Appendix E. Best Management Practices and Mitigation Summary

These measures will guide implementation of the project where appropriate and are intended to minimize adverse impacts to sensitive biological resources within the Project Area.

A. *Pre-construction Preparation*

1) The boundaries of construction areas will be clearly flagged and/or signed in advance of construction.
2) Trees or shrubs overhanging or encroaching on access roads will be trimmed back to allow vehicles to pass by without going off the road.
3) All material stockpiling and staging areas will be located within project right of ways in non sensitive areas, or at designated disturbed/developed areas outside of design construction zones.
4) The implementation of project elements will be conducted in incremental phases (as feasible) by region to ensure that disturbance to habitats and species is restricted to small and/or spatially separate portions of the site at any one time. These areas will be defined in coordination with the NPS Aquatic Ecologist.

B. *Transportation and Access*

1) Access to the project area will be restricted to existing access roads and routes identified in the project description. Appropriate turnaround areas will be approved by the Biological Monitor and shall be clearly marked.
2) Speed limit signs (10 miles per hour) will be posted on all access roads.
3) All entry gates to the construction area will be kept closed during construction and be locked when not in use.
4) Vehicle and equipment refueling and lubrication will only be permitted in designated disturbed developed areas where accidental spills can be immediately contained.
5) All vehicles will carry a suitable fire extinguisher and other protective and preventative gear as required by NPS.

C. *Training*

1) A qualified Biological Monitor will train all project staff, contractors and consultants prior to the start of construction regarding habitat sensitivity, identification of species of concern, and required practices within the habitat area. A fact sheet or flier containing this information will be prepared and distributed.

D. *Monitoring*

1) The Biological Monitor will inspect each active work area daily immediately before activities begin and continually monitor in advance of the work crew and heavy equipment.
2) The Biological Monitor will have the authority to stop activities that are in violation of permit conditions or put listed species in danger.
3) A Biological Monitor will inspect underneath any vehicle that is parked for 30 minutes or more immediately prior to moving the vehicle.
4) The Biological Monitors will keep a daily log of project activity and compliance with permit conditions.
5) NPS or GGNPC staff shall educate the public to report suspicious activity at Mori Point.
6) NPS or GGNPC staff shall carry out a protocol for monitoring visitor-associated impacts to

listed species, their host plants and habitats. A report will be submitted to the Service annually (e.g. in the annual report prepared by the stewardship team for the site).

E. *Reporting*

1) If the Biological Monitor discovers a reportable incident, they will concurrently notify the construction supervisor and the USFWS immediately following the discovery.
2) If a San Francisco garter snake or California red-legged frog is killed or injured by activities associated with this project, project activities in the vicinity will stop immediately, if this can be done safely, and would not resume until the USFWS have provided permission to resume activities.
3) Any dead or injured San Francisco garter snakes will be turned over to the USFWS. A written report detailing the date, time, location, and general circumstances under which a dead or injured San Francisco garter snake was found will be submitted to the USFWS no later than three business days following the incident.

F. *Site Restoration*

1) All trash, debris, and construction materials generated by construction will be contained within non-sensitive areas and promptly removed from the site.
2) A biologist or horticulturist will inspect the site, and determine whether reseeding is needed following construction. In upland habitat, areas of bare soil exposed as a result of project activities will be revegetated with appropriate native species collected on site to restore vegetation similar to pre-existing conditions.
3) Prior to any on-site seed collection efforts per year for restoration activities, including broadcast seeding and nursery propagation, the NPS Vegetation Ecologist will be consulted to determine appropriate collection methods and thresholds per native or sensitive plant community, per native species, and per geographic area on-site to ensure that seed collection efforts to not deplete natural seed resources and/or genetic diversity.
4) The effectiveness of restoration efforts would be monitored. Photographs will be taken before construction, immediately after construction, and at appropriate periods for the year following construction.

G. *Invasive Non-Native Plant Species Removal and Control*

All invasive non-native plant removal and control activities would be incrementally phased within small areas in order to reduce any potential impact on sensitive species.

1) <u>Manual Control</u>

- Hand pulling:
    - Large woody species- Prior to removal, the site will be surveyed for underground burrows. In those areas where no burrows are found, the plant will be removed by hand or by hand using a weed-wrench tool. Cleared vegetation would be placed in small piles to decompose naturally, unless the vegetation contains viable seeds. In those situations, vegetative material will be disposed of off-site. In cases where underground burrows are present, plants will be cut instead of pulled.
    - Small woody or herbaceous species – Small individuals or species that have a very small root mass, such as purple star thistle, or Italian thistle can be easily pulled by hand and

removed without causing any substantial ground disturbance, and would not require hand excavation of burrows prior to removal. These should be pulled when the soil is moist to facilitate removal and avoid breakage, resulting in roots remaining in the soil and possibly resprouting.

- Cutting:
    - Cutting may occur in cases where hand pulling is inadvisable due to the presence of rodent burrows. Cutting would not cause any soil disturbance and would hence not result in adverse impacts to sensitive species. Cleared vegetation would be placed in small piles to decompose naturally, unless the vegetation contains viable seeds. In those situations, vegetative material will be disposed of off-site.
    - During tree removal activities, trees will be felled into areas of lower quality habitat for San Francisco Garter snake and California red-legged frog whenever possible. A biologist will survey these areas immediately prior to felling or trees to ensure that neither of these species is present in the drop zone. All vehicles associated with tree-removal activities shall be escorted into the work area by the biologist when traveling cross country or when using any unpaved access toad. The biologist will clear the access roads and other routes prior to removal of logs by the skidder, but will not escort the vehicle. When skidding logs out of the project areas, this activity will be supervised by the biologist prior to moving logs. All tree removal will be conducted in such a way as to minimize erosion and changes to drain patterns. In most locations, stumps should be cut flush (parallel) with the ground. On steep slopes, stumps should be cut leaving a horizontal surface which should be cross-hatch cut with a saw to facilitate rapid rotting of the stump – this method is less visible than flush-cutting the stump parallel to the slope.
    - All wood chips associated with tree removal will be either 1) broadcast under a closed canopy pine, blackwood acacia, eucalyptus, or cypress forest with no understory (pine needle or leaf substrate) provided that the maximum chip depth is six inches or 2) the chips will be hauled off-site to an approved dump site.
- Grubbing:
    - Prior to any removal, vegetation will be carefully checked and searched for the presence of the San Francisco garter snake. If no snake is found, aboveground vegetation would be progressively cut back from overstory level to ground level to allow frogs to move out of the treatment area. Again. if no San Francisco garter snake is found, the remainder of the plant will be removed using a Pulaski, handpick, or similar digging tool. Cleared vegetation will be placed in small piles to decompose naturally, unless the vegetation contains viable seeds. In those situations vegetative material will be disposed of off site.

2) <u>Mechanical Control</u>

- Scorching (using a flame torch to wilt and kill young vegetation):
    - Scorching would only take place during winter and early spring months when vegetation is in a cotyledon or seedling stage, and small-statured enough to allow for a complete visual survey to ensure that snakes and frogs are not in the treatment area.
- Brushcut, mow, or chainwsaw.: mechanical equivalent of cutting, but faster. Excellent for removing large trees, patches of plants that respond to cutting or for eliminating inflorescences

from mature plants before they set seed. Examples include annual and perennial grasses, other annual or biennial species.

3) Chemical Control

- Stump-cutting and painting: Stump-cutting and painting poses very little threat to the San Francisco garter snake and California red-legged frog as it does not involve soil disturbance nor will it introduce pesticides into an area where reptiles and amphibians may contact them. In this method, stems or trunks are cut and a small amount of GGNRA approved herbicide applied to the growing tissue in the cut stem. No herbicide direct stump applications will be allowed in riparian or wetland habitats supporting special status species except in the dry season. No herbicide run-off would be permitted. In order to ensure that amphibians and reptiles do not come into contact with the herbicide, stems would not be cut less than 6 inches from the ground.
- Foliar spray application will not be used in the vicinity of wetland and riparian areas, unless the site has dried out completely. Herbicides would not be applied in any area where surface flow would transport herbicide residue into Sanchez Creek, or in any pond on or adjacent to Mori Point unless such application is approved by the GGNRA IPM specialist or USFWS.
- All herbicide use will be administered through the park's Integrated Pest Management (IPM) Coordinator, and only licensed personnel will be allowed to apply pesticides. All herbicide use for project actions will be reported monthly to the IPM Coordinator. No herbicide foliar spraying or direct stump applications will be allowed in riparian or wetland habitats supporting special status species except in the dry season. Foliar herbicide applications beyond the riparian corridor are not approved where saturated soils are present, at wind speeds over 5 miles per hour, or when weather conditions facilitate herbicide movement toward drainages. All herbicide use is administered through each park's integrated pest management coordinator.

H. *Wetlands*

The following serve as Best Management Practices (BMPs) for GGNRA actions that may have adverse impacts on wetlands (per *Procedural Manual #77-1: Wetland Protection*). Additional BMPs may be appropriate depending on local conditions or special circumstances. These also serve as "conditions" that must be met for the actions listed in Section 4.2.A of these procedures to qualify as "excepted."

1) Effects on hydrology: Action must have only negligible effects on site hydrology, including flow, circulation, velocities, hydroperiods, water level fluctuations, and so on.
2) Water quality protection and certification: Action is conducted so as to avoid degrading water quality to the maximum extent practicable. Measures must be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering the waterway or wetland. Action is consistent with state water quality standards and Clean Water Act Section 401 certification requirements (check with appropriate state agency).
3) Erosion and siltation controls: Appropriate erosion and siltation controls must be maintained during construction, and all exposed soil or fill material must be permanently stabilized at the earliest practicable date.
4) Effects on fauna: Action must have only negligible effects on normal movement, migration, reproduction, or health of aquatic or terrestrial fauna, including at low flow conditions.
5) Proper maintenance: Structure or fill must be properly maintained so as to avoid adverse impacts on aquatic environments or public safety.

6) Heavy equipment use: Heavy equipment use in wetlands must be avoided if at all possible. Heavy equipment used in wetlands must be placed on mats, or other measures must be taken to minimize soil and plant root disturbance and to preserve preconstruction elevations.
7) Stockpiling material: Whenever possible, excavated material must be placed on an upland site. However, when this is not feasible, temporary stockpiling of excavated material in wetlands must be placed on filter cloth, mats, or some other semi-permeable surface, or comparable measures must be taken to ensure that underlying wetland habitat is protected. The material must be stabilized with straw bales, filter cloth, or other appropriate means to prevent reentry into the waterway or wetland.
8) Removal of stockpiles and other temporary disturbances during construction: Temporary stockpiles in wetlands must be removed in their entirety as soon as practicable. Wetland areas temporarily disturbed by stockpiling or other activities during construction must be returned to their pre-existing elevations, and soil, hydrology, and native vegetation communities must be restored as soon as practicable.
9) Topsoil storage and reuse: Revegetation of disturbed soil areas should be facilitated by salvaging and storing existing topsoil and reusing it in restoration efforts in accordance with NPS policies and guidance. Topsoil storage must be for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and degradation of the soil microbial community. Salvaged topsoil should not be pile taller than 2 feet high and 3 feet wide, and piles should be windrowed to retain viability of the microorganisms.
10) Native plants: Where plantings or seeding are required, native plant material must be obtained and used in accordance with NPS policies and guidance. Management techniques must be implemented to foster rapid development of target native plant communities and to eliminate invasion by exotic or other undesirable species.
11) Boardwalk/bridge elevations: Minimizing shade impacts, to the extent practicable, should be a consideration in designing boardwalks and similar structures. (Placing a boardwalk/bridge at an elevation above the vegetation surface at least equal to the width of the boardwalk is one way to minimize shading.)
12) Coastal zone management: Action must be consistent, to the maximum extent practicable, with state coastal zone management programs.
13) Endangered species: Action must not jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, including degradation of critical habitat (see NPS Management Policies (1988) and guidance on threatened and endangered species).
14) Historic properties: Action must not have adverse effects on historic properties listed or eligible for listing in the NRHP.

I. *Invasive Non-Native Plant Introduction Control*

1) All vehicles will be brought in cleaned and free of weeds to prevent the spread and/or introduction of invasive plant species.
2) Appropriate excavated soil and aggregate materials from other projects within the GGNRA will be reused before allowing the importation of materials from outside the Park. Soils and vegetation contaminated with weed seeds from within the GGNRA would be segregated and disposed of or treated as appropriate.
3) At the direction of the Biological Monitor, restrictions will be placed on the movement or deposition of fill, rock, or other materials containing weed seed or viable plant cuttings to areas

relatively free of weeds.

J. *Erosion Control and Water Quality*

1) These BMPs include measures guiding the management and operation of construction sites to control and minimize the potential contribution of pollutants to storm runoff. These measures address procedures for controlling erosion and sedimentation and managing all aspects of the construction process to ensure control of potential water pollution sources. Erosion and sedimentation control practices typically include:
   - Construction will be limited to the dry-weather months, to the greatest extent practical.
   - Erosion and sedimentation control measures, such as rice straw mulch, sediment traps, check dams, geofabrics, drainage swales, sand bag dikes and/or straw wattles would be installed wherever deemed appropriate to eliminate the potential for sediment discharge into storm water and into wetlands and creeks from project construction. Erosion control structures will be installed concurrently with construction so that run-off will be deflected away from sensitive habitats. Fiber netting that has a mesh size smaller than 0.25 inches will be used to ensure that neither of these species gets trapped in the material. Plastic mono-filament erosion control matting shall not be used for erosion control where frogs or snakes may become entangled or trapped in it.
   - Erosion control measures and mulches that contain non-native plant seeds would be prohibited. Only rice straw should be permitted to prevent inadvertent introduction of wheat and barley species.
   - Stockpiled or disturbed soils would be temporarily covered with straw, matting, netting (no mono-filament plastic netting), or plastic sheeting. All open trench areas would be covered at the end of work day.
   - Waste and excess excavated materials would be stockpiled outside of drainages, and contained with appropriate silt control.
   - Unless no feasible alternative is available, heavy equipment use in areas with soils that are undisturbed, saturated or subject to extensive compaction would be prohibited. Where staging of heavy equipment, vehicles or stockpiling is unavoidable, the limit of allowable disturbance will be clearly demarcated by staking, flagging or fencing.
   - Erosion and sediment control measures would be implemented where project actions could leave soils exposed to runoff prior to revegetation. Areas disturbed by equipment or vehicles will be rehabilitated as quickly as possible to prevent erosion, discourage the spread of nonnative plants and address soil compaction. Techniques, including decompacting and recontouring to natural topography, compacting to natural, soil stabilization, and removal and monitoring of nonnative plants, will be used for rehabilitation efforts.
   - After tree felling, roots would be left in place in areas with highly erosive soils or on steep slopes. Stumps would be ground down to the ground level if appropriate.
   - Ensuring that all newly constructed impervious surfaces prevent, to the greatest extent feasible, increased water runoff volume and velocity, reduced water quality and reduced water infiltration.
   - Ensuring protection of normal movement, migration, reproduction, or health of aquatic fauna, including low flow conditions;
   - Properly maintaining structures or fill so as to avoid adverse impacts to aquatic environments and public safety;

- Placing excavated fill on non-sensitive upland sites, and stabilizing all material with compatible erosion control techniques;
- Designing projects to prevent alterations to drainage patterns or water movement. The design of trail features that intersect natural surface water bodies, such as bridges or wooden boardwalks, would include measures to avoid or reduce interference with the feature's natural flow dynamics;
- Placement and construction of new trails to prevent erosion and to minimize disruption to natural geologic processes, such as soils and slopes susceptible to erosion, minimize concentrated runoff, reduce sediment transport, and improve the quality of collected surface water. Trail slopes and gradients would comply with standard guidelines so that concentrated quantities of surface water would not run off at velocities capable of removing trail base material.
- Appropriate design would drain surface water from the trail to avoid ponding and development of soft, muddy surfaces that can lead to soil degradation and water quality impacts.

K. *Pollution Prevention*

1) Proper storage, use and disposal of chemicals, fuels, and other toxic materials would be required.
2) Construction equipment would be required to be refueled only in upland areas and in conformance with the Avoidance Zones described above to prevent fuel spills near sensitive habitats. Equipment would be inspected for hydraulic and oil leaks regularly as well as prior to use in the park.
3) All heavy equipment working in the GGNRA would be required to carry emergency spill containment materials. For example, pans should be placed under equipment that is stored onsite to reduce potential for leaking oil and other substances onto park lands. Absorbent materials should be on hand at all times to absorb any minor leaks and spills.
4) An Emergency Response Plan will be prepared by the construction and tree removal contractor(s), approved by NPS, and implemented during project implementation.

L. *Fugitive Dust Control Measures*

1) All active construction areas may be watered where soil is exposed to control dust frequency, depending on type of operation and wind exposure.
2) A person or persons would be designated to oversee the implementation of a comprehensive dust control program and to increase watering, as necessary.
3) All trucks hauling soil, sand, and other loose materials will be covered, or all trucks will be required to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer) in accordance with Section 23114 of the California Vehicle Code during transit to and from the site.
4) Inactive storage piles will be covered.

M. *Trail Construction*

<u>*Drainage Control*</u>*:* Trails in hilly terrain are particularly subject to erosion caused by water movement. Design and construction errors can allow water to build up volume and velocity, which often causes trail damage. There are several basic design strategies to improve drainage

control, such as using alignments perpendicular to sheetflow direction and full or half bench construction.

- *Outsloping:* Outsloping is slightly elevating the uphill edge of a trail. It encourages water to flow across the trail surface and reduces the potential for erosion. All proposed trail designs include outsloping. Full bench construction provides a more stable trailbed. Where cross slopes are not steep (generally less than 30 percent), half bench construction may be used.
- *Rolling Grade Dips:* Rolling grade dips are short sections of trail that channel water off the trail surface. Grade dips work best on trails with slow, steady grades and are best placed at naturally occurring drainage ways. Typically, trails are outsloped more at the point of the grade dip to provide better drainage. Grade dip backslopes should be about 1.2 to 1.8 m (4 to 6 ft) long to eliminate abrupt grade changes that may be barriers to access. For this reason, dips are preferable to both waterbars and open culverts. They typically require less maintenance than covered culverts, which can easily become clogged with leaves or other debris.

Trails in Wet Areas: Trails in the proximity of areas with seasonal or permanent soft and water-saturated soils pose problems for visitor enjoyment and for resource protection and maintenance. Trail users often walk to trail sides to avoid wet patches, which can cause destruction of adjacent vegetation and surface soil horizons. However, relocating these trails to higher or drier ground may not benefit the resource if the existing trail provides special benefits to users or if rerouting the trail would disturb sensitive habitat areas. Providing a hardened trail surface in the current trail alignment may be the best choice. Techniques that allow access for users with disabilities are preferred.

- *Surface Reinforcing:* Placing flat stones or cobbles on the trail surface, in combination with geotextile or sheet drain materials, is an aesthetically pleasing way to provide a stable trail surface in wet areas. Since water can pass through the entire structure, this solution offers the additional advantage of only minimally disrupting existing drainage patterns. Another alternative is a short, concrete-paved section that would be more accessible for people using wheelchairs.
- *Boardwalk/Bridge:* Trail structures such as bridges help maintain drainage patterns. They can be constructed of timber or recycled plastic lumber. To maximize accessibility for people with disabilities, bridge entrances and exits should be at grade rather than elevated or ramped. Additional maintenance might be required to ensure that surfaces that adjoin the entrances and exits do not vary more than 50 mm (2 in) from the bridge surface.
- *Drainage Lens:* The low-volume water flow caused by ephemeral springs or seeps can often be managed with a drainage lens. The area beneath the trail bed should be filled with progressively smaller quarry rock and then capped with fine aggregateor suitable native fill. Sandwiching the rock lens between two layers of geotextile material would provide a more stable base, and would prevent rock from mixing with surrounding soils.

Trails on Steep Cross Slopes: Steep slopes present many challenges for safe and sensitive trail design. Trail cuts on steep slopes increase the visual impact and the area of disturbance and often require special measures to stabilize the slope, such as slope protection or retaining walls. In some cases, stairways may also be needed. Trail structures and retaining walls, when

required, should be designed to minimize impact on natural and cultural resources and should use materials appropriate to the area's landscape management zone.

- *Area Avoidance and Trail Relocation:* When possible, avoid locating trails on steep slopes. Where trails must cross a steep slope, consider a minimum width trail.
- *Reinforced Backslope or Retaining Wall:* Depending on soil type, backslope cuts into hillsides may need protection in order to prevent severe erosion and slope destabilization. Backslope reinforcing and protection can be provided by a permanent structure or by temporary measures during revegetation. Retaining devices may be as simple as a log curb, or they may need to be designed by a structural engineer. Retaining materials may be poured-in place or pre-cast concrete segments, stones or timber from vegetation management practices, depending on the landscape management zone. All retaining structures must allow water to drain around or through the wall and not accumulate behind it. Stepped-back wall construction may provide opportunities for more planting. Green wall systems (a structure permeated by plantings) may be an acceptable alternative to retaining walls in some areas. Ongoing maintenance, including repair, replacement and removal of broken or detached components, must be provided for all retaining structures.
- *Trail Structure:* Boardwalks, stairways, and decks may be used where standard cut-and-fill techniques are inappropriate. For example, on steep trails on sandy or loose soils, stairways are recommended to avoid excessive erosion. Steel deck structures would allow light to penetrate to the vegetation below and reduce impacts on habitats sensitive to light.

Trails on Flat Grades: Since trails exist in dynamic environments, it is not possible to keep them clean and dry – especially when they're on primarily level terrain. Without proper drainage, trails on level ground tend to pond and collect debris, creating obstacles for all users. This creates a cycle that further degrades the trail and surrounding lands. Proper trail design can help mitigate this problem. There are several approaches for providing good drainage. The goal in all cases is to maintain a firm, stable, slip-resistant surface that is free of ponding.

- *Above Grade Trail:* One technique is to elevate a trail slightly, about 75 mm to 150 mm (3 in to 6 in), and provide drainage swales on each side. Using a gravel bed to elevate the trail would provide additional subsurface drainage. Raised trails are often used in conjunction with drainage lenses to facilitate water movement. An elevated trail offers a more convenient pathway for users during wet periods, provides the greatest degree of accessibility for persons with disabilities, and may require less maintenance.
- *Boardwalks :* This approach also provides an accessible trail surface. Boardwalks are often the most appropriate solution on erodible soils, such as sand or other loose, uncompacted soil.

Eroding and Hazardous Trail Edges: Edge protection has two purposes: to protect the trail and adjacent resources, and to protect the user. Clearly defined edges help keep users of all types on the established trail surface and help protect resources. Properly constructed edges also protect trails from water damage and erosion. Edge protection can also increase trail safety for various user groups. For example, a raised curb at least 75 mm (3 in) high or a guardrail may help a person using a wheelchair keep on track. However, some types of edge protection may be hazardous for bicyclists.

- *Edge Stabilization:* Edge protection is sometimes required to stabilize the trail structure, and prevent erosion of edges and eventual undermining of the trail base. Reinforcement of both sides of the trailbed can improve long-term sustainability. Soft surfaces such as those proposed for walking or jogging on the edges of multiple-use trails generally require full depth edge protection to prevent breakdown of trail edges. Since trails pass through many different environments, including sensitive natural habitat, edge protection should be consistent with the setting.
- *Edge Safety:* Trail edge safety provisions are sometimes required and must be appropriate to the trail user group and the setting. On multiple-use trails, edge protection and barriers must be designed for bicycle safety. For example, a raised curb that might aid a wheelchair user should not be located immediately adjacent to a bicycle way or paved portion of a multiple-use trail, unless the trail is widened to provide buffers. All vertical structures such as curbs and railings should be set back a minimum of 0.6 m (2 ft) from the bicycle way. Where required for trail user safety immediately adjacent to a steep drop off, safety railings with a height of 1.1 m (42 in) should be provided. However, because railings can be a visual intrusion in a natural setting, they should be used only when there is no other alternative.
- *Reducing Hazards at Drop-offs:* An effective strategy for reducing hazardous conditions on hillside trails (with or without additional edge protection) is to widen the trail and plant vegetation at the trail's edge.

Trails on Sandy Soils: Maintaining a stable trail surface can be particularly challenging in areas with sandy soils. Solutions depend on factors such as the relative sensitivity of the surrounding habitat, continuing maintenance costs, accessibility requirements, and issues specific to each landscape management zone.

- *Subsurface Geogrids:* Geogrids or geocells, when used in combination with geotextiles, provide a relatively unobtrusive means of stabilizing sandy trails. The geogrid confinement chambers distribute trail tread loads over a greater area and reduce settling, both of which help keep trail surfaces intact, in place and dry. The geotextile material provides separation between saturated soil and the tread fill, or increased containment over a sand base. Permeable tread fill provides drainage if the trail is built with a grade or on a sideslope. Imported soils should not be used for tread fill in areas of sensitive natural habitat.
- *Permanent and Moveable Above-Grade Trail Structures:* Boardwalks, which are permanent trail structures described in BMP 10-2, Boardwalks, are traditionally used for access across sandy soils. Another option is textured panels with drain holes, which are installed directly on the surface without excavation (Figure C-15). These panels meet current accessibility guidelines and can be relocated. They may require additional maintenance, such as sweeping and readjustment of linked panels to provide a uniform surface. Sand ladders are a series of logs connected by cable, such as the one in use on the dunes just south of Battery Crosby. They are an option for sandy trails with a steep linear grade. Sand ladders do not provide an accessible route for people with disabilities. Periodic maintenance is required to restore sand ladders to grade level after sand accumulates on the surface. Although temporary or moveable beach access routes are permitted, there are currently no recommendations for products that meet accessibility requirements.

Trails Damaged by Vehicle Use: Maintenance vehicles can damage trails that were not designed to support vehicular traffic. Trail structural stability and strength should be increased on pedestrian and multiple-use trails that will be used by maintenance vehicles. Since many trails are located in areas where sub-grades have a low bearing strength or are poorly drained, sub-bases and trail surfaces would need to be thicker than standard practice to support greater design loads.

- *Geotextile Underlay and Deeper Sub-Base:* Geotextiles can promote trail structural stability and increase the strength of trail cross sections. Wherever maintenance vehicle use is expected, geotextiles should be used to keep trail sub-bases intact and reinforce the structural qualities of trail sugrades. In some cases, the depth of trail subbases should be increased to 0.2 m (8 in).

Non-Designated Trails Requiring Closure: Although considered convenient by users, non-designated trails are often unsafe, contribute to the loss of plant communities, and disturb wildlife. They also impact water resources through erosion and soil compaction. In order to protect Mori Point's unique natural resources, non-designated trails would be closed.

- *Entrance Point Closures and Signs:* Obscuring the entrance to non-designated trails with brush piles or permanent or temporary barriers, such as fences and signs, can discourage the use of non-designated trails. Fencing should be kept to a minimum or used as a temporary measure to protect revegetation areas until these areas are well established. Trail closure signs might be installed temporarily until vegetation is established. Signs or notices posted at trailheads can inform people of the need for social trail closures and encourage them to comply with trail closures. Natural resources staff would help time the trail closures, to ensure that there is adequate time for seed and/or plant collection and salvage, and nursery propagation for revegetation.
- *Vegetation Restoration:* There are several effective techniques that can be used to rehabilitate areas damaged by non-designated trails. For instance, it might be necessary to camouflage the trail surface to discourage continued use. One technique is vertical mulch or brushing-in, where materials are collected from the immediate vicinity and "planted" into the trail surface. Vertical mulch can facilitate the deposition of blowing soil, organic debris, and seeds while creating a protected site for plant reestablishment. Specific prescriptions for plant establishment would be done in consultation with park vegetation restoration specialists. In heavily eroded areas, native soil fill, grading, and temporary check dams may help slow and disperse water flow and encourage the deposition of sediments in ruts or low points

Mitigation Measure Summary Table

IMPACT TOPIC	MITIGATION
Geology and Soils	GGNRA would prohibit construction activities in any site area with seismic hazards until geologic and soil conditions of the site are investigated and appropriate mitigation measures, if any, are incorporated into development/restoration plans.
Hydrology and Water Quality	Construction will be limited to the dry-weather months to the greatest extent practicable.
Hydrology and Water Quality	Areas disturbed by equipment or vehicles will be rehabilitated as quickly as possible to prevent erosion, discourage the spread of nonnative plants and address soil compaction.
Hydrology and Water Quality	Appropriate design would drain surface water from the trail to avoid ponding and development of soft, muddy surfaces that can lead to soil degradation and water quality impacts.
Hydrology and Water Quality	Erosion and sediment control measures would be implemented where project actions could leave soils exposed to runoff prior to revegetation. Erosion control measures would be installed wherever necessary during construction to eliminate the potential for sediment discharge into stormwater, wetlands, and creeks.
Visitor Safety	As per recommendation from the SMCMAD, monitoring of mosquito populations and possible application of *Bacillus thuringensis* would be implemented.
Visitor Safety	Advanced notification of construction work, detour signage, and construction fencing will be implemented to restrict visitors from hazardous areas during construction.
Visitor Use and Recreation	Hours of construction will be limited and restricted between the hours of 8:00 p.m. until 7:00 a.m., would not occur on weekends, and established trails will be rerouted during construction.
Noise	Use of powered construction equipment will comply with the City of Pacifica Municipal Code, Sec. 5-10.03. Enumerated, which prohibits construction noise at night from 8:00 p.m. until 7:00 a.m. Neighbors would also be given notice prior to any construction activities.
Noise	Noise generated by the construction equipment will be reduced by proper muffling of machinery.
Noise	Construction vehicles and equipment will not idle when not in use.
Biological Resources	All vehicles will be brought in cleaned and free of weeds to prevent the spread and/or introduction of invasive plant species.
Biological Resources	Soils and vegetation contaminated with weed seeds would be segregated and disposed of or treated as appropriate.
Biological Resources	At the discretion of the project Biological Monitor, restrictions will be placed on the movement or deposition of fill, rock, or other materials containing weed seed or viable plant cuttings to areas relatively free of weeds.
Biological Resources	No earthmoving or soil disturbing work shall occur in the vicinity of the "Bowl" or existing ponds or wetlands between November 15 and April 15, the breeding season for California red-legged frog and the season when San

	Francisco garter snake are inactive in their winter burrows.
Biological Resources	Vegetation in all construction areas will be progressively cleared by hand equipment to a height of 4 inches and checked for presence of snakes prior to ground-disturbance and construction equipment or vehicles entering the sites. Once vegetation is cleared, a pre-construction survey for the San Francisco garter snake will be conducted in the impact area.
Biological Resources	Prior to construction near wetlands or ponds, exclusion fencing will be constructed and all rodent burrows in the construction area will be hand excavated until the burrows terminates or until a maximum depth of 30 centimeters in areas where soil or fill will be removed or placed.
Biological Resources	Speed limits of 10 miles per hour will be posted on all access roads.
Biological Resources	A Biological Monitor will inspect for snakes and frogs underneath any vehicle that is parked for 30 minutes or more, immediately prior to moving the vehicle.
Biological Resources	Exclusion fencing gates will be closely monitored throughout construction to ensure no snakes enter the area.
Biological Resources	Personnel who detect any suspected San Francisco garter snake or California red-legged frog on-site will immediately report their finding to a Biological Monitor for positive identification. Non-permitted personnel will not attempt to capture or move any snake or frog detected. If the Biological Monitor determines that the animal is not a San Francisco garter snake or California red-legged frog, the Biological Monitor may hand capture and move the animal to suitable habitat outside the construction area. If the Biological Monitor determines that the detected animal is a San Francisco garter snake or a California red-legged frog, or is unable to positively identify the animal, then the Biological Monitor will notify the permitted biologist for appropriate action.
Biological Resources	A biologist holding a valid Scientific Collection Permit from the U.S. Fish and Wildlife Service will be on call or on-site to handle any San Francisco garter snakes or California red-legged frogs encountered during pre-construction and construction activities. Only a holder of a valid Scientific Collection Permit from the USFWS will handle San Francisco garter snakes. California red-legged frogs will only be handled by a holder of a valid Scientific Collection Permit from the USFWS or a USFWS-approved Monitor.
Biological Resources	All excavated holes and trenches will be either covered at the end of the workday, ramped or escape boards will be placed in trench to allow the animals to escape. Trenches will be inspected each morning and late afternoon by the Biological Monitor as well as before the trench is filled. The permitted biologist will relocate any San Francisco garter snake or California red-legged frog individuals found.
Biological Resources	Equipment and trucks used for construction should utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, and installation of sound blanket around the project site, wherever feasible and necessary). Construction vehicles should be properly maintained

	and equipped with exhaust mufflers that meet state standards.
Biological Resources	Impact tools used for construction should be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust should be used. External jackets on the tools themselves and quieter procedures should be used wherever feasible.
Biological Resources	Invasive non-native plant removal would be conducted as follows so that any San Francisco garter snakes that may be hiding in vegetation can escape unharmed. First, search each clump or patch thoroughly for snakes. If a San Francisco garter snake is found, disturbing it is likely to make it hide more deeply in the vegetation, therefore, leave the clump or patch alone and check it again on a later day. If no San Francisco garter snake is found, cut the vegetation manually 1 to 2 feet above ground level and search it again (carefully). If no San Francisco garter snake is found, the remainder of the clump or patch can be removed.
Biological Resources	Current sterilization protocols will be followed for all wetland sampling and monitoring at Mori Point, to protect against chytrid and trematode infestation.
Biological Resources	Wetlands will be monitored for invasive aquatic species and removal will be conducted if found. During invasive non-native plant removal, if physical removal or destruction is planned, conduct the work as follows so that any San Francisco garter snakes that may be hiding in the grass can escape unharmed. First, search each clump or patch thoroughly for snakes. This should be done with caution, since there is some potential for rattlesnakes to be present. If a garter snake is found, disturbing it is likely to make it hide more deeply in the vegetation, therefore, leave the clump or patch alone and check it again on a later day. If no garter snake is found, cut the vegetation manually 1 to 2 feet above ground level and search it again (carefully). If no garter snake is found, the remainder of the clump or patch can be removed.
Biological Resources	Project activities including vegetation removal, grading, earth movement, or other activities involving mechanized equipment shall not be conducted during the bird-nesting season, from March 1 through July 31st, unless a qualified biologist conducts a pre-project survey for nesting birds and determines that birds are not nesting within the project area. All pre-project surveys would be coordinated with the GGNRA Wildlife Ecologist. To the greatest extent possible, these activities will be planned and conducted outside bird-nesting season. If work is necessary during the bird-nesting season, vegetation shall be removed to a height of less than 8 inches prior to the nesting season (March 1st through July 31st) and throughout project activities to discourage the nesting of ground-dwelling bird species.
Biological Resources	In order to protect nesting raptors, trees shall not be removed between January 1st and July 31st unless qualified personnel conduct a pre-project survey for nesting birds and determine that birds are not nesting within the project area. If nesting raptors are detected, a qualified biologist will delineate a suitable buffer.
Biological Resources	Prior to implementation of proposed project activities, conduct visual surveys

	within the Monterey pine and cypress groves on-site to determine the presence or absence of woodrat nests. If woodrat nests are located during this survey, avoid the nest(s) and establish a minimum protection buffer of 50 feet around each nest. Project activities requiring grading, mechanized equipment or vehicles, or large crews within the 25-foot protective buffer should only occur during the non-breeding season (October-November) to avoid noise impacts to any breeding woodrats that may occupy the nest from December through September. If project activities cannot avoid impacting or removing the nest, then the nest(s) should be dismantled by hand prior to grading or vegetation removal activities. The nest dismantling shall occur during the non-breeding season (October-November) and shall be conducted so that the nest material is removed starting on the side where most impacts will occur and ending on the side where the most habitat will be undisturbed, which will allow for any woodrats in the nest to escape into adjacent undisturbed habitat. If young are encountered during nest dismantling, the dismantling activity should be stopped and the material replaced back on the nest and the nest should be left alone and rechecked in 2-3 weeks to see if the young are out of the nest or capable of being out on their own (as determined by a qualified biologist); once the young can fend for themselves, the nest dismantling can continue.
Biological Resources	Prior to implementation of proposed project activities, conduct visual surveys on-site to determine the presence or absence of suitably sized burrows for badgers. If potential badger burrows are located on-site, surveys will be conducted at each burrow to determine the presence or absence of badgers. If badgers are determined to be present, a qualified biologist will be consulted to determine appropriate buffer distances from each occupied burrow to maintain during project activities, and possible project timing restrictions to avoid impacts to birthing individuals (most young are born in March and April[9]. If avoidance of impacts to occupied burrows is not feasible, then a qualified biologist shall implement a pre-construction program during the non-birthing season (Summer through Winter) to exclude badgers from their burrows by closing each burrow once the badger has emerged.

[9] Long 1973 (Long, C. A. 1973. Taxidea taxus. Mammal. Species. No. 26. 4pp.) from "California's Wildlife, Mammals, Badger. California Wildlife Habitat Relationships System, California Department of Fish and Game, 1983."