4.6 UTILITIES

This section evaluates potential impacts on utilities, including water supply and distribution, wastewater treatment and disposal, storm drainage, solid waste and energy consumption and distribution. The evaluation methodology, impacts for each alternative, and mitigation measures to address potential impacts are discussed under each topic area.

4.6.1 WATER SUPPLY AND DEMAND

METHODOLOGY

For each of the PTMP alternatives, future (2020) water demand is projected using the Presidio Water Balance (PWB) - an interactive computer-based model that estimates water demand and resulting production of wastewater at the Presidio. The PWB and demand factors developed as part of the Revised *PTIP Water Projections Technical Memorandum* (March 2002) were used to predict future domestic and irrigation water demand. Because irrigation demand fluctuates seasonally, off-season, peak and average monthly estimates are presented. Total projected water demand is evaluated with in the context of supplies to demonstrate the impact of each alternative on water consumption at the park. Mitigation measures which include demand and supply-side management actions are presented at the end of this section.

POTENTIAL IMPACTS

Table 51 presents a summary of projected domestic and irrigation water demands; refer to Appendix H for additional information concerning projections. At full occupancy, the domestic water demands, which do not fluctuate seasonally, range from 0.56 million gallons a day (mgd) to 0.81 mgd depending on the alternative. For the No Action Alternative (GMPA 2000), the projected domestic water demand is 0.57 mgd. Domestic demands were estimated assuming that residential units had been retrofitted with low-flow fixtures. The Trust has already renovated a majority of the residential units on the Presidio using low-flow fixtures and will continue this practice. Projections for non-residential building do not take into account conservation measures.

Irrigations demands vary greatly from season to season as well as from year to year, depending on precipitation. Projected irrigation demands range from an off-season low of 0.03 mgd to peak month demand of 1.35 mgd. Irrigation demands were estimated based on evapotransporation rates for the area and do not take into account conservation measures such as the planned use of recycled water. For the No Action Alternative (GMPA 2000), the average demand is 0.5 mgd with an off-season and peak month demand of 0.03 mgd and 1.22 mgd, respectively. Combining the domestic and irrigation demands for the No Action Alternative (GMPA 2000) yields a total demand range of 0.60 mgd to 1.79 mgd.

The projected water demands presented in Table 51 could be reduced through the implementation of water conservation practices. Estimates indicate that the domestic water projections could be reduced by as much as 25% by retrofitting non-residential buildings with low-flow fixtures similar to residential buildings. Irrigation demands can be reduced by implementing of various BMPs (see Mitigation Measures section) as well as irrigation guidelines to improve water use efficiency. The demand and use of potable water for irrigation would also be reduced through implementation of the proposed Presidio Water Recycling Project (see Section 2.2 “Common Features” in the Alternatives Chapter).

INCREASED DEMAND FOR DOMESTIC WATER

No Action Alternative (GMPA 2000)

Under the No Action Alternative (GMPA 2000), daily domestic water demand is estimated at 0.57 mgd. As shown in Table 51, irrigation demands fluctuate greatly throughout the year with a projected peak demand of up to 1.21 mgd during the month of July and off-season low demand of 0.03 mgd. The projected average daily irrigation demand is 0.50 mgd. Total water demand (domestic and irrigation) would range from 0.60 mgd to 1.78 mgd throughout the year. The projected total water consumed on an annual basis would be approximately 391 million gallons.

Table 51: Summary of Estimated Water Demands at 2020

Alternative	Domestic Demand Average Daily (mgd)	Irrigation Demand Average Daily (mgd)	Irrigation Demand Off Season Nov-April (mgd)	Irrigation Demand Peak Month (mgd)	Total Demand Range (mgd)	Projected Annual Consumption (million gallons)
No Action (GMPA 2000)	0.57	0.50	0.03	1.21	0.60 - 1.78	391
Final Plan	0.72	0.50	0.03	1.21	0.75 - 1.93	445
Final Plan Variant	0.58	0.53	0.03	1.28	0.61 - 1.86	403
Resource Consolidation	0.63	0.57	0.03	1.35	0.66 - 1.98	432
Sustainable Community	0.71	0.47	0.03	1.14	0.74 - 1.85	443
Cultural Destination	0.81	0.52	0.03	1.27	0.84 - 2.08	487
Minimum Management	0.56	0.47	0.03	1.13	0.59 - 1.69	376

On-site (Lobos Creek) water supply ranges from approximately 1.2 to 2.1 mgd. A minimum flow of 500,000 gallons per day (0.78 cfs) must pass the Lobos Creek water extraction point for support of downstream riparian habitat (see Figure 33 in Affected Environment). The Presidio therefore has a reliable, on-site water supply of between 0.7 and 1.6 mgd. As discussed in the Affected Environment Chapter (Section 3.6.1), the Army, National Park Service and Trust have purchased water from the City and County of San Francisco on an as-needed basis. Purchases range depending on the type of water year. Currently the Trust purchases approximately 15% of the annual water demand from the City. The Presidio is considered a "retail" water customer by the City and as such is subject to all mandatory water rationing programs and rate structures adopted during drought conditions

As described in the Affected Environment Chapter, the Presidio has implemented a variety of water conservation measures. In order to further conservation efforts and reduce the amount of water needed from off-site sources, the Trust has identified mitigation measures which include demand and supply measures (see UT-1 through UT-3). Implementation of the conservation and other best management practices are anticipated to reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would provide up to 0.5 mgd of additional water supply to meet or offset irrigation demands. Even with these actions, the on-site resources (Lobos Creek and recycled water) may not be sufficient to meet peak demands during summer months when Lobos Creek flows are at their lowest. Therefore, supplemental water purchases from the City will continue to be pursued on as-needed basis.

Final Plan Alternative

As shown in Table 51, daily domestic water demand under the Final Plan Alternative is estimated at 0.72 mgd. Similar to the No Action Alternative (GMPA 2000), irrigation demands fluctuate greatly throughout the year. The projected peak month and off season low demands are 1.21 and 0.03 mgd, respectively. The projected average irrigation demand is 0.50 mgd. Combining the domestic and irrigation demands yields a total water demand range of 0.75 to 1.93 mgd. The projected total water consumed on an annual basis under this alternative would be roughly 445 million gallons, which is approximately 14% greater than the No Action Alternative (GMPA 2000). As noted above, available potable water supplies from Lobos Creek vary by water year between approximately 0.7-1.6 mgd.

Similar to the No Action Alternative (GMPA 2000), mitigation measures UT-1 through UT-3 would be implemented to reduce demands and develop additional supplies. Implementation of conservation and other best management practices could reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would

provide up to 0.5mgd of additional water supply which could be used to meet or offset irrigation demand. However, supplemental water would continue to be purchased from the City on an as needed basis during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands.

Final Plan Variant

As shown in Table 51, the Final Plan Variant is projected to have a daily domestic water demand of approximately 0.58 mgd. Similar to the GMPA, irrigation demands fluctuate greatly throughout the year. The projected peak month and off season low demands are 1.28 and 0.03 mgd, respectively. The projected average irrigation demand is 0.53 mgd. Combining the domestic and irrigation demands yields a total water demand range of 0.61 to 1.86 mgd. The projected total water consumed on an annual basis under this alternative would be roughly 403 million gallons, which is approximately 3% greater than the No Action Alternative (GMPA 2000).

Similar to the No Action Alternative (GMPA 2000), mitigation measures UT-1 through UT-3 would be implemented to reduce demands and develop additional supplies. Implementation of conservation and other best management practices could reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would provide up to 0.5 mgd of additional water supply which could be used to meet or offset irrigation demand. However, supplemental water would continue to be purchased from the City on an as needed basis during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands.

Resource Consolidation Alternative

As shown in Table 51, daily domestic demand for water under the Resource Consolidation Alternative is estimated at 0.63 mgd. Similar to the No Action Alternative (GMPA 2000), irrigation demands fluctuate greatly throughout the year. The projected peak month and off-season low demands are 1.35 and 0.03 mgd, respectively. The projected average irrigation demand is 0.57 mgd. Combining the domestic and irrigation demands yields a total water demand range of 0.66 to 1.98 mgd. The projected total water consumed on an annual basis under this alternative would be roughly 432 million gallons, which is approximately 10% greater than the No Action Alternative (GMPA 2000). Similar to the No Action Alternative (GMPA 2000), mitigation measures UT-1 through UT-3 would be implemented to reduce demands and develop additional supplies. Implementation of conservation and other best management practices could reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would provide up to 0.5 mgd of additional water supply which could be used to meet or offset irrigation demand. However, supplemental water would continue to be purchased from the City on an as needed basis during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands.

Sustainable Community Alternative

As shown in Table 51a, daily domestic water demand under the Sustainable Community Alternative is estimated at 0.71 mgd.. Similar to the GMPA, irrigation demands fluctuate greatly throughout the year. The projected peak month and off-season low demands are 1.14 and 0.03 mgd, respectively. The projected average irrigation demand is 0.47 mgd. Combining the domestic and irrigation demands yields a total water demand range of 0.74 to 1.85 mgd. The projected total water consumed on an annual basis under this alternative would be roughly 443 million gallons, which is approximately 13% greater than the No Action Alternative (GMPA 2000).

Similar to the No Action Alternative (GMPA 2000), mitigation measures UT-1 through UT-3 would be implemented to reduce demands and develop additional supplies. Implementation of conservation and other best management practices could reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would provide up to 0.5 mgd of additional water supply which could be used to meet or offset irrigation demand. However, supplemental water would continue to be purchased from the City on an as needed basis during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands. .

Cultural Destination Alternative

As shown in Table 51 daily demand for domestic water under the Cultural Destination Alternative is estimated at 0.81 mgd. Similar to the GMPA, irrigation demands fluctuate greatly throughout the year. The projected peak month and off-season low demands are 1.27 and 0.03 mgd, respectively. The projected average irrigation demand is 0.52 mgd. Combining the domestic and irrigation demands yields a total water demand range of 0.84 to 2.08 mgd. The projected total water consumed on an annual basis under this alternative would be 487 million gallons, which is roughly 25% greater than the No Action Alternative (GMPA 2000).

Similar to the No Action Alternative (GMPA 2000), mitigation measures UT-1 through UT-3 would be implemented to reduce demands and develop additional supplies. Implementation of conservation and other best management practices could reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would provide up to 0.5 mgd of additional water supply which could be used to meet or offset irrigation demand. However, supplemental water would continue to be purchased from the City on an as needed basis during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands

Minimum Management Alternative

As shown in Table 51, the daily demand for domestic water would under the Minimum Management Alternative is estimated at 0.56 mgd. Similar to the GMPA, irrigation demands fluctuate greatly throughout the year. The projected peak month and off-season low demands are 1.13 and 0.03 mgd, respectively. The projected average irrigation demand is 0.47 mgd. Combining the domestic and irrigation demands yields a total water demand range of 0.59 to 1.69 mgd. The projected total water consumed on an annual basis under this alternative would be roughly 376 million gallons, which is approximately 4% less than the No Action Alternative (GMPA 2000).

Similar to the No Action Alternative (GMPA 2000), mitigation measures UT-1 through UT-3 would be implemented to reduce demands and develop additional supplies. Implementation of conservation and other best management practices could reduce demands (domestic and irrigation) by as much as 25% on an annual basis. The proposed water recycling project would provide up to 0.5 mgd of additional water supply which could be used to meet or offset irrigation demand. However, supplemental water would continue to be purchased from the City on an as needed basis during the summer months when on-site supplies (Lobos Creek and recycled water) are not sufficient to meet peak demands

MITIGATION MEASURES

Measures adapted from the GMPA EIS

The GMPA EIS did not include mitigation for water supply and demand.

New Mitigation

Water Supply and Demand

The following measures would apply to all alternatives.

UT-1 *Demand Management Best Management Practices*. The Trust, in cooperation with all its tenants and residents, would continue to implement Best Management Practices that encourage water conservation. Given the evolutionary nature of water conservation measures, the Trust would make provisions for the removal or addition of BMPs as the technical and economic reasonableness of measures are determined. Current BMPs are:

- Continue to identify and repair leaks to reduce distribution system losses;
- Install water meters and develop a consumption-based billing system to discourage inefficient use of water;
- Conduct water audits and monitor tenants' meters, water heaters, and plumbing fixtures;
- Install water-conserving devices as part of all building rehabilitation projects. Retrofit requirements include installation of low-flow toilet and shower fixtures and faucet aerators, and recycled water irrigation systems (in areas where recycled water is or will be available);
- Implement park-wide Irrigation Guidelines which include specific requirements for efficient and effective water application (i.e., non-

daylight hour application, use of highly-efficient irrigation systems, use of meteorological data in irrigation scheduling, etc.), and use of recycled water for irrigation wherever available;
- Prohibit use of additional water for new landscaping or expansion of existing facilities unless low water use landscaping designs and plant materials are consistent with the recommendations of the adopted Presidio Vegetation Management Plan (which requires the use of drought tolerant plant species) and water efficient irrigation systems;
- Hire or designate an in-house Water Conservation Coordinator;
- Provide comprehensive water conservation outreach efforts to tenants and residents, including brochures, newsletter announcements, posters, direct mailings, and other "attention getters;" and
- Participate in efforts being made by other water management agencies to identify additional conservation programs.
- Install Pressure Regulating Valves (PRV) at specific buildings where water pressure warrants such action.

UT-2 *Water Shortage Emergency Response*. The Trust would prepare a water shortage contingency analysis that includes the following elements:

- Stages of action to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions that are applicable to each stage;
- An estimate of the minimum water supply available based on the driest three-year historic sequence for water supply;
- Actions to be undertaken to prepare for, and implemented during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster;
- Additional, mandatory prohibitions against specific water-use practices during water shortages;
- Appropriate consumption reduction methods in the most restrictive stages that have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply;
- Penalties or charges for excessive use, if feasible; and
- A mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.

In addition, the Trust would also be subject to the City and County of San Francisco's (CCSF) water contingency plan and drought restrictions for all City-purchased water. During times of drought or low runoff, when the CCSF water system may be vulnerable in its ability to provide a safe reliable source of water, the Trust may be allocated a drought allotment based on an examination of domestic water usage, irrigation water usage, and water produced from the Lobos Creek Water Treatment Plant. Under CCSF emergency conditions, the Trust would consider supplying water to the CCSF for the purpose of augmenting its total water supply if Trust water is available beyond the amounts necessary to meet Presidio service needs (based on a rationed domestic use and restricted irrigation schedule), and ensure resource protection objectives and minimum stream flows within Lobos Creek are met.

UT-3 *Recycled Water Use.* The Trust is proceeding with an evaluation and environmental review of an onsite phased water reclamation system (see UT-6) for use as a non-potable water source. The system would use recycled water in the Presidio to reduce consumption of potable water for non-potable uses (i.e., irrigation), and also to lower the volume of wastewater discharged to the City's combined sewer system.

4.6.2 WASTEWATER TREATMENT AND DISPOSAL

METHODOLOGY

Wastewater generation under the various EIS alternatives is projected by applying a 90 percent factor to the domestic water use estimates, which are discussed above. In response to public comments on the Draft EIS, the factor was increased to 0.90 from 0.80 to be consistent with the City's practice. This methodology assumes that approximately 90 percent of all water used (excluding water used for irrigation purposes) enters the wastewater treatment and disposal system. Projected wastewater generation is compared to current levels to determine whether there would be an adverse effect on the City's sanitary sewer system, which treats wastewater from the Presidio.

Each alternative is also compared to the No Action Alternative (GMPA 2000) to determine the project impact in terms of wastewater generation. This process is contained in Table 52. The water inputs are shown in Table 51.

POTENTIAL IMPACTS

As shown in Table 52, the projected wastewater generated from all of the alternatives ranges from a low of 0.50 mgd to a high of 0.73 mgd. All of the alternatives would produce wastewater flows greater than current flow of approximately 0.4 mgd. However, as discussed in the Affected Environment Chapter, historic flows entering the CCSF system have been much higher. In 1990, as the Army was leaving the Presidio, approximately 475 million gallons of wastewater was discharged to the CCSF system, which equates to a flow of 1.29 mgd. Even at full occupancy, all of the alternative would generate far less wastewater than the 1990 levels.

Before leaving the Presidio, the Army implemented a large-scale infrastructure repair program, which included slip-lining existing pipe lines to minimize infiltration of stormwater. This program as well as infrastructure repairs made by the National Park Service and the Trust (i.e. repairing cracked sections of pipe and separating cross connections between the stormwater and sanitary systems) have resulted in a substantial reduction in Presidio flows entering the CCSF combined sewer system. Although it is difficult to make a direct comparison between annual flow data from before and after these various improvements were made (as occupancy rates have also varied), there is clearly a noticeable reduction. In 2000 total annual flows were approximately 120 million gallons – or roughly one-quarter of the 1990 flows.

Under each of the alternative, activities to rehabilitate the sewer infrastructure would continue to further reduce infiltration. Additionally, the proposed recycled water project, which would recycle up to 500,000 gpd of wastewater, would further reduce flows to the CCSF system.

INCREASED WASTEWATER GENERATION

No Action Alternative (GMPA 2000)

The No Action Alternative (GMPA 2000) is projected to generate approximately 0.51 million gallons of wastewater per day (Table 52). This amount represents approximately 0.11 mgd more than the current Presidio wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Additionally, as discussed in the Affected Environment Chapter, approximately 85% of the wastewater generated on the Presidio is discharged through the three east-side discharges to the CCSF system and routed to the SEWPCP. Under this alternative, approximately 0.48 mgd would be routed to the SEWPCP, which is less than one-half percent of the plant's dry and wet weather capacity. The proposed mitigation measures, which include construction of a recycled water treatment pant and conservation measures, would further reduce wastewater generation, and would minimize flows to the City of San Francisco's sanitary sewer.

Table 52: Projected Wastewater Generation (mgd)

Alternative	Projected Water Use[a]	Wastewater Generation[b]	Change from Current Flows[c]
No Action (GMPA 2000)	0.57	0.51	0.11
Final Plan	0.72	0.65	0.25
Final Plan Variant	0.58	0.52	0.12
Resource Consolidation	0.63	0.57	0.17
Sustainable Community	0.71	0.64	0.24
Cultural Destination	0.81	0.73	0.33
Minimum Management	0.56	0.50	0.10

Sources: EIP Associates; The Presidio Trust; Bay Area Economics, 2001; URS 2001 & 2002.

Notes:
a Water use projections, less irrigation.
b Wastewater generation is assumed to be 90 percent of domestic water consumption (i.e., excludes irrigation uses).
c Current flows are 400,000 gallons per day; 1990 flows were approximately 1.3 million gallons per day
mgd = million gallons per day

Final Plan Alternative

The Final Plan Alternative is projected to generate approximately 0.65 million gallons of wastewater per day (Table 52). This amount represents approximately 0.25 million gallons a day more than the current wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Similar to the No Action Alternative (GMPA 2000), approximately 85% (or 0.55 mgd) would be routed to the SEWPCP, which is less then one-half percent of the plant's capacity. The proposed mitigation

measures, which include construction of a recycled water treatment pant and conservation measures, would minimize discharges to the City's system.

Final Plan Variant

The Final Plan Variant is projected to generate approximately 0.52 million gallons of wastewater per day (Table 52). This amount represents approximately 0.12 million gallons a day more than the current wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Similar to the No Action Alternative (GMPA 2000), approximately 85% (or 0.44 mgd) would be routed to the SEWPCP, which is less than one-half percent of the plant's dry and wet weather capacity. The proposed mitigation measures, which include construction of a recycled water treatment pant and conservation measures, would minimize discharges to the City's system.

Resource Consolidation Alternative

The Resource Consolidation Alternative is projected to generate approximately 0.57 million gallons of wastewater per day (Table 52). This amount represents approximately 0.17 million gallons a day more than the current wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Similar to the No Action Alternative (GMPA 2000), approximately 85% (or 0.48 mgd) would be routed to the SEWPCP, which is less than one-half percent of the plant's dry and wet weather capacity. The proposed mitigation measures, which include construction of a recycled water treatment pant and conservation measures, would minimize discharges to the City's system.

Sustainable Community Alternative

The Sustainable Community Alternative is projected to generate approximately 0.64 million gallons of wastewater per day (Table 52). This amount represents approximately 0.24 million gallons a day more than the current wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Similar to the No Action Alternative (GMPA 2000), approximately 85% (or 0.54 mgd) would be routed to the SEWPCP, which is less than one-half percent of the plant's dry and wet weather capacity. The proposed mitigation measures, which include construction of a recycled water treatment pant and conservation measures, would minimize discharges to the City's system.

Cultural Destination Alternative

The Cultural Destination Alternative is projected to generate approximately 0.73 million gallons of wastewater per day (Table 52). This amount represents approximately 0.33 million gallons a day more than the current wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Similar to the No Action Alternative (GMPA 2000), approximately 85% (or 0.62 mgd) would be routed to the SEWPCP, which is less than one-half percent of the plant's dry and wet weather capacity. The proposed mitigation measures, which include construction of a recycled water treatment pant and conservation measures, would minimize discharges to the City's system.

Minimum Management Alternative

The Minimum Management Alternative is projected to generate approximately 0.52 million gallons of wastewater per day (Table 52). This amount represents approximately 0.10 million gallons a day more than the current wastewater flow to the City of San Francisco's sanitary sewer system but substantially less than 1990 flows. Similar to the No Action Alternative (GMPA 2000), approximately 85% (or 0.43 mgd) would be routed to the SEWPCP, which is less than one-half percent of the plant's dry and wet weather capacity. The proposed mitigation measures, which include construction of a recycled water treatment pant and conservation measures, would minimize discharges to the City's system.

MITIGATION MEASURES

Measures Adapted from the GMPA EIS

The GMPA EIS did not include mitigation for wastewater treatment.

New Mitigation

The following measures would apply to all alternatives.

UT-4 *Reduction of Onsite Wastewater Generation.* The Trust would implement water conservation best management practices described in Measure UT-1 in the Water Supply and Demand section, to limit water usage at the Presidio, which would reduce wastewater generation as well. These practices would include repairing leaks, installing water meters, conducting water audits, retrofitting with water-conserving devices, designating an in-house Water Conservation Coordinator, providing information to tenants and residents, and participating in the efforts of other water management agencies. Additionally the Trust would continue to rehabilitate the sewer infrastructure (slip-lining and replacing broken a cracked sections of pipe) to reduce stormwater infiltration into the wastewater system.

UT-5 *Limits on Offsite Wastewater Flows.* The Trust would continue the development of the reclaimed water system and treatment plant (see also UT-3). As stated in the Affected Environment, the plant would have a minimum treatment capacity of 200,000 gpd and be expandable up to 500,000 gpd and would reduce wastewater flows to the City of San Francisco combined system.

At times of year when recycled water is not needed for irrigation, the Trust would consider using the reclaimed water system to treat wastewater from the eastern side of the Presidio and discharge it on the western side of the park to the City's Oceanside Water Pollution Control Plant (OWPCP). The sanitary sewer system serving the OWPCP has a greater capacity to absorb wet weather flows. Therefore, redirecting Presidio flows to the west side would help limit CSOs from the City's combined sewage system.

4.6.3 STORM DRAINAGE

METHODOLOGY

A general assessment of potential changes in stormwater runoff was conducted for each of the alternatives evaluated in this EIS. The purpose of the assessment is to provide a comparison among the alternatives, and identify general increases and decreases in the volume of stormwater runoff that may occur. In order to provide a gross assessment of potential changes in stormwater flows, the amount of net new construction (i.e. new construction less demolition) in each planning district is used to estimate possible changes in permeable surfaces and thus stormwater runoff. Note that this is a conservative methodology, as it assumes that all additional construction would only have one story and that new construction would directly result in new impervious surfaces. In all likelihood, new construction would include building additions and/or would be constructed in areas that are already covered with impervious surfaces and thus would not increase the rate or volume of existing stormwater runoff. In addition, the square footage of new construction identified under each alternative does not directly equate to new impervious surfaces as new structures could have, for example, two stories and thus cover half the space that would otherwise be inferred from directly using total new square feet. This assessment also does not account for reduction in previous surfaces associated with cultural landscape restoration (i.e., conversion of the Main Post parade ground from concrete to pervious surfaces) that would occur under the various alternatives.

The primary source of available information related to Presidio storm hydrology and system capacity is the 1994 Presidio Stormwater Management Plan (Stormwater Plan) and corresponding model. Information from the Stormwater Plan related to the 30 minute and 60 minute storm events were evaluated in the preparation of this analysis. These events were used because, according to the Stormwater Plan, they "…correspond to the time of concentration of the individual subbasins as well as the cumulative time of concentration for the watershed basin" (Section 5.1, Stormwater Management Plan). Based on this data, and assuming a 10-year storm event of one hour, the assumed rainfall intensity of 0.85 inches an hour was used for the purposes of this analysis. A distinct runoff coefficient is used for each planning district to reflect the varying surfaces across the Presidio. Coefficients were derived based on professional judgment of Trust staff and information provided in the Stormwater Plan.

The following presents a generalized assessment of the storm drainage system's ability to accommodate projected increase in flow based on the professional judgment of Trust utilities staff. In general, the projected

increase in flow under all of the alternatives is considered minor and does not pose a significant capacity issue for the existing storm drainage system. Because this analysis relies on a generalized methodology, additional site-specific infrastructure planning would occur following completion of the PTMP planning and environmental review processes and approval of a particular alternative.

In addition to the discussion of changes in runoff volume, a general description of the water quality monitoring and Best Management Practices (BMPs) to improve quality and reduce runoff is provided for each alternative. These actions are collectively being addressed in the interim Stormwater Pollution Prevention Plan (SPPP) currently under preparation. As described in Section 3.6.3 (Affected Environment), the SPPP is being developed to be consistent with the guidelines for stormwater management as established under the National Pollutant Discharge Elimination System (NPDES) and will remain in effect until the Trust obtains an NPDES permit. As such, the SPPP would be implemented under all of the EIS alternatives.

Main Post and Crissy Field

These Planning Districts are served by outfall pipes D through L. System D has a 72-inch outfall pipe with sufficient capacity to accommodate additional flows from any of the alternatives. Systems E and F are expected to accommodate any increase in stormwater flows due to the recent construction of Crissy Field outfalls. Stormwater systems G-H, and I-J-K-L are designed for the 50-year event, and can therefore accommodate the additional flows.

Letterman

The Letterman Planning District is served by outfall B-4. As stated in Section 3.6.3 (Affected Environment), outfall B-4 is a 42-inch pipeline with a capacity of 85 cfs, which is sufficient to accommodate the additional flow from the alternatives. Additionally, the discharge location for this outfall is planned to be rerouted to Crissy Marsh with use of an oil/water separator to prevent blockage due to sand accumulation. The Letterman Planning District consists of approximately 90 percent impervious area, and the existing storm drain system is adequate to accommodate all flows from the 10-year event. Even if the impervious area were increased to 100 percent impervious, the drainage system would still accommodate the 10-year event.

Fort Scott

As discussed in Section 3.6.3 (Affected Environment), the main outfall serving the Fort Scott District currently experiences flooding during intense storm events if the mouth of the outfall is not regularly maintained. This operational problem would continue under all of the alternatives. Proposals to address this problem and reduce the need for constant maintenance are currently being evaluated.

East Housing

Outfall D (72-inch pipe with 350 cfs capacity) is large enough to accommodate additional flows. The Tennessee Hollow Restoration Project (planning is currently underway) is expected to reduce the amount of impervious surface in this area, and therefore, will further limit stormwater flows.

South Hills and Public Health Service Hospital

As stated in Section 3.6.3 (Affected Environment), these planning districts do not currently experience flooding problems and the net reduction in built area proposed under all alternatives would further reduce storm flows in these areas

POTENTIAL IMPACTS

INCREASED DEMAND FOR STORMWATER DRAINAGE

No Action Alternative (GMPA 2000)

As seen in Table 53, Fort Scott is the only planning that would experience an increase in stormwater flow under the No Action Alternative (GMPA 2000). The projected increase has the potential to exacerbate the current operation problem of the outfall. Implementation of mitigation measures proposed at

Table 53: General Estimates for Stormwater Runoff, By Planning Area

	New Construction (sf)	Demolition (sf)	Net New Construction (sf)	Net New Construction (acres)	Q (cfs)	Change from No Action (GMPA 2000) (cfs)
No Action (GMPA 2000)						
Main Post/Crissy	100,000	270,000	-170,000	-3.9	**-2.8**	N/A
Letterman	0	0	0	0.0	**0.0**	N/A
Fort Scott	50,000	0	50,000	1.1	**0.6**	N/A
East Housing	0	100,000	-100,000	-2.3	**-0.6**	N/A
South Hills/PHSH	20,000	750,000	-730,000	-16.8	**-5.0**	N/A
Total					**-7.8**	N/A
Final Plan						
Main Post/Crissy	180,000	60,000	120,000	2.8	**2.0**	4.9
Letterman	160,000	30,000	130,000	3.0	**2.3**	2.3
Fort Scott	170,000	70,000	100,000	2.3	**1.3**	0.7
East Housing	70,000	100,000	-30,000	-0.7	**-0.2**	0.4
South Hills/PHSH	130,000	810,000	-680,000	-15.6	**-4.6**	0.4
Total					**0.8**	8.7
Final Plan Variant						
Main Post/Crissy	0	290,000	-290,000	-6.7	**-4.8**	-2.0
Letterman	0	40,000	-40,000	-0.9	**-0.7**	-0.7
Fort Scott	0	10,000	-10,000	-0.2	**-0.1**	-0.7
East Housing	0	100,000	-100,000	-2.3	**-0.6**	0.0
South Hills/PHSH	0	810,000	-810,000	-18.6	**-5.5**	-0.5
Total					**-11.1**	-3.9
Resource Consolidation						
Main Post/Crissy	480,000	320,000	160,000	3.7	**2.7**	5.5
Letterman	470,000	80,000	390,000	8.9	**6.8**	6.8
Fort Scott	150,000	80,000	70,000	1.6	**0.9**	0.3
East Housing	150,000	160,000	-10,000	-0.2	**-0.1**	0.4
South Hills/PHSH	0	1,270,000	-1,270,000	-29.1	**-8.7**	-3.6
Total					**1.6**	9.4
Sustainable Community						
Main Post/Crissy	410,000	110,000	300,000	6.9	**5.1**	7.8
Letterman	0	20,000	-20,000	-0.4	**-0.5**	-0.4
Fort Scott	0	30,000	-30,000	-0.7	**-0.4**	-1.0
East Housing	190,000	100,000	90,000	2.0	**0.5**	1.1
South Hills/PHSH	20,000	630,000	-610,000	-14.0	**-4.2**	0.8
Total					**0.6**	8.3
Cultural Destination						

Table 53: General Estimates for Stormwater Runoff, By Planning Area

	New Construction (sf)	Demolition (sf)	Net New Construction (sf)	Net New Construction (acres)	Q (cfs)	Change from No Action (GMPA 2000) (cfs)
Main Post/Crissy	530,000	100,000	430,000	9.9	**7.2**	10.0
Letterman	410,000	70,000	340,000	7.8	**6.0**	6.0
Fort Scott	200,00	80,000	120,000	2.7	**1.5**	0.9
East Housing	100,000	130,000	-30,000	-0.7	**-0.2**	0.4
South Hills/PHSH	130,000	990,000	-860,000	-19.7	**-5.8**	-0.8
Total					**8.7**	16.5
Minimum Management						
Main Post/Crissy	0	0	0	0.0	**0.0**	2.8
Letterman	0	0	0	0.0	**0.0**	0.0
Fort Scott	0	0	0	0.0	**0.0**	-0.6
East Housing	0	0	0	0.0	**0.0**	0.6
South Hills/PHSH	0	0	0	0.0	**0.0**	5.0
Total					**0.0**	7.8

Source: EIP; Presidio Trust; Bay Area Economics, 2002.

Notes:

Assumes a 10-year storm event of 1-hour duration, rainfall of 0.85 inches an hour, and the following runoff coefficients:

Planning District	Runoff Coefficient
Main Post/Crissy	0.85
Letterman	0.90
Fort Scott	0.65
East Housing	0.30
South Hills/PHSH	0.35

Runoff coefficients derived from conversations with Trust Utility staff and the 1994 Presidio Stormwater Management Plan.

the end of this section, would require a detailed analysis of system capacity and operation deficiencies and subsequent infrastructure improvements prior to the implementation of new construction. The Trust would also require that future site-specific planning activities incorporate design actions to minimize stormwater runoff and improve overall stormwater quality (refer to mitigation measures at the end of this section for additional detail).

In addition to these mitigation measures, the Trust will be required to obtain a National Pollution Discharge Elimination System (NPDES) phase II permit. As described in the Affected Environment Section (Section 3.6.3), the Presidio Trust is in the process of finalizing, in cooperation with the NPS, an interim Stormwater Pollution Prevention Plan (SPPP). The SPPP will identify Best Management Practices (BMPs) as well as the sampling design and protocol, threshold requirements for constituents monitored, and a reporting mechanism which will be used to monitor and ensure that the BMPs being implemented are effectively meeting stormwater quality requirements. This interim SPPP will adhere to the general guidelines for stormwater management as established under the NPDES and will remain in effect until the Trust obtains the required NPDES phase II permit. The BMPs identified in the SPPP will be consistent with the California Stormwater Best Management Practices Handbook, including the use of oil-water separators (several are already in use at Crissy Field), street sweeping, and other actions to improve stormwater quality at the park.

Final Plan Alternative

As shown in Table 53, the Final Plan Alternative is projected to increase stormwater flow in the Main Post, Crissy Field, Letterman, and Fort Scott Planning Districts and a decrease the East Housing and South Hills Planning Districts. The additional flow in the Main Post, Crissy Field, and Letterman Planning Districts would be negligible, given the large capacity of these drainage systems. As in the No Action Alternative (GMPA 2000), Fort Scott's existing drainage system requires upgrades to address existing capacity deficiencies as well as any changes in projected future flows. Overall, this alternative would generate approximately 8.7 cfs more stormwater runoff than the No Action Alternative (GMPA 2000), however, there would be a net reduction in total parkwide stormwater runoff when compared to existing conditions (based on the overall reduction in built space at the Presidio). Similar the to the No Action Alternative (GMPA 2000), the Trust would require site-specific evaluation of system capacity and infrastructure repairs prior to new construction. The Trust would also ensure that future planning incorporate actions to minimize stormwater runoff and improve water quality (i.e., use of on-site vegetation and landscaping as a filtration and retention systems, etc.). BMPs and other provisions required as part of the interim SPPP and subsequent NPDES phase II permit would be implemented to improve stormwater quality, minimize runoff and monitor the effectiveness of these actions. Implementation of the proposed mitigation and NPDES requirements would minimize the impacts of increased flows from this alternative and improve stormwater quality.

Final Plan Variant

As shown in Table 53, the Final Plan Variant is projected to decrease stormwater flow in all planning districts when compared to the No Action Alternative (GMPA 2000). Overall, there would be approximately 3.9 cfs less stormwater runoff than the No Action Alternative (GMPA 2000). The Final Plan Variant would also result in a net reduction in stormwater flows when compared to existing conditions (based on the overall reduction in built space at the park). While this alternative decreases stormwater flow and mitigation would not be required, the Trust would implement BMPs and other provisions required as part of the interim SPPP and subsequent NPDES phase II permit to improve stormwater quality and further reduce runoff.

Resource Consolidation Alternative

As shown in Table 53, the Resource Consolidation Alternative is projected to increase stormwater flow in the Main Post, Crissy Field, Letterman, and Fort Scott Planning Districts and an overall reduction of in the East Housing, South Hills and PHSH Planning Districts. The additional flow in the Main Post, Crissy Field, and Letterman Planning Districts would be negligible, given the large capacity of these drainage systems. As in the No Action Alternative (GMPA 2000), Fort Scott's existing drainage system requires upgrades to accommodate existing and projected flows. Overall, impacts under this alternative would generate approximately 9.4 cfs more stormwater runoff than

the No Action Alternative (GMPA 2000), however, there would be a net reduction when compared to existing conditions (based on the overall reduction in built space at the Presidio). Similar the to the No Action Alternative (GMPA 2000), the Trust would implement mitigation measures to ensure that necessary infrastructure repairs and upgrades are implemented prior to new construction, and that future planning incorporate site-specific actions to reduce stormwater runoff and improve water quality. In addition, BMPs and other provisions required as part of the interim SPPP and subsequent NPDES phase II permit would be implemented to improve stormwater quality. Implementation of the proposed mitigation and NPDES permit requirements would minimize the impact of increased flows from this alternative and improve stormwater quality.

Sustainable Community Alternative

As shown in Table 53, the Sustainable Community Alternative is projected to increase stormwater flow in the Main Post, Crissy Field, and East Housing Planning Districts and an overall reduction in the Letterman, Fort Scott, South Hills, and PHSH Planning Districts. The additional flows in the Main Post, Crissy Field, and East Housing Planning Districts would be negligible, given the large capacity of these drainage systems. Overall, this alternative would generate approximately 8.3 cfs more stormwater runoff than the No Action Alternative (GMPA 2000) and would have a net reduction in total runoff when compared to existing conditions (based on the overall reduction in built space). The main outfall serving the Fort Scott Planning District would require improvements even with no increase in flow. Similar the to the No Action Alternative (GMPA 2000), the mitigation measures presented at the end of this section would be implemented to ensure that necessary infrastructure repairs and upgrades are implemented prior to new construction and that future planning incorporate actions to minimize runoff and improve water quality. In addition, BMPs and other provisions required as part of the interim SPPP and subsequent NPDES phase II permit would be implemented to improve stormwater quality. Implementation of the proposed mitigation and NPDES permit requirements would minimize the impacts of increased flows from this alternative, and improve overall stormwater quality.

Cultural Destination Alternative

As shown in Table 53 the Cultural Destination Alternative would increase stormwater flow in the Main Post, Crissy Field, Letterman and Fort Scott Planning Districts and would reduce flows in the East Housing, South Hills, and PHSH Planning Districts. The Letterman system could accommodate the increased flows, given the large capacity of its drainage system. As in the No Action Alternative (GMPA 2000), Fort Scott's existing drainage system requires upgrades to accommodate existing and projected flows. Overall, this alternative would generate approximately 16.5 cfs more stormwater runoff than the No Action Alternative (GMPA 2000). Similar the to the No Action Alternative (GMPA 2000), the mitigation measures presented at the end of this section would be implemented to ensure that necessary infrastructure repairs and upgrades are implemented prior to new construction and that future planning incorporate actions to minimize runoff and improve water quality. In addition, BMPs and other provisions required as part of the interim SPPP and subsequent NPDES phase II permit would be implemented to improve stormwater quality. Implementation of the proposed mitigation and NPDES permit requirements would minimize the impacts of increased flows from this alternative, and improve overall stormwater quality.

Minimum Management Alternative

As no new construction is planned under the Minimum Management Alternative, no increase in stormwater flow is projected. However, since the baseline for comparison is the No Action Alternative (GMPA 2000) which would generate a net decrease in stormwater flows, this beneficial effect would not be realized under this alternative. In comparison to the No Action Alternative (GMPA 2000), this alternative would generates approximately 7.8 cfs more stormwater flows (See Table 53). Under this alternative, the main outfall serving the Fort Scott Planning Area would require improvements to accommodate current flows. Similar the to the No Action Alternative (GMPA 2000), BMPs and other provisions required as part of the interim SPPP and subsequent NPDES phase II permit would be implemented to improve stormwater quality. .

MITIGATION MEASURES

Measures Adapted from the GMPA EIS

The GMPA EIS did not include mitigation for storm drainage.

New Mitigation

The following mitigation measures would apply to all alternatives except the Minimum Management Alternative.

UT-6 *Stormwater Drainage System Upgrades.* Prior to any new construction, the Trust would require that necessary infrastructure upgrades to the stormwater drainage system are performed on a site-specific basis to ensure that the adequate system capacity is provided and also to correct existing operational problems.

UT-7 *Stormwater Reduction.* As part of planning for future projects under the PTMP, the Trust would implement designs or measures to limit or eliminate impervious surfaces in order to reduce stormwater runoff volumes and improve water quality. The Trust would practice natural stormwater reduction by using on-site vegetation and landscaping as a filtration and retention system to the extent feasible. Grass, sand, and other porous surfaces, particularly when placed around non-porous surfaces such as asphalt, could significantly limit stormwater runoff. Projects would be reviewed to determine if stormwater flows could be limited through reduction of impervious surfaces and addition of porous surfaces. [See Section 4.3.2 (Water Resources) for additional mitigation measures related to stormwater quality.]

4.6.4 SOLID WASTE

METHODOLOGY

For each PTMP alternative, the estimated amount of solid waste that would be generated over the 20-year planning horizon is provided. Please refer to Appendix I for additional background including information on the regional waste stream (for the nine counties in the San Francisco Bay Area). The estimates for solid waste generated under each alternative is compared to the waste generated under the No Action Alternative (GMPA 2000) as well as the regional waste stream

POTENTIAL IMPACTS

INCREASED SOLID WASTE GENERATION

No Action Alternative (GMPA 2000)

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the No Action Alternative (GMPA 2000) would result in the disposal of up to 113,991 tons of debris, constituting 0.08 percent annually of the regional solid waste stream over the next twenty years (see Table 54). The Trust would reduce waste through efficient resource use, recycling and reuse, and by diverting organic material from waste and purchasing products composed of recycled materials. A solid waste management program would be implemented. Recycled asphalt and concrete would be used for paving where practical. Recycling bins would be available at all activity sites, and tenants would be encouraged to set aside indoor recycling areas. Mitigation measures would help minimize the solid waste generated by construction activities under this alternative. In addition, the Presidio Salvage Program would reclaim valuable equipment, supplies and materials and divert them from the waste stream. Building materials would be saved from deconstruction and selective demolition projects. These would be reused on the Presidio, and made into new products or art. Wood from downed trees would be used for value-added purposes such as construction projects or mulch, or would be sent off site to be used as fuel.

Final Plan Alternative

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the Final Plan Alternative would result in the disposal of up to 109,276 tons of debris (see Table 54). The waste would be generated primarily from the deconstruction/ demolition of the 1.1 million square feet, new construction of 710,000 square feet and rehabilitation of 4.9 million square feet of building space (see Table 54).

Table 54: Estimated Solid Waste Impacts

	Estimated Total Debris (tons) (a)	Change from No Action (tons)	Estimated Annual Project Impact (tons) (b)	Estimated Percent of Total 1999 Tonnage (c)
No Action (GMPA 2000)	113,991	N/A	5,700	0.08
Final Plan	109,276	(4,715)	5,464	0.08
Final Plan Variant	125,962	11,971	6,298	0.09
Resource Consolidation	162,812	48,821	8,141	0.12
Sustainable Community	98,792	(15,199)	4,940	0.07
Cultural Destination	126,904	12,913	6,345	0.09
Minimum Management	50,209	(63,782)	2,510	0.04

Sources: California Integrated Waste Management Board; Bay Area Economics, 2002.

Notes:

(a) See Solid Waste Estimates by PTMP Alternative (Table 3) in Appendix I.
(b) Assumes a 20-year buildout.
(c) Total 1999 Bay Area Solid Waste Tonnage: 6,851,632 (from Appendix I Table 1). This percentage is derived from the Annual Project impact divided by the total 1999 Bay Area Solid Waste Tonnage.

The Final Plan Alternative would generate up to 4,715 tons less waste than the No Action Alternative (GMPA 2000), and would result in an annual reduction of 9 tons of debris. Overall, this tonnage represents approximately 0.08 percent of the estimated annual regional waste stream. Mitigation for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Final Plan Variant

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the Final Plan Variant would result in the disposal of up to 125,962 tons of debris. The Final Plan Variant would generate up to 11,971 tons more waste than the No Action Alternative (GMPA 2000), and would result in the disposal of an additional 527 tons of annual debris. This tonnage represents approximately 0.09 percent of the estimated annual regional waste stream (see Table 54). Mitigation for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Resource Consolidation Alternative

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the Resource Consolidation Alternative would result in the disposal of up to 162,812 tons of debris – the most of any of the alternatives. The Resource Consolidation Alternative would generate up to 48,821 tons more waste than the No Action Alternative (GMPA 2000), and would result in the disposal of an additional 2,369 tons of annual debris. Overall, this tonnage represents approximately 0.12 percent of the estimated annual regional waste stream (see Table 54). Mitigation for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Sustainable Community Alternative

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the Sustainable Community Alternative would result in the disposal of up to 98,792 tons of debris. The Sustainable Community Alternative would generate up to 15,199 tons less waste than the No Action Alternative (GMPA 2000), and would result in the reduction of solid waste by 832 tons annually. Overall, this tonnage represents approximately 0.07 percent of the estimated annual regional waste stream (see Table 54). Mitigation for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Cultural Destination Alternative

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the Cultural Destination Alternative would result in the disposal of up to 126,904 tons of debris. This alternative would generate up to 12,913 tons more waste than the No Action Alternative (GMPA 2000),and would result in the disposal of an additional 574 tons of annual debris. Overall, this tonnage represents approximately 0.09 percent of the estimated annual regional waste stream (see Table 54). Mitigation for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Minimum Management Alternative

Demolition, construction, and rehabilitation activities at the Presidio under build-out of the Minimum Management Alternative would include the disposal of up to 50,209 tons of debris. The Minimum Management Alternative would generate up to 63,782 tons less waste than the No Action Alternative (GMPA 2000), and would result in the reduction of solid waste by 3,261 tons annually. Overall, this tonnage represents approximately 0.04 percent of the estimated annual regional waste stream (Table 54). Mitigation for this alternative would be the same for the No Action Alternative (GMPA 2000).

MITIGATION MEASURES

Measures Adapted from the GMPA EIS

The GMPA EIS did not include any mitigation for solid waste.

New Mitigation

The following mitigation would apply to all alternatives.

UT-8 *Waste Diversion.* To the extent possible, the Trust would implement cost-effective, environmentally protective alternatives to disposal of

demolition debris to help meet the mandates of the State's 1989 waste diversion law (requiring cities and counties to divert 50 percent of their waste streams from landfills by the year 2000) including the following:

- Selection of contractors who understand the processes involved and are able to maximize reuse and recycling of construction and demolition materials;
- Clearing salvageable items from structures prior to demolition activities, including such items as piping, flooring, doors, windows, bathroom fixtures and kitchen fixtures, hospital equipment, heaters, and lumber;
- Removing and encapsulating contamination before demolition to minimize commingling of the wastes and to maximize reuse of the uncontaminated materials;
- Bringing down buildings piece by piece, as in hand demolition, to recover the maximum amount of reusable materials;
- Size-reducing (especially concrete) and presorting and segregating materials after demolition to increase salvage value of the recovered materials, and to decrease tipping fees for different materials in the debris;
- Recycling materials on-site to lower both hauling and disposal costs; and

Storing recovered materials within the Presidio to avoid flooding a market with too much recyclable materials at one time (which drives local prices down and reduces potential income from the sale of materials).

4.6.5 ENERGY CONSUMPTION AND DISTRIBUTION

Presidio Electrical Supply

METHODOLOGY

The proposed square footage for each land use is used to project the electrical use and demand generated under the various alternatives. Energy and demand factors are derived from Pacific Gas & Electric (PG&E) load study data and RS Means electrical demand data respectively. A coincidence factor of 25 percent and a system loss factor of 10 percent are assumed. Electrical projections for each alternative are contained in Tables 1 through 7 in Energy Appendix J and summarized on Table 55.

The projected electrical demand under each alternative is compared to the capacity of the existing on- and off-site electrical distribution system to determine if system upgrades are necessary. On-site demand must be served by transformers at the Main Post and Greenwich substations. Total demand must not exceed the total on-site transformer capacity of 13,275 kilowatts (kW). Individual transformers must also have the capacity to meet the demand from the buildings they serve. In terms of off-site requirements, PG&E's feeders entering into the Presidio currently have approximately 2,700 kW of spare capacity.[1] The Trust reports that existing current demand is 3,876 kW. Any alternative whose electrical demand exceeds the sum of spare capacity and existing demand (i.e. 6,576 kW) would, therefore, require off-site upgrades by PG&E.

POTENTIAL IMPACTS

DEMAND FOR ELECTRICITY

No Action Alternative (GMPA 2000)

Under the No Action Alternative (GMPA 2000), up to 47.80 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 9.54 kilowatt-hours (kWh) per square foot (see Table 55). The projected maximum demand under this alternative is 6,456 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 5,061 kW. The remaining maximum demand would not exceed PG&E's 6,576 kW feeder capacity to on-site substations. Total on-site transformer capacity would not be exceeded by this projected demand, although a more detailed analysis could indicate that older style transformers at a given

1 Per meeting between PG&E and the Trust, June 12, 2000.

Table 55: Electrical Use Projection Summary

Alternative	Total Area (million gsf) (a)	Projected Energy Use (million kWh/yr)	Electricity Index (kWh/sf)	Difference from No Action (GMPA 2000) (million kWh/yr)	% Difference from No Action (GMPA 2000)	Projected Max Demand (kW)	PG&E Feeder Capacity (kW) (b)	Remaining Capacity (kW)
No Action (GMPA 2000)	5.01	47.80	9.54	N/A	N/A	6,456	6.576	120
Final Plan	5.60	50.24	8.97	2.44	5.1%	7,646	6.576	(1,070)
Final Plan Variant	4.74	45.13	9.52	(2.67)	(5.6%)	6,565	6,576	11
Resource Consolidation	5.30	54.72	10.30	6.92	14.5%	7,412	6.576	(836)
Sustainable Community	5.69	53.50	9.40	5.70	11.9%	7,871	6.576	(1,296)
Cultural Destination	5.96	56.02	9.40	8.20	17.2%	8,194	6.576	(1,618)
Minimum Management	5.96	54.15	9.08	6.35	13.3%	7,865	6.576	(1,289)

Source: Henwood Energy; Presidio Trust; PG&E; Bay Area Economics, 2001.

Notes:

(a) Per meeting between the Presidio Trust and PG & E on 6/12/2000, regarding remaining capacity on feeders to the Presidio.
(b) Table includes 900,000 SF of office space for LDAC project that will be served directly through PG&E.

substation may lack capacity. Mitigation measures would ensure that adequate electrical capacity exists by providing for upgrades to the Presidio's electrical system. Furthermore, under this alternative, the Trust would maximize energy efficiency, monitor and control use, generate energy using efficient and clean technologies and purchase "green" power as needed.

Final Plan Alternative

Under the Final Plan Alternative, up to 50.24 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 8.97 kWh per square foot (see Table 55). This level of consumption is 5.1 percent greater than under the No Action Alternative (GMPA 2000). The projected maximum demand under this alternative is 7,646 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 6,251 kW. The remaining maximum demand would not exceed PG&E's 6,576 kW feeder capacity to on-site substations. Total on-site transformer capacity would not be exceeded by this projected demand, although a more detailed analysis could indicate that older style transformers at a given substation may lack capacity. Mitigation measures for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Final Plan Variant

Under the Final Plan Variant up to 45.13 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 9.52 kWh per square foot (see Table 55). This level of consumption is 5.6 percent less than under the No Action Alternative (GMPA 2000). The projected maximum demand under this alternative is 6,565 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 5,170 kW. The remaining maximum demand would not exceed PG &E's 6,576 kW feeder capacity to on-site substations. Total on-site transformer capacity would not be exceeded by this projected demand, although a more detailed analysis could indicate that older style transformers at a given substation may lack capacity. Mitigation measures for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Resource Consolidation Alternative

Under the Resource Consolidation Alternative, up to 54.72 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 10.30 kWh per square foot (see Table 55). This level of consumption is 14.5 percent greater than under the No Action Alternative (GMPA 2000). The projected maximum demand under this alternative is 7,412 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 6,017 kW. The remaining maximum demand not would exceed PG&E's 6,576 kW feeder capacity to on-site substations. Total on-site transformer capacity would not be exceeded by this projected demand, although a more detailed analysis could indicate that older style transformers at a given substation may lack capacity. Mitigation measures for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Sustainable Community Alternative

Under the Sustainable Community Alternative, up to 53.50 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 9.40 kWh per square foot (see Table 55). This level of consumption is 11.9 percent greater than under the No Action Alternative (GMPA 2000). The projected maximum demand under this alternative is 7,871 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 6,476 kW. The remaining maximum demand would not exceed PG&E's 6,576 kW feeder capacity to on-site substations. Total on-site transformer capacity would not be exceeded by this projected demand, though a more detailed analysis could indicate that older style transformers at a given substation may lack capacity. Mitigation measures for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Cultural Destination Alternative

Under the Cultural Destination Alternative, up to 56.02 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 9.40 kWh per square foot (see Table 55). This level of consumption is 17.2 percent greater than under the No Action Alternative (GMPA 2000). The projected maximum demand under this alternative is 8,194 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 6,799 kW. The remaining maximum demand is slightly greater than the capacity of PG&E's feeder capacity (6,576 kW) to on-site substations and may require off-site improvements. Total on-site transformer capacity would not be exceeded by this projected demand, although a more detailed analysis could indicate that older style transformers at a given substation may lack capacity. Mitigation measures for this alternative would be the same as for the No Action Alternative (GMPA 2000).

Minimum Management Alternative

Under the Minimum Management Alternative, up to 54.15 million kilowatt-hours of electricity are projected to be consumed at the Presidio annually, with an average energy consumption index of 9.08 kWh per square foot (see Table 55). This level of consumption is 13.3 percent greater than under the No Action Alternative (GMPA 2000). The projected maximum demand under this alternative is 7,865 kW. Since the release of the Draft EIS, the LDAC project has elected to receive electrical service directly through PG&E. Excluding the LDAC demand, the remaining maximum demand under this alternative is 6,470 kW. The remaining maximum demand would not exceed PG&E's 6,576 kW feeder capacity to on-site substations. Total on-site transformer capacity would not be exceeded by this projected demand, although a more detailed analysis could indicate that older style transformers at a given substation may lack capacity. Mitigation measures for this alternative would be the same as for the No Action Alternative (GMPA 2000).

MITIGATION MEASURES

Measures Adapted from the GMPA EIS

The GMPA EIS did not include mitigation for electrical use and infrastructure.

New Mitigation

The following measures would apply to all of the alternatives.

UT-9 *Improve Existing Onsite Electrical Infrastructure.* The Trust would address on-site infrastructure capacity through utility planning, and re-wiring or replacement of existing on-site transformers to re-distribute power to high demand areas.

UT-10 *Upgrade Off-site Electrical Facilities* If required the Trust would work with PG&E to identify the necessary upgrades to off-site feeders.

UT-11 *Environmental Building Design.* Whenever possible, the Trust would incorporate the site's environmental conditions in building design solution, maximizing solar energy and utilizing natural light.

Mitigation Measure UT-13, in Energy Conservation, would also apply to this area.

Presidio Natural Gas Supply

METHODOLOGY

The natural gas demands of the various alternatives are estimated using current (1999) usage by square foot as a factor for estimating future demand. Demand under each alternative is then compared to peak demand under the military's occupation of the Presidio in 1990 to determine if adequate infrastructure exists to meet projected demand.

If projected demand would be below natural gas demand in 1990 (6.7 million therms), it is assumed that the existing natural gas distribution infrastructure is adequate and significant upgrades are unnecessary.

Natural gas use under each alternative is also compared to consumption under the No Action Alternative (GMPA 2000), the baseline alternative.

POTENTIAL IMPACTS

DEMAND FOR NATURAL GAS

No Action Alternative (GMPA 2000)

Development under the No Action Alternative (GMPA 2000) would generate demand for up to 2.05 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.68 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative (see Table 56). Development under this alternative would adopt the principles of sustainable design and technology, and conservation measures would be practiced to minimize natural gas usage.

Final Plan Alternative

Development under the Final Plan Alternative would generate demand for up to 2.3 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.43 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative. Natural gas usage under this alternative is 0.25 million therms greater, or 12 percent more than would be consumed under the No Action Alternative (GMPA 2000) (see Table 56). Development under this alternative would adopt the principles of sustainable design and technology, and conservation measures would be practiced to minimize natural gas usage.

Final Plan Variant

Development under the Final Plan Variant would generate demand for up to 1.94 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.79 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative. Natural gas usage under this alternative is 0.11 million therms below, or 5 percent less than would be consumed under the No Action Alternative (GMPA 2000) (see Table 56). Development under this alternative would adopt the principles of sustainable design and technology, and conservation measures would be practiced to minimize natural gas usage.

Resource Consolidation Alternative

Development under the Resource Consolidation Alternative would generate demand for up to 2.17 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.56 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative. Natural gas usage under this alternative is 0.12 million therms greater, or 6 percent more than would be consumed under the No Action Alternative (GMPA 2000) (see Table 56). Development under this alternative would adopt the principles of sustainable design and technology, and conservation measures would be practiced to minimize natural gas usage.

Sustainable Community Alternative

Development under the Sustainable Community Alternative would generate demand for up to 2.33 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.4 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative. Natural gas usage under this alternative is 0.28 million therms greater, or 14 percent more than would be consumed under the No Action Alternative (GMPA 2000) (see Table 56). Development under this alternative would adopt the principles of sustainable design and technology, and conservation measures would be practiced to minimize natural gas usage.

Table 56: Natural Gas Use Projection (a)

Year	Occupied Area (a) (million sf)	Gas Usage (million therms)	Gas Index (million therms/sf)
1990	6.66	6.73	1.01
1999	2.89	1.18	0.41

	Occupied Area (million sf)	Gas Usage (b) (million therms)	Change from 1990 Usage (million therms)	Difference from No Action (GMPA 2000) (million therms)	% Difference from GMPA 2000
No Action (GMPA 2000)	5.01	2.05	(4.68)	N/A	N/A
Final Plan	5.60	2.30	(4.43)	0.25	12%
Final Plan Variant	4.74	1.94	(4.79)	(0.11)	(5%)
Resource Consolidation	5.30	2.17	(4.56)	0.12	6%
Sustainable Community	5.69	2.33	(4.40)	0.28	14%
Cultural Destination	5.96	2.44	(4.29)	0.39	19%
Minimum Management	5.96	2.44	(4.29)	0.39	19%

Sources: The Presidio Trust; Bay Area Economics, 2001.

Notes:

(a) Occupied Area data from Presidio Trust.
(b) 1999 Gas Index applied to proposed square footages to project gas usage.

Cultural Destination Alternative

Development under the Cultural Destination Alternative would generate demand for up to 2.44 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.29 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative. Natural gas usage under this alternative is 0.39 million therms greater, or 19 percent more than would be consumed under the No Action Alternative (GMPA 2000) (see Table 56). Development under this alternative would adopt the principles of sustainable design and technology, and conservation measures would be practiced to minimize natural gas usage.

Minimum Management Alternative

Development under the Minimum Management Alternative would generate demand for up to 2.44 million therms of natural gas annually, with an index of 0.41 therms/square foot. This projected demand is 4.29 million therms below the Presidio's natural gas usage in 1990, demonstrating that the Presidio's natural gas distribution system has adequate capacity to meet demand under this alternative. Natural gas usage under this alternative is 0.39 therms greater, or 19 percent more than would be consumed under the No Action Alternative (GMPA 2000) (see Table 56).

MITIGATION MEASURES

Measures Adapted from the GMPA EIS

No mitigation for natural gas was identified in the GMPA EIS.

New Mitigation

Mitigation measures listed under Energy Conservation would apply to this area. Specifically, these include UT-12 and UT-13.

Presidio Energy Conservation

METHODOLOGY

As discussed in the Affected Environment section, development activities at the Presidio must adhere to Executive Order 13123, which mandates that energy use at the Presidio must be reduced by 35 percent below 1985 levels by 2010. This analysis examines energy use at build-out (projected in 2020), rather than in 2010, assuming that energy usage at the Presidio will increase as development nears completion. Therefore, if energy usage under an alternative complies with Executive Order 13123 at build-out, it can be inferred that the alternative will also be in compliance in 2010.

Since 1985 energy usage data is unavailable, 1990 data is used as a proxy. Energy consumption at the Presidio decreased between 1985 and 1990, making 1990 a more conservative baseline for comparison. In 1990, 869,231 million British Thermal Units (BTUs) of energy were consumed at the Presidio, serving 6.664 million sf of buildings with an annual energy index of 130,437 BTU per square foot (see Table 57).

POTENTIAL IMPACTS

No Action Alternative (GMPA 2000)

Total energy usage under the No Action Alternative (GMPA 2000) is projected to reach up to 368,563 million BTU (MMBTU) annually, or 73,566 BTU per square foot. This energy consumption level represents a 44 percent reduction from 1990 levels (see Table 57). This level of reduction meets Executive Order 13123 mandates. Mitigation measures would further reduce energy consumption at the Presidio under this alternative.

Table 57: Energy Conservation - Executive Order 13123 Compliance (a)

	Total Area (sf)	Total Electricity (kWh/yr)	Total Gas (therms)	Total Energy (MMBTU)	Energy Index (BTU/sf)	% Reduction from 1990 (a)	Difference from No Action (GMPA 2000) (BTU/sf)	% Difference from GMPA 2000
No Action (GMPA 2000)	5,009,954	47,803,845	2,054,081	368,563	73,566	-44%	N/A	N/A
Final Plan	5,595,026	50,243,365	2,293,961	400,877	71,649	-45%	(1,917)	-2.6%
Final Plan Variant	4,735,183	45,125,952	1,941,425	348,157	73,526	-44%	(40)	N/A
Resource Consolidation	5,295,601	54,719,297	2,171,196	403,877	76,266	-42%	2,700	3.6%
Sustainable Community	5,686,756	53,504,405	2,331,570	415,768	73,112	-44%	(454)	-0.6%
Cultural Destination	5,962,044	56,020,163	2,444,438	435,641	73,069	-44%	(497)	-0.6%
Minimum Management	5,962,032	54,962,032	2,444,438	429,272	72,001	-45%	(1,565)	-2.1%

Source: Presidio Trust; Bay Area Economics, 2001.

Notes:

(a) 1990 Energy Use is 130,437 BTU/sf.

Final Plan Alternative

Total energy usage under the Final Plan Alternative is projected to reach up to 400,877 MMBTU annually, or 71,649 BTU per square foot. This energy consumption level represents a 45 percent reduction from 1990 levels. This level of reduction meets Executive Order 13123 mandates. Total energy usage is projected to be up to 2.6 percent less than usage under the No Action Alternative (GMPA 2000) (see Table 57). Mitigation would further reduce energy consumption.

Final Plan Variant

Total energy usage under the Final Plan Variant is projected to reach up to 348,157 MMBTU, or 73,526 BTU per square foot. This energy consumption level represents a 44 percent reduction from 1990 levels. This level of reduction meets Executive Order 13123 mandates. Total energy usage is projected to be about the same as the usage under the No Action Alternative (GMPA 2000) (see Table 57). Mitigation would further reduce energy consumption.

Resource Consolidation Alternative

Total energy usage under the Resource Consolidation Alternative is projected to reach up to 403,877 MMBTU, or 76,266 BTU per square foot. This energy consumption level represents a 42 percent reduction from 1990 levels. This level of reduction meets Executive Order 13123 mandates. Total energy usage is projected to be up to 3.6 percent greater than usage under the No Action Alternative (GMPA 2000) (see Table 57). Mitigation would further reduce energy consumption.

Sustainable Community Alternative

Total energy usage under the Sustainable Community Alternative is projected to reach up to 415,768 MMBTU, or 73,112 BTU per square foot. This energy consumption level represents a 44 percent reduction from 1990 levels. This level of reduction meets Executive Order 13123 mandates. Total energy usage is projected to be about the same as the usage under the No Action Alternative (GMPA 2000) (see Table 57). Mitigation would further reduce energy consumption.

Cultural Destination Alternative

Total energy usage under the Cultural Destination Alternative is projected to reach up to 435,641 MMBTU, or 73,069 BTU per square foot. This energy consumption level represents a 44 percent reduction from 1990 levels. This level of reduction meets Executive Order 13123 mandates. Total energy usage is projected to be about the same as the usage under the No Action Alternative (GMPA 2000) (see Table 57). Mitigation would further reduce energy consumption.

Minimum Management Alternative

Total energy usage under the Minimum Management Alternative is projected to reach up to 429,272 MMBTU, or 72,001 BTU per square foot. This energy consumption level represents a 45 percent reduction from 1990 levels. This level of reduction meets Executive Order 13123 mandates. Total energy usage is projected to be up to 2.1 percent less than usage under the No Action Alternative (GMPA 2000) (see Table 57). Mitigation would further reduce energy consumption.

MITIGATION MEASURES

The following measures would apply to all alternatives.

Measures Adapted from the GMPA EIS

UT-12 *Energy Conservation.* The Trust would expand the energy conservation public education activities and develop specific measures to minimize building energy use for buildings to be renovated.

New Mitigation

UT-13 *Energy Conservation*. The Trust would employ the following practices to meet the goals of Executive Order 13123 and minimize the environmental impacts of energy consumption throughout the built environment at the Presidio:

- Meet or surpass the energy conservation requirements of California Title 24 energy code during building rehabilitation where these requirements do not conflict with historic preservation objectives;
- Implement cost-effective energy conservation retrofits of buildings and utility infrastructure where these retrofits do not conflict with historical preservation objectives;
- Develop and implement energy education programs for staff, tenants and park visitors;
- Develop energy conservation and efficient energy generation demonstration projects;
- Purchase a portion of Presidio's electric needs from renewable energy sources; and
- Implement energy efficient appliance and computer purchasing programs.