4.8 CUMULATIVE IMPACTS

Cumulative impacts result when the impacts arising from an action are added to those of other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time (40 CFR Section 1508.7).

When evaluating the potential impacts of specific alternatives, the direct and indirect consequences of implementing an alternative are examined. When evaluating cumulative impacts, the potential direct and indirect impacts of an alternative are reviewed in light of other activities that have occurred in the past and are likely to occur over time in the future. In other words, the cumulative analysis considers impacts in light of all the activities affecting a resource, not just the project in isolation.

When considering cumulative impacts, the geographic area to be examined can vary, depending on the resource topic. However, the context for cumulative impact evaluation is generally similar to the context for project impact evaluation. For example, the affected environment for a specific historic structure would be the site of the structure and a reasonable area around that locale, or the National Historic Landmark District itself.

Identifying cumulative effects can be a complex task. A question necessarily arises as to how far back to look to understand how current site conditions came about. Likewise, when looking forward at all "reasonably foreseeable future actions" there is a question of what is reasonably foreseeable. However, some of the characteristics of the alternatives evaluated in this EIS tend to simplify the assessment of cumulative effects. Specifically, all alternatives would result in fewer acres of land in developed uses and more acreage in open space, as compared to current conditions. While the mix of land uses would vary among the alternatives, all alternatives would also have the same or less built space (i.e., square footage) than current conditions.

The discussion of cumulative impacts below is organized by environmental resource topic. Table 62 indicates the plan, program, and/or projects that provide the context for evaluating cumulative impacts.

4.8.1 CULTURAL RESOURCES

IMPACTS ON HISTORIC RESOURCES AND THE CULTURAL LANDSCAPE

The analyses of potential impacts associated with each alternative address the potential for Trust actions to result in an adverse effect on individual historic resources, the Presidio cultural landscape, and on the overall significance of the NHLD, which encompasses both Areas A and B. Therefore, the analysis considers the potential for cumulative effects on cultural resources in Presidio Areas A and B.

Potential impacts associated with building rehabilitation and enhancements to the Presidio cultural landscape under each alternative would be considered beneficial, due to their conformance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, as well as the PTMP Planning Principles and Planning District Guidelines. This would have the potential for beneficial cumulative effects.

All of the alternatives except for Minimum Management would involve some building demolition, although only the No Action Alternative (GMPA 2000), the Resource Consolidation Alternative and the Final Plan Variant specify that individual historic buildings will be included among the demolitions. Despite the proposed demolitions, the 1994 GMPA EIS concluded that cumulative effects on historic resources would be beneficial due to the extent of rehabilitation proposed. Consistent with planning principles articulated in the Final Plan, other EIS alternatives would also involve substantial rehabilitation in conformance with the Secretary of the Interior's Standards. Only the Resource Consolidation Alternative would include demolition (e.g., removal of the PHSH complex) that could affect the integrity of the NHLD. The impacts of these two alternatives, when viewed in combination with the Doyle Drive projects, could be more severe, however, their overall effect on historic resources would remain beneficial due to the extent of building rehabilitation they propose.

Table 60: Cumulative Context for Project and Cumulative Impact Analysis

Plans	Programs	Project Impact Zones	Projects
Mountain Lake Enhancement Plan	PresidioGo (Presidio Shuttle)	Presidio Areas A and B	Letterman Digital Arts Center (LDAC)
Presidio Trails and Bikeways Master Plan	Presidio Trust Water Resource Management	Presidio and Adjacent Neighborhoods	Doyle Drive Reconstruction
Presidio Vegetation Management Plan	Community Stewardship Programs	City and County of San Francisco	Presidio Environmental Remediation Projects
Crissy Field Marsh Study and Project	NPS's Presidio operations, GGNRA, other regional recreational opportunities	San Francisco Bay Region	East Fort Baker Retreat and Conference Center
Tennessee Hollow Restoration Project		Muni/GGT Service Areas	Micro-Cogeneration and Other Energy Efficiency Actions
USFWS Recovery Plans		San Francisco Air Quality Basin	Presidio Water Recycling Project
San Francisco Urban Water Management Plan			Golden Gate Bridge Seismic Retrofit Project
Baylands Ecosystem Goals Project (Central Bay)			
Clean Air Plan (San Francisco Air Quality Basin)			
San Francisco Bay Area Regional Transportation Plan (as included in SFCTA model)			

Impacts associated with new construction activities would be considered less than significant, due to the limits set on the level of new construction, the commitment to future planning and environmental analysis for a proposed undertaking, the Final Plan's policy to preserve the integrity of the NHLD and to follow the Planning Principles and Planning District Guidelines presented in the Final Plan, and the requirement for further consultation under Section 106 of the National Historic Preservation Act. Thus, no significant cumulative effects of new construction have been identified.

The potential for cumulative impacts affecting resources in the region was assessed in the GMPA EIS, which concluded – despite the potential for specified demolitions within the Presidio – that the rehabilitation and preservation actions proposed "would have a positive cumulative effect on regional efforts to preserve [important] resources and their settings." Given constraints on demolition and new construction through commitments to resource preservation contained in the Trust Act, the NHPA, the PTMP Planning Principles and Planning District Guidelines provided in the Final Plan and applicable to all alternatives (Final EIS Appendix B), and a commitment to additional planning and environmental analysis to determine the full effects of proposed actions, this conclusion remains valid for all alternatives. The terms of the final Programmatic Agreement lay the framework for the necessary additional consultation and review process needed for proposed undertakings that could have a significant effect on cultural resources at the Presidio; through this process, as well as with additional planning and public input, the Trust will ensure the preservation and protection of the Presidio's NHLD status.

ARCHAEOLOGICAL RESOURCES

The cumulative context for archaeological resources includes projects in Areas A or B that could disturb or destroy archaeological resources during excavation or grading. Such projects, in addition to the EIS alternatives, include the Doyle Drive Reconstruction Project, the Mountain Lake Enhancement Plan, the Presidio Trails and Bikeways Master Plan, and the LDAC project. The Tennessee Hollow project and any proposed expansion of Crissy Marsh cannot be evaluated until specific restoration/expansion alternatives are identified.

Cumulative impacts on known prehistoric archaeological sites or historic archaeological resources are, in general, not expected to be adverse. Possible exceptions include prehistoric and historic sites in the Crissy Field Planning District, which could be subjected to impacts from the Doyle Drive

Reconstruction Project and any expansion of Crissy Field Marsh. In particular, for the Doyle Drive Reconstruction Project, the alternatives with below-ground or tunnel features pose the greatest threat to buried prehistoric and historic archaeological sites. The Federal Highway Administration and Caltrans will consider impacts to archaeological sites from each of the construction alternatives. The Trust, in partnership with the NPS and the Golden Gate National Parks Association, has initiated the Crissy Field Marsh Expansion Technical Study (Marsh Study). The Marsh Study will consider a broad array of options to achieve long-term ecological viability of Crissy Marsh. The Marsh Study itself will have no cumulative effect on archaeological resources because it will not develop alternatives, it will provide a technical basis to inform a later environmental review process. As such, it would be speculative to predict specific impacts on archaeological resources from marsh expansion or Tennessee Hollow restoration until specific alternatives are identified.

The Mountain Lake enhancement is an ongoing project for which an archaeological management assessment will be prepared prior to implementation. The lake and its original shoreline have the potential for prehistoric archaeological sites and for remains of the 1776 de Anza Spanish encampment. An archaeological field survey and testing program will be conducted and the project will be redesigned if necessary to avoid impacts to significant archaeological sites.

No cumulative impacts on archaeological resources are expected from the Presidio Trails and Bikeways Master Plan for which there is agreement to redesign routes and facilities to avoid all such effects. The 23-acre LDAC project is also not expected to contribute to cumulative archaeological impacts, because no evidence of buried archaeological sites was found during a recent investigation, archaeological monitoring will take place during the demolition and new construction phases, and the process defined in the Programmatic Agreement for the Letterman Project will be adhered to.

Because implementation actions under the PTMP EIS alternatives and the above projects will involve site investigations prior to excavation and monitoring for archaeological resources as needed during excavation, the likelihood that archaeological resources would be destroyed or damaged without appropriate attention to recordation and recovery would be minimized. Therefore, cumulative impacts are not expected to be significant.

4.8.2 NATURAL RESOURCES

BIOLOGICAL RESOURCES

Although most of the Presidio's remaining natural communities are small, and often isolated, they provide an essential refuge for a diversity of native plants communities and associated special-status plant species, some of which have been almost entirely lost in San Francisco (Vasey 1996). Thus, the Presidio is a significant contributor to the region's biological diversity. These natural communities and other open space features also provide essential habitat for several hundred bird species, some of which are considered extirpated and others rare within the San Francisco bioregion. Many of these species have evolved with, and require the unique habitat-types found on the Presidio which are dependent on specific aspect (exposure to wind), elevation, slope, and soil conditions that are geographically specific, and cannot be duplicated elsewhere.

The San Francisco Bay Area is also one of six "hotspots" within the nation identified by the Nature Conservancy as requiring critical attention to improve and protect the region’s current biological diversity. The selected areas support high levels of biological richness, and have the highest percentage of species that are either imperiled or rare. Some plant species that were historically found on the Presidio, such as the Franciscan manzanita, are extinct, others, such as the Marin dwarf flax, have been recently (within the past decade) locally extirpated from regions within the Presidio due to increased competition with invasive non-native species. Wildlife richness has also been greatly reduced, with many larger mammals no longer found on the Presidio, and other species, such as the Xerces blue butterfly, now extinct, with its last known sighting in the Lobos Valley on the Presidio.

During the past decade, community groups, the NPS, the GGNPA, and natural resources stewards have protected and restored important habitat

connections and rare plant communities, as well as controlled and reduced some of the most invasive threats to the Presidio's biological resources. These efforts have led to restoration of several large areas including the Lobos Creek Dunes, Inspiration Point grasslands and components of the Crissy Marsh and dune systems. Most recently the Trust has coordinated with the NPS to implement VMP pilot projects and as completed the planning phase of the Mountain Lake Enhancement Plan. These efforts will result in increased species richness, the reintroduction and expansion of endangered species populations, and a net increase in habitat for native communities and wetland systems. Actions under the PTMP alternatives (such as habitat management and restoration) would contribute positively to these efforts, but new (replacement) construction and land use activities may have site-specific impacts that would require mitigation.

Other projects and programs that could contribute cumulatively to biological effects include the Presidio Trails and Bikeways Master Plan, the Doyle Drive Reconstruction Project, environmental remediation activities, VMP, Mountain Lake Enhancement and Restoration Program, Crissy potential Marsh expansion and Tennessee Hollow restoration, actions undertaken to implement USFWS recovery plans for several listed plant species, and routine maintenance and operations. Each of these activities are in various stages of development, some still in the alternatives development phase, but all could have both beneficial and negative short-term and long-term impacts on the Presidio's biological resources. A brief discussion of each is provided below.

Construction of the Doyle Drive tunnel through the bluffs above Crissy Field has been identified as one potential action. The lead agencies for this project (San Francisco County Transportation Authority, Caltrans and FHWA) are refining alternatives, which will be subject to environmental review. If the tunnel component was eventually selected, it would most likely have an unavoidable adverse biological impact on the eastern segment of the bluffs, potentially resulting in a change to the hydrologic regime and loss and/or alteration of the localized vegetation richness and wetland habitat values. Another action also being considered at this time is the construction of a tunnel under the potential Tennessee Hollow creek and Crissy Marsh interface. Construction of the tunnel could impact localized hydrogeology, affecting the establishment of a healthy ecotone between Tennessee Hollow and Crissy Marsh. Elevated structures within the same footprint could affect the establishment of a diversity of vegetation species associated with that ecotone, depending upon the degree of shading. Increased noise, debris and dust from Doyle Drive construction activities adjacent to the marsh system and the western bluffs could also impact wildlife use. All of these issues will be the subject of an environmental analysis, which will include the development of mitigation measures to minimize where possible, adverse impacts. Because this analysis has not been conducted, and the refinement of alternatives is still underway, it would be highly speculative to attempt to precisely predict specific impacts on the biological resources of the Presidio. For the purposes of this cumulative analysis, it is assumed that some type of localized impact along the existing Doyle Drive alignment would occur.

The NPS and Trust are working cooperatively to prepare a draft Presidio Trails and Bikeways Master Plan for the Presidio. The draft Plan and corresponding Environmental Assessment (EA) is expected to be released for public review and comment in late 2002. Based on the public planning process completed to date, it appears that several possible actions in the plan could contribute cumulatively to biological impacts. In particular is the proposed removal of selected undesignated trails that currently bisect wetland features, or fragment much of the serpentine bluff habitat. If implemented, this action could have a beneficial impact on those areas. Proposed trail alignments that would maintain the same alignment within sensitive areas could continue to affect those habitats. Other proposed multimodal trail alignments could directly affect habitat for special status species in the southwestern section of the Presidio, and indirectly contribute to localized disturbance of wildlife. However, in general, it is anticipated that native plant communities and associated wildlife and special-status species would benefit by the management actions expected in the plan.

The Presidio's environmental remediation program is an ongoing process involving site cleanup of hazardous substances, under CERCLA, petroleum contamination, and lead in soils cleanup. Site remediation activities include excavation of contaminated materials, construction of protective caps, and monitoring of groundwater resources. The majority of clean up activities at the Presidio are being addressed in the Feasibility Study which is evaluating

cleanup alternatives for each site and will be used as the basis to select final cleanup actions at a number of sites. Small-scale projects and other remediation activities not covered by the program will be subject to the Trust's NEPA review process, and will be conditioned with the coordination and mitigation actions to avoid or minimize potential impacts. The Feasibility Study identifies the location of known contaminants and proposed remedial actions and identifies cleanup standards to ensure the protection of human health and the environment (applicable or relevant and appropriate requirements or ARARs). Based on the draft documents, remedial activities would occur within the following natural habitat areas: Inspiration Point, Crissy Field, Tennessee Hollow, dune and wetland habitats north of the PHSH Planning District, and the western dune and serpentine bluff habitat. It is anticipated that remedies would occur within or directly adjacent to habitat for the San Francisco lessingia, the Raven's manzanita, and the Presidio clarkia, resulting in the potential loss of individuals in the Inspiration Point and Lobos Valley areas. Activities would also occur within habitat for several other rare species, including the coast rock cress, San Francisco campion, San Francisco wallflower and San Francisco owls clover, as well as within and adjacent to wetland habitat. Implementation of the Environmental Remediation Program would also benefit native plant communities and associated wildlife and special-status species by coordinating subsequent habitat restoration efforts with implementation of the PTMP and the VMP. Coordination would ensure that habitat disturbed during environmental remediation activities would be restored to the appropriate ecological community in a timely manner, benefiting special-status species, native plant communities and wildlife. Cleanup standards (ARARs) selected for each remediation site ensure both short-term and long-term protection and enhancement of natural resources.

The USFWS has adopted or is in the process of reviewing draft Recovery Plans for 4 species of federally-protected plants occurring within the Presidio: Marin dwarf flax, Presidio clarkia, Raven's manzanita, and San Francisco lessingia. The underlying goal of these Recovery Plans is to enlarge existing populations and provide for long-term conservation, with the ultimate objective being declassification of the species as threatened or endangered. These plans include specific recovery actions (i.e., restoration activities) that are needed to successfully meet the declassification objective. Implementation of these plans will have a beneficial effect on special status species within the Presidio. The Trust will coordinate PTMP activities with the USFWS regarding with these plans.

In 2001, the NPS and the GGNPA completed the Crissy Field Marsh. Within the northern waterfront area of the Presidio, a series of natural, cultural and recreational features were created. From a biological perspective, this action had a substantial beneficial effect on the native plant communities and wildlife habitat occurring within the Presidio. Specifically, this Crissy Field (Area A) project established a new 18-acre tidal marsh and 14-acre northern foredune community in the Presidio. The Trust, in partnership with the NPS and the Golden Gate National Parks Association, has initiated the Crissy Field Marsh Expansion Technical Study (Marsh Study). The Marsh Study will consider a broad array of options to achieve long-term ecological viability of Crissy Marsh. The Marsh Study itself will have no cumulative effect on biological resources because it will not develop alternatives, it will provide a technical basis to inform a later environmental review process. As such, it would be speculative to predict specific impacts on biological resources. Generally, expansion is expected to have a beneficial effect on the marsh and related native plant and wildlife habitat.

VMP implementation of the pilot project and other phases of the VMP, the Mountain Lake Enhancement Plan, and proposed Presidio-based restoration activities are anticipated to promote the USFWS Recovery Plans for several listed plant species; however, these actions could result in some short-term biological impacts. Potential short-term impacts could include impacts to wildlife species resulting from temporary losses of vegetation cover or conversions of vegetation communities and assemblages. Over the long-term, however, these actions would have a beneficial affect for special-status species, the natural plant communities that support them, and the wildlife populations with which those communities are associated.

Management of the Presidio as a park requires implementing a variety of maintenance and routine operational activities. These activities include the upkeep of the site's infrastructure (i.e., cleaning of storm drains, fixing leaking pipes, roadway maintenance, etc.), maintaining historic buildings

and landscapes, and other day-to-day activities. These activities have the potential to disrupt wildlife and plant communities at the park. To minimize potential impacts to natural resources, the Trust implements standard conditions and management practices to protect resources when work occurs within sensitive areas. Examples of these conditions include restrictions on the timing of maintenance activities to avoid disturbance to nesting wildlife, use of buffer areas to avoid sensitive plant communities, and consultation with resource experts. Projects which could have a potential impact based on their location or the intensity of the proposed activities, are subjected to the Trust's NEPA review process and conditions are applied to ensure that impacts are minimized or avoided.

In conclusion, programs and projects could contribute cumulatively to biological impacts at the Presidio. These projects/programs are in varying stages of development and implementation, and include activities being managed by outside agencies.

Overall, these activities, coupled with potential PTMP actions could contribute cumulatively to the effects on special-status plant, native plant community, and wildlife at the Presidio. PTMP mitigation would help reduce these impacts, and protect these resources through the timely ecological restoration of disturbed remediation areas and limiting the amount of concurrent habitat disturbance (Presidio-wide). In addition, long-term wildlife and vegetation monitoring as mitigation in this EIS would help create, and maintain comprehensive data on the biological resources at the Presidio. (All monitors would be trained to minimize potential disturbances associated with data collection.) Overall, these data will play an important role in future site-specific planning and environmental review activities, as well as the future evaluation of cumulative projects.

WATER RESOURCES

The proposed reconstruction of Doyle Drive is still in the planning and environmental review stages; however, several draft concepts for potential alternatives have been identified. One of these preliminary draft alternatives would involve construction of a Doyle Drive tunnel, which could result in a change to the hydrologic regime and loss and/or alteration of the localized wetland features and processes, vegetation richness and associated wetland habitat values. The tunnel could also affect establishment of a healthy functioning wetland system between the freshwater inflow of Tennessee Hollow and Crissy Marsh.

Removal of the majority of undesignated (e.g., "social") trails followed by habitat restoration, as called for in the adopted Presidio Vegetation Management Plan and proposed Presidio Trails and Bikeways Master Plan, would likely have a beneficial impact on wetland features.

Clean up of the Presidio's numerous environmental remediation sites would occur within or directly adjacent to wetland habitats, and could result in either the short-term or long-term redirection of surface and groundwater flow within these areas. However, it is anticipated that the programs' long-term beneficial impacts to wetland features would exceed the short-term impacts by their coordination of subsequent habitat restoration efforts with implementation of the PTMP and the VMP. Appropriate mitigation measures would be identified to ensure both short-term and long-term protection and enhancement of wetland resources.

Finally, the proposed Mountain Lake Enhancement Plan would benefit native freshwater marsh and riparian communities and water quality values through restoration and management activities. This beneficial effect would contribute cumulatively to the water resources within the Presidio.

While the Doyle Drive Reconstruction Project could have an adverse effect on wetlands, the combined effect of the above projects and the PTMP alternatives (excluding Minimum Management) would be cumulatively beneficial, because there would be a net increase in wetlands and associated habitat values at the Presidio as a result of the PTMP alternatives and other projects described above.

VISUAL RESOURCES

The cumulative context of the Presidio's visual environment would be the Presidio itself and the adjacent areas in the City and County of San Francisco. In addition to physical changes associated with the PTMP, there are other planning efforts underway that could affect the Presidio's visual resources, including the Presidio Trails and Bikeways Master Plan, the

Mountain Lake Enhancement Plan, the Doyle Drive Reconstruction Project, and the VMP. In addition, changes within the 23-acre site in the Letterman Planning District would include replacement of the existing 10-story former hospital, which would provide improved views within the Presidio.

Removal of the majority of undesignated trails and revegetation, as called for in the Presidio Trails and Bikeways Master Plan, could have a beneficial effect on the visual quality in the park as the areas are returned to a natural state. Actions in the Mountain Lake Enhancement Plan would also enhance native vegetation, but would not substantially alter the visual environment in the Presidio.

Construction of improvements to Doyle Drive would generally improve views by placing portions of the roadway at or below ground level.

Over the long term, visual qualities on the area will be enhanced by activities in the VMP. For example, changes to the pygmy forest along the southern boundary of the park would enhance views from residences adjacent to the Presidio. The management of vegetation and the removal of non-historic tree cover would open views that have become blocked over time, which would have a positive effect on visual resources in the Presidio.

The areas adjacent to the Presidio are fully developed urban areas that are not expected to substantially change in visual character for the foreseeable future. Changes that would occur within the Presidio as a result of the alternatives would be incremental and localized. Significant views within the Presidio would be protected or enhanced as would views of the Presidio from adjacent areas.

AIR QUALITY

The San Francisco Bay Area Air Basin is the geographic area considered in evaluating cumulative air quality impacts. This regional air basin does not attain the state and federal standards for ozone. All emissions of reactive organic gases (ROG) and nitrogen oxides (NO_x) in the region contribute to cumulative regional increases in ozone levels. Regional air quality planning efforts aim to reduce ozone levels while allowing growth to occur. Any project that would not be consistent with regional clean air planning efforts is also considered to cause a significant cumulative impact because it would make attainment of air quality goals more difficult. Any project that would cause significant increases in cumulative levels of carbon monoxide (CO) in areas of localized CO violations would also be inconsistent with plans for maintenance of CO levels.

A significant cumulative impact would occur if an alternative would be inconsistent with the most recent Clean Air Plan (CAP). As discussed in the Consistency with Regional Clean Air Plans section, housing and employment growth related to each alternative could outpace the growth assumed in the current GMPA and the assumptions of the 2000 CAP, so that Presidio-related emissions could exceed levels assumed in the CAP. Other regional growth, land use trends, and transportation projects that are outside the control of the Trust could also exceed the levels assumed in the CAP and must be considered in conjunction with PTMP-related growth when assessing cumulative effects. These potential increases in air emissions would be a significant and unavoidable cumulative impact. However, no significant cumulative impacts on localized CO concentrations would occur.

NOISE

Noise is a localized issue limited to the geographic area adjacent to or in the vicinity of a project or activity. Noise can be short term, as during construction, or on going, as with noise from a highway. Short-term cumulative impacts could be related to concurrent Presidio construction projects and the reconstruction of Doyle Drive. Over the long term, new development within the Presidio would coincide with anticipated region-wide growth in traffic noise, especially from traffic on U.S. Highways 101 and 1. Increased traffic noise from cumulative growth on roadways within the Presidio is analyzed in the Environmental Consequences, Noise, chapter of this EIS above because traffic data for buildout conditions account for cumulative traffic increases. Noise from other sources and activities within the Presidio would add to this effect. These cumulative effects were analyzed in the GMPA EIS and were found to be minor. Under any alternative, these effects would occur, but would not substantially exceed noise levels identified in the GMPA EIS, and the impact would remain less than significant.

4.8.3 THE COMMUNITY

LAND USE

The effects of the alternatives when added to the effects of other past, present, and forthcoming projects, would be positive. In general, the projects–including the VMP, Mountain Lake enhancements, Crissy Field (Area A) improvements, the Presidio Trails and Bikeways Master Plan, and the Environmental Remediation Program–would increase open space, enhance park values, and improve the Presidio's natural and recreational qualities. When considered in combination with increases in open space included in all EIS alternatives, the beneficial impacts would be even greater. Ultimately, open space would constitute about 75 percent of the Presidio total acreage (Area A and B). The projects would restore additional native plant habitat, reestablish portions of the historic forest, and enhance the historic setting. Most of the Area B open space improvements would take place in the southern part of the park, primarily through concentrating developed areas in the north and northeast, and removing residential areas in the south to expand open space. The cumulative effect of this change in land use patterns would be to provide a more park-like setting in many parts of the Presidio.

SOCIOECONOMIC ISSUES/HOUSING SUPPLY

The assessment of housing demand and other socioeconomic topics presented in Section 4.4 inherently address potential impacts of the EIS alternatives when combined with demand for housing, schools, and public services from other sources. For example, the number of households (net of those residing in the Presidio) generated under each alternative is expressed as a percentage of the new households in the Housing Impact Area (HIA) between 2000 and 2020 (the HIA is defined in Table 16). The new households in the HIA, projected by ABAG, represent the cumulative household demand resulting from other local developments. The analysis for each alternative shows that when compared to the No Action Alternative (GMPA 2000), the impact of new housing demand on the regional housing supply is less than 1 percent, which is not considered significant.

SCHOOLS

Residential development throughout the City of San Francisco is likely to generate additional public school students over the next twenty years. This development, in conjunction with each of the alternatives, will have a cumulative impact on school capacity. However, it is not possible to develop reasonable projections of cumulative impacts on total school capacity due to a multitude of variables including changes in state-mandated classroom size, the addition of temporary and permanent facilities, and changes in the percentage of San Francisco children in the public school system. ABAG projections indicate that San Francisco household size between 2000 and 2020 will decrease from 2.46 to 2.37 persons per household. The City's total population is projected to grow to 818,800 persons through 2010 and then decrease to 808,000 persons by 2020. Both trends suggest that public school enrollment may decrease slightly over the next twenty years, creating additional capacity for students. With the exception of high schools, City schools that serve the Presidio appear to have sufficient capacity to accommodate the anticipated school population generated by each alternative. Galileo High School has some limited capacity, which could be exceeded by new Presidio-resident students. However, the increase in students is a very minor fraction of the total district enrollment and, in the absence of long-term student population projections, cannot be considered significant.

VISITOR EXPERIENCE

Expanded facilities and programming under the PTMP would complement the visitor experience offered by the NPS's Presidio operations, the rest of the GGNRA, and other regional visitor resources. Development by NPS at the Presidio (Area A), including the recently completed Crissy Field Plan have had a beneficial effect on the educational and interpretative (as well as recreational) opportunities for visitors. Other NPS projects and programs include Fort Point National Historic Landmark, National Maritime Museum, the proposed Fort Baker Retreat and Conference Center, Bay Area Discovery Museum, and various existing programs and visitor facilities within the Marin Headlands and throughout the GGNRA. Other regional visitor resources contribute to both the regional and national efforts to

expand interpretive and educational opportunities for the public. With implementation of any of the EIS alternatives, additional educational resources would be available to Bay Area residents and visitors. No adverse cumulative impacts on visitor facilities are anticipated as a result. As discussed in Section 4.4.4, the Trust would implement measures to ensure that future visitation does not adversely impact the Presidio's resources or the public's enjoyment of the park.

RECREATION

The PTMP would enhance passive recreational and educational experiences and would increase and diversify recreational opportunities through the creation of new open space areas and through the continued restoration of remnant natural areas and historic forest stands. Other projects (in addition to the PTMP) at the Presidio, the rest of the GGNRA, and other regional recreation resources would contribute to recreational opportunities in the Bay Area. For example, improvements at Mountain Lake would include construction of a 350-foot unpaved trail with three overlooks along the east shore of the lake and an overlook with benches and interpretive exhibits on the lake's south shore. A $34 million rehabilitation of Crissy Field in Area A provides 100 acres of restored parkland including a tidal marsh, promenade, boardsailing area, picnic areas, and bike path. The National Park Service, Presidio Trust and Golden Gate National Parks Association have also initiated an effort to study the expansion of the Crissy Marsh. The Presidio Trails and Bikeways Master Plan (currently under preparation) would provide a comprehensive network of trail and road-based natural/cultural areas, regional trails, public transportation stops, and other recreational/open space features of the Presidio. All of these projects, in combination with the PTMP alternatives, would contribute substantially to enhancing recreation opportunities within the region. Projects that could displace existing recreation uses, such as the Tennessee Hollow project, would be subject to additional planning and analysis, and their potential effects would tend to be balanced by the commitment to maintain and expand recreational opportunities under all EIS alternatives (see planning principle 10 in the Final Plan).

PUBLIC SAFETY

Law Enforcement

Law enforcement is generally provided on a local level with cumulative development having little impact beyond a local jurisdiction. The United States Park Police (USPP) serves the Presidio with a dedicated operation with its own budget and personnel. Other development at the Presidio, including the LDAC project, in combination with any of the proposed alternatives, would be adequately served if mitigation identified in this EIS (requiring a review and expansion of services as needed) is implemented. Cumulative regional development will have little or no impact on USPP Presidio operations at the Presidio, because the USPP would not operate outside of its jurisdiction.

Fire Protection and Emergency Services

Fire protection and emergency response is generally provided on a local level with cumulative development having little impact beyond a local jurisdiction. The Presidio Fire Department serves the Presidio with Fire Station 1, which also serves Presidio Area A. Fire Station 2, in the Marin portion of the GGNRA, provides backup for Fire Station 1 with additional backup being provided by the San Francisco Fire Department. Cumulative development elsewhere in the Presidio, including the LDAC and Area A, would not increase the need for expanded services beyond those identified in the impact discussion. Other cumulative regional development would have little impact on Fire Station 1 of the Presidio Fire Department. The development of East Fort Baker would necessitate the relocation and expansion of Fire Station 2 from the Marin headlands to East Fort Baker, but this relocation would not have a significant impact on the ability of Station 2 to provide backup services to Area B.

4.8.4 TRANSPORTATION AND CIRCULATION

ROADWAY NETWORK AND TRAFFIC

The future (2020) cumulative transportation effects of PTMP alternatives were determined using the San Francisco County Transportation Authority

(SFCTA) travel demand forecasting model plus a detailed travel demand evaluation of the Area B elements to reflect full buildout conditions, for typical daily, a.m. and p.m. peak commute hour conditions. Under the year 2020 cumulative conditions, the transportation network away from the Presidio was assumed to be that currently contained in the SFCTA model, which reflects the projects currently included in the San Francisco Bay Area Regional Transportation Plan, prepared by the Metropolitan Transportation Commission. As discussed in the methodology section, the existing transportation network in the Presidio was adjusted to reflect assumptions about changes in the local highway network, including modifications to the 14th and 15th street gates, realignment of Halleck Street to connect with Lincoln Boulevard, and the provision of a grade-separated connection to Doyle Drive, in the vicinity of the Main Post and Letterman Planning Districts.

The impact analysis presented in the Transportation and Circulation section identifies the combined effects of PTMP alternatives along with projected growth in traffic volumes in the area, and thus provides a cumulative analysis of future year 2020 transportation conditions. As discussed in the Transportation and Circulation section, all of the PTMP alternatives would adversely affect the operation of local intersections. Mitigation measures either adapted from the GMPA EIS or identified as new mitigation in this EIS, would improve intersection operations to acceptable levels under cumulative conditions, except for the three intersections of Lincoln Boulevard/Bowley Avenue/Presidio Drive (a.m. and p.m. peak hours), Park Presidio Boulevard/Lake Street (p.m. peak hour) and Park Presidio Boulevard/California Street (p.m. peak hour), which would operate at an unacceptable level of service due to overall regional traffic growth.

The impact analysis presented the Environmental Consequences section of this EIS identifies the combined effect of PTMP along with projected growth in traffic volumes in the area, and thus provides a cumulative analysis of future year 2020 transportation conditions.

The potential for implementation activities under all EIS alternatives to coincide with construction or implementation of other large projects increases the likelihood that residents, visitors, and employees will experience delays and other inconveniences associated with construction activities. The contribution of EIS alternatives to these cumulative effects would be minimized through preparation and implementation of construction traffic management plans for individual projects, as specified in Mitigation Measure TR-26. In general, construction activities undertaken as a result of all EIS alternatives would be geographically dispersed, and would occur intermittently. Other projects considered in the cumulative context, such as the Golden Gate Bridge retrofit, the LDAC project, and Doyle Drive reconstruction, would include more focussed construction impacts requiring additional (project-specific) mitigation.

PARKING

All of the PTMP alternatives would provide sufficient parking to accommodate the expected cumulative weekday demand within Area B of the Presidio. The number of parking spaces proposed would exceed the estimated demand by 5 percent under all of the alternatives, except for the Minimum Management Alternative where the supply would exceed demand by eight percent.

Some special events could generate additional cumulative demand for parking beyond that of a typical weekday. Thus, special events would be scheduled and coordinated based on parking availability and events would be regulated to ensure that supply meets the cumulative demand. Cumulative or spill-over effects crossing the Area A/B jurisdictional boundary would be addressed through mitigation measures included in Section 4.5.

BICYCLE AND PEDESTRIAN FACILITIES

Implementation of the Presidio alternatives would result in a substantial increase (about 200 percent) in pedestrian and bicycle activity within the Presidio and on streets adjacent to the key gates. Under all alternatives, approximately 14 to 18 percent of all trips generated by the land uses are anticipated to occur by walking and parking as the primary mode. The cumulative pedestrian and bicycle activity would be generally accommodated within the existing pedestrian and bicycle network, plus

planned improvements to be outlined in the Bikeways and Trails Master Plan.

PUBLIC TRANSPORTATION

The alternatives would double or triple the current number of transit trips on Muni and GGT. About 75 or 80 percent of the additional transit trips would be on Muni and about eight percent on GGT. The increased of ridership on Muni lines would be distributed among the thirteen bus lines serving the Presidio and its vicinity, while the increase in ridership on GGT would be distributed among the 26 routes that serve the Presidio. In general, the Muni lines have available capacity in the vicinity of the Presidio and the maximum load points to accommodate the cumulative transit demand. GGT bus lines also generally have available capacity with the exception of five GGT routes (2, 4, 26, 72 and 74) that currently operate at a 90 percent or higher level of utilization. A substantial passenger increase on these lines would result in a cumulative impact unless GGT service on these lines is increased in the future to match the expected cumulative demand.

4.8.5 UTILITIES

WATER SUPPLY AND DEMAND

Cumulative impacts take into account the combined demand of the Presidio and other demands within the SFPUC service area. As seen in Table 51, the projected demand varies significantly throughout the year (0.59 mgd – 2.08 mgd). Available on-site potable supplies from Lobos Creek vary by water year between approximately 0.7-1.6 mgd. For all alternatives, the Trust would maximize the use of on-site water supplies; however, there would still be a need to purchase supplemental water from the City. This need would occur primarily during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands. Because this demand will vary from year to year depending upon annual precipitation, it is difficult to precisely predict the amount of water that would be needed. The SFPUC's *Final Urban Water Management Plan for the City and County of San Francisco* identified the Presidio as a retail customer and assumed a constant demand of 1.0 mgd for the Presidio. It is safe to assume that under normal operating conditions, none of the PTMP alternatives would require this level of service. The Presidio demand identified in the SFPUC's Plan represent less than a quarter of a percent of the projected total demand for the SFPUC service area (407 mgd). The Trust is committed to minimize the need for off-site water purchases under all alternatives through the implementation of aggressive water conservation and use of recycled water. Cumulatively, the PTMP would have a negligible effect on water supply within the region.

WASTEWATER TREATMENT AND DISPOSAL

Cumulative impacts take into account the combined effect of the Presidio and other local development on wastewater discharge to the City's sewage treatment system. Wastewater flows from the Presidio are conveyed to the City's system and treated at one of two plant sites: the Oceanside Water Pollution Control Plant or the Southeast Water Pollution Control Plant (SEWPCP). The Trust and City monitor these flows, and the Trust reimburses the City for the cost of treatment and disposal. The SFPUC reports that, under dry weather conditions, the City's sanitary sewer system has sufficient capacity to accommodate projected growth in San Francisco in the immediate future. However, the system's ultimate capacity under wet weather conditions has yet to be determined (personal communication, Carlin). Currently, the SEWPCP, which receives the greatest share of the City's wastewater flow, is operating at capacity under wet weather conditions (personal communication, Franza). The San Francisco 2001 *Final Urban Water Management Plan* projects an increase in water usage from 83.9 mgd to 85.8 mgd between 2000 and 2020, indicating an increase in wastewater flows over the same period. The SFPUC is exploring the possibility of increasing treatment capacity at the North Point Water Pollution Control Plant in response to these projections. Increased capacity at the North Point Plant would also limit flow to SWPCP and reduce the number of combined sewer overflows (CSOs) under wet weather conditions.

Under all of the PTMP alternatives, wastewater flows to the City's combined sewer system would increase above current levels but would always remain substantially lower than historic levels which were measured at 475 million gallons in 1990. Current flows are approximately 120 million gallons annually. Under the various PTMP alternatives, annual 2020 flows

would range from 183 million gallons under the Minimum Management alternative to 266 million gallons under the Cultural Destination alternative. To put these flow in context with the City's system, both the current and maximum future flows represent less than one half of one percent of the capacity of the either of the City's plants where these flows are treated. Implementation of the mitigation measures identified in this EIS including water conservation practices (i.e., use of water efficient toilets and faucets) and system upgrades would further reduce flows. Implementation of the proposed water recycling project would have a direct reduction in flows that would otherwise go to the SEWPCP for treatment and disposal. Implementation of the water recycling project would divert, treat and reuse on-site up to 85 million gallons of wastewater that would otherwise go to the SEWPCP. Cumulatively, the PTMP alternatives are minor contributors to the City's combined sewer system and the Trust would continue to pursue actions to minimize Presidio flows as described above.

STORM DRAINAGE

As the Presidio storm drainage system is largely exclusive to the Presidio, development outside the Presidio is not expected to generate additional drainage to the system. Conversely, the Presidio is not expected to add to storm water runoff into the City's system, since it is a separate system and drains to the bay or ocean. Therefore, no cumulative impacts on San Francisco's storm water system are anticipated. Implementation of the Presidio VMP, Crissy Field project (existing and possible expansion), Presidio Trails and Bikeways Master Plan, and the Mountain Lake Enhancement Plan, to the extent that they increase vegetation and other porous surfaces and reduce non-porous surfaces, will reduce storm water runoff within the Presidio storm drainage system. Implementation of the Presidio Stormwater Pollution Prevention Plan (SPPP), currently under preparation, will also have a cumulatively beneficial effect on storm drainage within the park by ensuring the implementation of Best Management Practices (BMPs) to minimize runoff and improve water quality. The SPPP will establish a detailed monitoring program which will be implemented to track the effectiveness of the BMPs and monitor the quality of storm water runoff at the park over the long-term.

SOLID WASTE

Cumulative impacts take into account the combined effect of the Presidio development and other local development in the nine-county Bay Area on regional solid waste generation. The analysis presented in the Environmental Consequences section of this document provides a cumulative impact assessment, by calculating the percentage of the regional waste stream produced by development under the alternatives. Construction activities under the alternatives would either reduce the regional solid waste stream, or generate an additional .01 to .03 percent of the regional solid waste, as compared to the No Action Alternative (GMPA 2000). The No Action Alternative (GMPA 2000) would generate .08 percent of the regional waste stream. Mitigation identified in this EIS would further limit the production of solid waste.

ENERGY CONSUMPTION AND DISTRIBUTION

Electrical Supply

California is currently undergoing a statewide electrical crisis, with demand in excess of supply and costs increasing significantly as a result. The State of California has responded to this problem by negotiating long-term contracts for electricity, facilitating construction of new power plants, encouraging conservation measures, and investigating power generators' activities. As a major population and industrial center, the Bay Area has been particularly impacted by the power shortage. ABAG projects the regional population to grow by 16 percent and the number of jobs to increase by 27 percent over the next twenty years, suggesting an increase in regional electrical consumption. Development at the Presidio under all the alternatives would contribute to this regional electrical demand. To limit the Presidio's impact on regional demand, mitigation identified in this EIS would be implemented. Measures would also be taken by the Trust would also be in compliance with Executive Order 13123, mandating that energy use at the Presidio be reduced by 35 percent below 1985 levels by 2010. These steps would further reduce the Presidio's impact on regional electrical demand and consumption.

Natural Gas Supply

As stated above, the regional population is projected to increase by 16 percent, and regional employment by 27 percent. This growth will lead to an increase in regional natural gas consumption. Development at the Presidio under all alternatives would represent a portion of this regional demand. To limit the Presidio's impact on regional demand, mitigation identified in this EIS would be implemented. In addition, measures taken by the Trust to reach compliance with Executive Order 13123 would reduce the Presidio's contribution to regional natural gas demand.

Energy Conservation

The cumulative analysis under the Energy Consumption and Distribution and Natural Gas Supply states that development under any of the Presidio alternatives would represent an increase in regional energy demand. However, compliance with Executive Order 13123 assures that the Presidio would reduce its energy consumption under each of its alternatives, thus limiting its impact on regional energy demand and furthering the goals of energy conservation.

ENVIRONMENTAL CONSEQUENCES

Cumulative Impacts