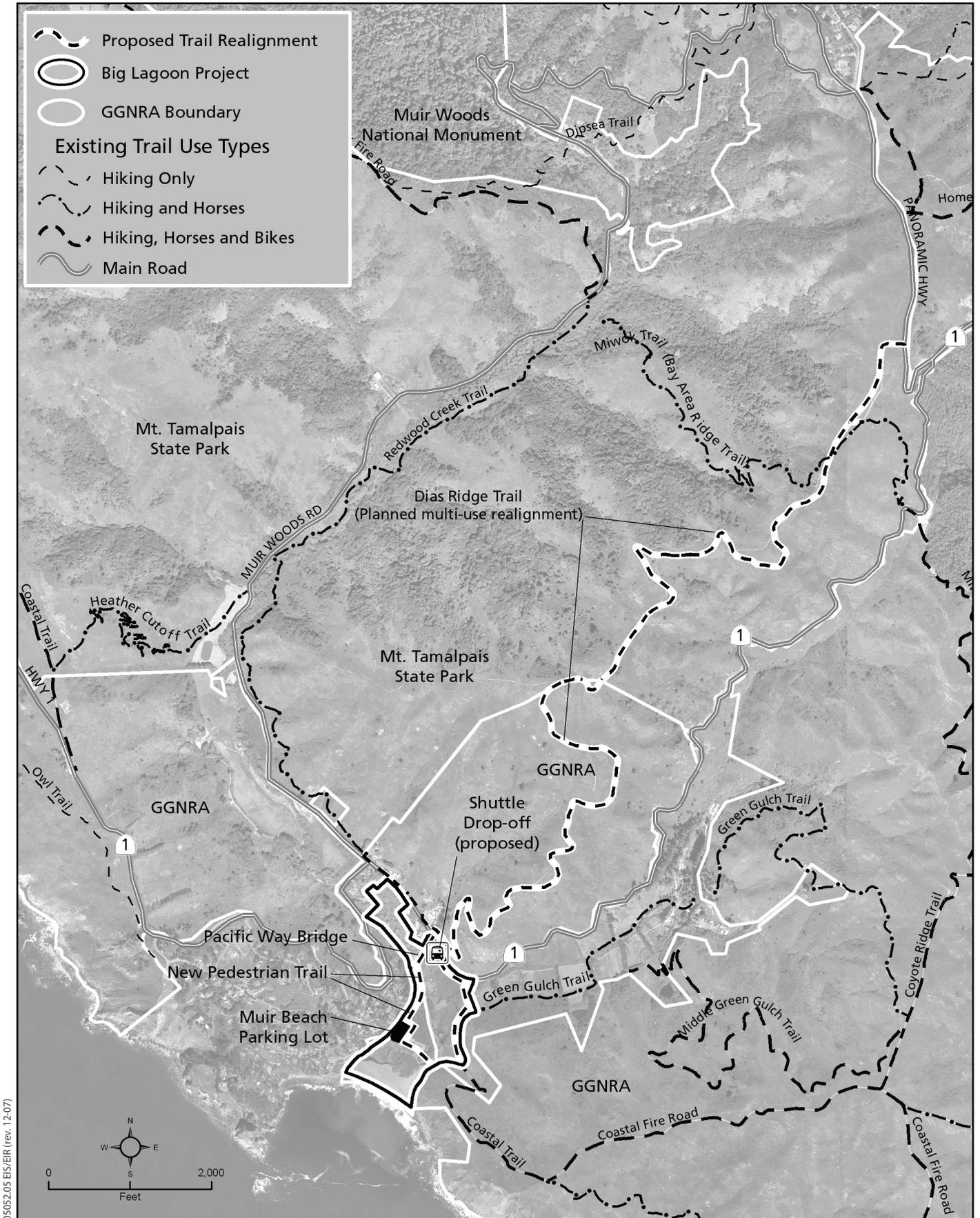
Because of their short duration, construction impacts are generally not considered cumulatively considerable. However, large amounts of fill hauling result in the determination that Restoration Alternatives 3 and 4 contribute to significant, adverse cumulative impacts. Public Access Alternatives B1, B2 and C, by reducing parking capacity and LOS, are also anticipated to lead to significant, adverse cumulative impacts. All other alternatives would have either no contribution or cumulatively beneficial effects on traffic.

## Aesthetics

Construction of the Restoration, Public Access, Bridge, and Fill Disposal Alternatives would result in impacts related to alteration of scenic views and the existing visual character during construction activities. Nearby residences would have construction occurring adjacent to their homes, and the visual character of their homes would be affected during construction times. Visitors and recreationists to the project area would be subjected to construction-related activities, as would those traveling on Hwy 1.

Following construction, all of the various Restoration, Public Access, and Fill Disposal alternatives would contribute to a beneficial impact on aesthetics. Bridge Alternatives BR1–BR4 would change views on Pacific Way from implementation of the bridge, although not substantially, and would result in a less-than-significant impact.

Adverse impacts on aesthetics as a result of other projects would generally be related to construction activities and would be short-term. Implementation of any of the reasonably foreseeable future projects identified in Table 4.2.4.2-1 could result in short-term impacts on aesthetics. Long-term beneficial impacts on



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**Figure 5-1**  
**Trail Connections (Proposed and Existing)**  
**in the Vicinity of Muir Beach**



aesthetics would likely result from the following projects' restoration activities: Salmonid Habitat Restoration on Lower Redwood Creek at the Banducci Site, Floodplain and Salmonid Habitat Restoration on Redwood Creek at the Banducci Site, Muir Woods Road Decommissioning, Lower Redwood Creek Interim Flood Reduction Measures and Floodplain/Channel Restoration, and Hamilton Wetland Restoration Project. While implementation of the project and other projects in the area would result in adverse impacts during construction, because they are distributed spatially and over time, are not thought to create a cumulative impact related to construction. Overall, the aesthetic effects of the project would be cumulatively beneficial.

## Public Services

The project would not result in a significant cumulative impact on energy, public services, utilities, and service systems. Construction equipment will require energy during construction activities. However, the contractor would use gas-powered equipment and portable electricity generators, thus surrounding/regional energy users would not be affected by reduced energy supply. There would be no demand for energy or conflicts with existing energy use policies or standards after project construction. Public Access Alternatives B1, B2, and C would potentially result in increased congestion along Pacific Way and adjacent roads when parking demand exceeds supply or cause increased traffic on Hwy 1, which could both affect emergency response times. However, these impacts would be less than significant. All of the project's Fill Disposal Alternatives would result in negligible impacts on energy, public services, utilities, and service systems.

Other projects in the area would be unlikely to result in any significant impacts on energy, public services, utilities, and service systems. The Green Gulch Farm Residential Addition, and the Green Gulch Farm's possible operations of a fruit stand or country store could increase the demands on energy, public services, utilities, and service systems. Overall, the cumulative impacts of these other projects and the Big Lagoon project would be less than significant.

## Human Health and Safety

Implementation of the project would not have cumulatively significant, adverse effects on human health and safety. The Restoration, Public Access, Bridge, and Fill Disposal Alternatives of the project would have negligible impacts, following implementation of mitigation measures, on the potential risk of an accidental explosion or release of hazardous substances during construction and the exposure of people to undiscovered or undocumented sources of contamination. The Bridge and Fill Disposal Alternatives would not result in any additional impacts. Restoration Alternatives 2-4 would reduce the potential for a fire hazard by reducing the area covered by annual grasses. Public Access Alternatives B1, B2 and B4 would reduce the number of spaces for motor vehicle use and thereby reduce the potential for fires caused by motor vehicles, where

dry vegetation is present. Other projects in the area that would beneficially affect human health and safety by reducing fire fuels are the Fire Management Plan, Vegetation Stewardship project, Muir Woods Road Fencing, and the Vegetation Management and Trail Plans. The project would not contribute to significant cumulative adverse impacts on human health and safety; therefore this impact would be less than significant.

## Land Use, Planning, and Agriculture

The various project alternatives are consistent with existing land use plans and policies, and would have only minimal effects on agriculture through the reduction in area available for horse grazing. The project would therefore not contribute to any cumulative impacts related to loss of agricultural lands or unplanned development.

## Noise

Construction activities for the project could result in noise impacts over 3–4 years of seasonal construction. Other reasonably foreseeable future projects could also result in short-term noise impacts. However, because construction activities among these projects would be distributed spatially and over time, it is unlikely that they would combine to create a cumulative noise impact.

## Growth-Inducing Impacts

Implementation of the Big Lagoon project would not induce major or significant development or economic growth in the vicinity. Construction of the project would not generate a substantial number of new jobs that could cause economic growth in the area. The project would create an enhanced visitor experience (as described in Section 4.6, *Social Resources*) and, depending upon the Public Access Alternative that is selected, could improve public access by expanding the existing number of parking spaces or by creating a drop-off/turnaround zone. However, the preferred alternative does not include an expansion in the number of parking spaces or creation of a drop-off/turnaround zone. Other public access improvements would be expected to benefit visitors to the area; however, the improvements would not be expected to substantially increase the number of visitors to the project area (Section 4.6, *Social Resources*).

The project would improve year-round access for local residents from replacement of the Pacific Way Bridge, but would not stimulate development at Muir Beach. The unincorporated Muir Beach community lies within the West Marin Planning Area #7 and the Marin County Local Coastal Program Unit I. The Muir Beach Community Plan and the Marin County planning process, including the Marin County General Plan (adopted in 1994) and the Marin County Code, guide development at Muir Beach (Section 3.4.6, *Land Use*,

*Planning, and Agricultural Resources*). Title 13, *Roads and Bridges*, in the Marin County Code would guide the proposed bridge improvements. Therefore, the proposed bridge replacement would not stimulate unplanned growth and would be implemented in agreement with the project area's designated and planned land uses and zoning.

## Socioeconomics

CEQ regulations implementing NEPA state that when economic or social effects and natural or physical environmental effects are interrelated, the EIS will discuss these effects on the human environment (40 CFR 1508.14). The CEQ regulations state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." To the extent that the restoration project could affect the natural or physical environment, the socioeconomic analysis evaluates how elements of the human environment such as population, employment, and housing might be affected. Construction of the project would not generate a substantial number of new jobs or cause a change related to employment or housing demand.

Project construction may have minor effects on local businesses (e.g., the Pelican Inn, the San Francisco Zen Center) in that potential customers may be deterred by the construction activities and choose to plan their visit for another location. However, it is anticipated that any effects would be short term, limited to the season of construction, and would cease once construction is complete. In addition, for the Pelican Inn, the project will have overall long-term benefits in terms of flood reduction, which helps enable their long-term economic viability. The Big Lagoon project is not anticipated to result in reduced viability of local businesses to the extent that they might fail, and as such has only minor impacts.

## Sustainability and Long-Term Management

The first discussion below describes the trade-off between long-term sustainability and the short-term effects of the project. The second discussion addresses any irreversible (permanent loss or non-renewable resource) or irretrievable (short-term loss or loss of renewable resource) commitments of resources the project would require. The final discussion is a summary of any significant adverse impacts that cannot be mitigated to the level of insignificance.

## Relationship between Short-Term Uses and Long-Term Productivity

Short-term uses of the environment that would occur with the project include the impacts on existing habitats associated with project construction. Short-term impacts would include the potential temporary disturbance of vegetation communities and various species of wildlife. In addition, potential releases of construction-related hazardous materials or sediment from access roads, staging areas, ground-disturbing activities and stockpiles could affect the existing water quality and fish species. Other potential short-term impacts resulting from construction activities include:

- temporary air quality impacts related to dust;
- reduced recreation opportunities;
- altered visitor perception and use of the project area;
- traffic impacts of delivery of construction equipment and fill disposal;
- alteration of scenic views and existing visual character; and
- elevated levels of noise.

The proposed project would create numerous long-term benefits to the existing site conditions and ecological function and the quality of the visitor experience. These include a variety of beneficial effects. Under all action alternatives, excavation of emergent wetland at the landward edge of the tidal lagoon would result in enlargement of the lagoon and enhanced dynamic quality from year to year and season to season. Installation of large woody debris adjacent to the tidal lagoon would increase the diversity of estuarine habitat in this area. In addition, relocation of the Redwood Creek channel to its historic back beach alignment would increase scour and tidal flushing of the tidal lagoon, resulting in improved water quality and habitat functioning. Native vegetation would be removed for this enlargement, but its loss would be offset by the gain in the dynamic quality of the lagoon and its function for salmonids.

Additional long-term benefits of the project would include, but are not limited to:

- developing a new pedestrian trail from Hwy 1 to the parking lot;
- providing new interpretive displays and trails; and
- implementing a higher bridge than the existing bridge to prevent flooding and preserve vehicular access during all but the largest of storm events.

The proposed project would be focused on promoting sustainability and long-term resource enhancement with minimal short-term resource damage or use. Construction phasing considerations (Chapter 2, *Alternatives*) and/or implementation of mitigation measures would reduce or eliminate the potential for most of the aforementioned short-term impacts. Site disturbance would be

minimized to the greatest extent possible by using existing disturbed areas for access roads and staging areas, and concentrating the area of disturbance associated with restoration actions to the minimum necessary based on the restoration design.

In summary, the project is designed to improve the long-term sustainability of the project site; however, as part of this effort, some short-term impacts are unavoidable.

## Irreversible or Irretrievable Commitments of Resources

Construction materials, including gravel and other rock and earthen materials, would be irretrievably committed toward the construction of the new bridge and other components of the proposed project. Most of the construction materials would be reused from on-site sources (e.g., fill generated as part of project construction) or imported to the site from nearby commercial sources that have been subject to separate environmental review before they could make such materials available for use. The project would also involve use of energy, such as fuels for construction equipment. NPS employee time would be committed to the project, which would also constitute an irretrievable commitment of resources.

The restoration of the site is not considered an irreversible commitment of resources because the landscape could again be converted to other land uses in the future. The proposed project does not involve converting the land to urban land uses, which tend to be irreversible for all practical purposes.

## Significant Unavoidable Impacts of All Alternatives

The various alternatives would result in 29 significant unavoidable environmental impacts. These impacts are summarized below. The preferred alternative (Restoration Alternative 2, Public Access Alternative ~~B3~~B4, and Bridge Alternative ~~BR3~~BR4) would result in only 9 of these significant unavoidable environmental impacts, of which all are construction related.

## Restoration Alternatives

The No Action Alternative (Restoration Alternative 1) would have the following significant and unavoidable impacts:

- **WP-R5: Long-Term Flooding.** This alternative would continue to have flooding problems that would increase over time as elevated sediment delivery from the watershed increases channel aggradation and frequency of out-of-bank flows.

- **WP-R8 and WP-R9: Accommodation of Sediment Loads and Maintenance of Equilibrium Channel Form.** Because the channel would continue to aggrade, potential would increase over time for loss of defined channel form (e.g., through channel avulsion).
- **WP-R10: Potential for Channel Avulsion.** As described above, the potential for channel avulsion would increase over time as the channel aggrades.
- **FISH-R6: Fish Passage Barriers.** Channel avulsion could lead to the loss of a defined stream channel and inadequate conditions for fish passage.
- **FISH-R7: Fish Entrapment Due to Out-of-Bank Flows and/or Channel Avulsion.** During high-flow conditions, out-of-bank flows or channel avulsion could result in fish entrapment because fish may not be able to return to the stream channel once waters recede.

The action alternatives (Restoration Alternatives 2, 3, and 4) would have the following significant and unavoidable impacts:

- **VEG-R2: Construction-Related Impacts on Vegetation Communities.** During construction, disturbance to vegetation communities at the site would be unavoidable. This would be of greater extent for the more intensive alternatives (i.e., Restoration Alternatives 3 and 4).
- **REC-R1: Reduced Recreational Opportunities and Visual and Noise Disturbance During Construction.** Although efforts would be made to reduce impacts of restoration construction on recreation, some impacts would be unavoidable.
- **AES-R1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.** Construction activities would have unavoidable adverse effects on views and character at the site, which would cease once construction was complete.
- **NZ-R1: Exposure of Noise-Sensitive Land Uses (Residents and Visitors) to Elevated Levels of Noise from Construction Activities.** Construction noise would be minimized to the extent possible but would still be considered a significant impact.

Restoration Alternatives 3 and 4 would also have the following significant and unavoidable impacts:

- **VEG-R4: Change in Extent and Quality of Emergent Wetland Habitat.** Under all of the action alternatives, there would be a possible substantial reduction of acreage of emergent wetland habitat, although the long-term mosaic of vegetation is difficult to predict and long-term changes in groundwater elevations could also reduce the loss of emergent wetlands. Although short-term potential losses would be partially replaced with a smaller extent of new higher-functioning wetland habitat, the overall potential loss is considered significant.

- **TC-R4: Effects of Truck Trips Associated with Fill Disposal.** Because of the number of haul trips that would be associated with excavation of the lagoons for these alternatives, impacts on traffic and roadways are considered significant and unavoidable.

Restoration Alternative 4 would also have the following significant and unavoidable impacts:

- **AIR-R1: Generation of Construction-Related Pollutant Emissions.** Construction activities would produce NO<sub>x</sub> emissions that would exceed thresholds, thus resulting in a significant and unavoidable impact.
- **VEG-R5: Change in Extent and Quality of Riparian Wetland Habitat.** The loss of riparian extent and function in the first years after construction is considered a significant and unavoidable aspect of this alternative. However, as vegetation matures, functioning would be restored and a small increase in the areal extent of riparian habitat would occur.

## Public Access Alternatives

The various public access action alternatives would have a variety of significant and unavoidable impacts, depending on alternative characteristic:

- **REC-P1: Reduced Resident and Visitor Access, Visitor Amenities, and Recreational Opportunities During Construction.** Reductions in available parking and other site amenities during construction of the Public Access Alternatives would have significant effects.
- **REC-P2: Effects of Parking Lot Configuration and Siting on Recreational Opportunities and Visitor Experience.** The two smallest lots, Public Access Alternatives B1 and C, would reduce visitor experience and recreational opportunities at the site because of insufficient parking.
- **REC-P5: Effects of Parking Lot Configuration and Siting On Community Relationships.** The reduced size of the parking lot under Public Access Alternatives B1 and B2 would increase potential for illegal visitor parking and conflicts with residents. Although Public Access Alternative C would also have reduced parking, its remote location would reduce these potential conflicts such that impacts were determined not to be significant.
- **TC-P1: Changes in Parking Availability During Construction.** Reductions in available parking during construction of the Public Access Alternatives would be considered significant from the standpoint of parking adequacy.
- **TC-P6: Long-Term Changes in Parking Availability.** The two smallest lots, Public Access Alternatives B1 and C, would have significant impacts from the standpoint of parking adequacy.

- **TC-P7: Effects of Parking Lot Size on Vehicle Queuing.** The two smallest lots, Public Access Alternatives B1 and C, would have significant impacts from the standpoint of vehicle queuing.
- **TC-P9: Long-Term Effects on Pedestrian, Equestrian, and Bicyclist Safety.** The location of Public Access Alternative C near Hwy 1, and length of the trail from the lot to the beach, would create some unavoidable impacts related to pedestrian, equestrian, and bicyclist safety.
- **TC-P12: Consistency with NPS Policies Related to Parking.** Public Access Alternatives B2 and C would have a shortage of parking capacity for some seasons. Thus these alternatives would be noncompliant with NPS policies.
- **AES-P1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.** Construction activities would have unavoidable adverse effects on views and character at the site, which would cease once construction was complete.
- **LU-P1: Consistency with Land Use Policies Related to Trails.** Public Access Alternatives B1, B2, and C, by reducing parking lot capacity, would be inconsistent with County policies related to provision of adequate parking at trailheads.

Of these, the following would apply to the preferred alternative (Public Access Alternative ~~B3~~B4):

- **REC-P1: Reduced Resident and Visitor Access, Visitor Amenities, and Recreational Opportunities During Construction.**
- **TC-P1: Changes in Parking Availability During Construction.**
- **AES-P1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.**

## Bridge Alternatives

The No Action Alternative (Bridge Alternative BR0) would have the following significant and unavoidable impact:

- **PS-B4: Conflict with Emergence Response.** Existing parking constraints and restricted access during flooding events reduce emergency response time and access.

The action alternatives (Bridge Alternatives BR1, BR2, BR3 and BR4) would have the following significant and unavoidable impacts:

- **AES-B1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.** Construction activities would have unavoidable adverse effects on views and character at the site, which would cease once construction is complete.

- **NZ-B2: Exposure of Noise-Sensitive Land Uses (Residents and Visitors) to Elevated Levels of Noise from Pile Driving.** Despite the implementation of mitigation, the extreme level of noise generated by pile driving is considered a significant and unavoidable impact.

In addition, Bridge Alternative BR1 would also have the following significant and unavoidable impact:

- **WP-B1: Effects of Bridge Configuration on Flooding.** This bridge design would create a backwater effect and increase upstream flood elevations slightly, with potential to worsen flooding at the Pelican Inn and homes located in the floodplain upstream of Pacific Way.

## Fill Disposal Alternatives

Disposal of fill at the Hamilton site would have the following significant and unavoidable impact:

- **TC-F2: Effects of Truck Trips Associated with Fill Hauling.** Because of the number of haul trips, the length of the haul route, and the degraded LOS on these roadways, impacts on traffic and roadways are considered significant and unavoidable. Note that this alternative would only be used in combination with Restoration Alternatives 3 and 4.

## Significant Unavoidable Impacts of the Preferred Alternative

Of the 29 significant unavoidable environmental impacts described above for all alternatives, only 9 are associated with the preferred alternative (Restoration Alternative 2, Public Access Alternative ~~B3B4~~, and Bridge Alternative ~~BR3BR4~~). These impacts are:

- VEG-R2: Construction-Related Impacts on Vegetation Communities.
- REC-R1: Reduced Recreational Opportunities and Visual and Noise Disturbance During Construction.
- AES-R1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.
- NZ-R1: Exposure of Noise-Sensitive Land Uses (Residents and Visitors) to Elevated Levels of Noise from Construction Activities.
- REC-P1: Reduced Resident and Visitor Access, Visitor Amenities, and Recreational Opportunities During Construction.
- TC-P1: Changes in Parking Availability During Construction.

- AES-P1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.
- AES-B1: Alteration of Scenic Views and Existing Visual Character During Construction Activities.
- NZ-B2: Exposure of Noise-Sensitive Land Uses (Residents and Visitors) to Elevated Levels of Noise from Pile Driving.