During operation, this alternative would generate roughly 740 tons of waste per year. Solid waste would be reduced by as much as two-thirds through efficient resource use, recycling and reuse, diverting organic material from waste, and purchasing products composed of recycled materials.

Gas System – The PTMP EIS takes into account the natural gas demand of this alternative. Based on the natural gas use projections of the proposed use (by square foot) within the PTMP EIS, this alternative would consume 164 thousand therms of natural gas annually. Existing services are adequately sized for the proposed development at the project site, although some upgrades to the infrastructure may be required. The development would adopt the principles of sustainable design and technology, and conservation measures would be implemented to minimize natural gas usage (PTMP EIS Mitigation Measure UT-13 *Energy Conservation*).

Any improvement in the existing gas services to the site would be the responsibility of PG&E. If required, replacement of older gas lines in the streets in the adjacent neighborhoods with modern new piping (that is more resistant to corrosion and earth movement) would temporarily inconvenience affected residences. PG&E would attempt to keep disruption to a minimum. PG&E representatives would notify property owners prior to construction. Traffic, parking restrictions, and some noise and dust would be the greatest concerns. Construction may take several weeks to complete and may necessitate different heavy equipment and construction techniques to facilitate the work, depending on the location of other underground facilities and soil conditions. Temporary parking restrictions may be imposed in the construction areas, for which "No Parking" signs would be posted in the affected areas at least 72 hours in advance. This would allow work to flow at a productive rate and be completed in a shorter time frame. Steel plates would be used to temporarily cover excavation and trenches. Construction materials such as soil, asphalt, and pipe may be left on streets to eliminate delivery by extra equipment. Jobsites would be secured every night to restore as much normalcy as possible. Interruption of gas services would be minimal, and may require relighting of pilot lights on any affected gas appliance once the gas is restored following installation and testing of pipelines. Streets under repair would be left covered with temporary asphalt during the initial phase of construction, and then permanently paved. Streets and sidewalks would be restored to their pre-existing conditions.

Electrical System – The potential impacts of this alternative on electrical use were analyzed in the PTMP EIS. The estimated square footage for proposed land uses under this alternative was used to project the electrical use and demand. Based on the projections by land use in the PTMP EIS, up to 2.61 million kilowatt-hours (kWh) of electricity would be consumed at the PHSH district annually. PG&E representatives have indicated that current feeds into the PHSH district would be adequate to meet future power loads (personal communication with Lawrence Ng, Senior Project Manager [Rule 20] San Francisco Project Services, and Gordon Duhon, Senior Program Manager, Commercial New Construction Program Customer Energy Management). The Trust's private development partner(s) would work directly with the Trust (or PG&E)[25] to upgrade the electrical system serving the PHSH district for safety and efficiency, including repair and rehabilitation of old cables and, where possible, undergrounding of

[25] While the Trust operates and maintains the electrical distribution system at the Presidio, it is a bundled service customer of PG&E. Therefore, the development team may choose service directly from PG&E.

overhead lines. Replacement of overhead electric facilities with underground lines on 14th and 15th Avenues as part of PG&E's undergrounding program (which would also serve the project) could temporarily inconvenience adjacent residences (see discussion under "Gas System" directly above). Energy conservation practices would be employed within the PHSH district to maximize energy efficiency.

Fire Protection and Emergency Response – Without adequate structural fire protection and suppression, a structural fire within the PHSH district could cause significant damage to property and result in deaths and injuries. Fire prevention, protection, and suppression would be primary considerations in the design, construction, rehabilitation, maintenance, and operation of all PHSH facilities. Prevention priorities would focus on occupied structures and historic resources, with emphasis placed evenly on code compliance, early warning detection, suppression systems, and employee training and awareness. Fire prevention at the district would occur through code-compliant new construction, upgrading of existing structures, and properly installed and maintained detection and suppression systems. The best available technology would be used to detect and provide early warning of fires and to prevent and suppress structural fires. Prior to occupancy, structural fire deficiencies would be addressed and corrected, including removing and replacing the existing fire escapes within Building 1801 with code-compliant exit stairs within the building, and installing automatic wet pipe sprinkler systems. The water supply and delivery system would be designed and maintained to provide sufficient flows to operate fire sprinkler systems and fire hydrants.

Prior to building rehabilitation, construction documents and shop drawings would be submitted, reviewed, and approved by Presidio Fire Department fire inspectors. Construction documents would include all fire prevention requirements for the proposed uses, and the shop drawings would be required to comply with applicable codes and standards. Buildings and structures would be equipped, maintained, and operated in accordance with applicable codes and standards to provide a reasonable level of life safety, public welfare, and property protection from actual and potential hazards created by fire. The preservation of historic buildings would be effectively integrated with fire management through the use of "minimum impact" techniques. Presidio Fire Department fire inspectors would inspect construction in progress and provide life safety inspection of subsequent occupancy and public education to reduce fire loss.

In the event of a structural fire at the PHSH district, effective management of the safe and orderly evacuation of building residents would require an adequate number of Presidio Fire Department responders. The existing first alarm response by the Presidio Fire Department would consist of two engines, two paramedic (ALS) ambulances, one truck company, and one chief officer. This level of response would provide between 10 and 13 firefighters to the scene to initiate search and rescue operations, assist in evacuation, and conduct fire suppression operations. The Presidio Fire Department has indicated that additional equipment and staff located in a temporary or permanent location in the southern portion of the Presidio would be required to meet fire flow and provide an adequate number of personnel to conduct an initial attack operation safely within the NFPA standard. According to the Presidio Fire Department, additional equipment and staff would also be required in a suitable location in the southern portion of the Presidio to ensure the availability of the required four-minute response to

emergency medical calls for service (see PTMP EIS Mitigation Measure CO-12 *Expansion of Public Safety Services* below).

Law Enforcement – The increase in resident and employee population in the PHSH district would potentially increase the number of calls for police service from occupants while reducing calls related to vagrancy and vandalism. As required by PTMP EIS Mitigation Measure CO-12 *Expansion of Public Safety Services*, as calls for police service increase, the USPP would make appropriate increases in staff, equipment, and facilities and scale up its operations as necessary to ensure that law enforcement services remain at adequate levels.

3.9.2.3 Alternative 2: Infill Alternative

Water Supply and Demand – Water demand under this alternative would be less than that taken into account in the PTMP EIS water demand calculations, and therefore projected water supply would be sufficient for expected needs. The alternative would demand approximately 69,000 gpd annually, compared to 10,000 gpd under the Requested No Action Alternative and 71,000 gpd estimated in the PTMP EIS (Alternative 1). Use of CCSF water as an alternative source would reduce the Presidio's dependence on Lobos Creek for water supply.[26] The physical condition and capacity of feeds from both the Presidio and CCSF systems are generally adequate to serve the project; however, some upgrades and new backflow prevention devices, fire laterals, and meters would be required.

The alternative would use water efficiently and responsibly. The water system would be designed to maximally conserve water. Water-efficient devices would be installed in all structures, and efficient methods would be used for outdoor irrigation.

Wastewater Treatment and Disposal – New uses at full occupancy under this alternative would generate 53,000 gpd of wastewater annually. Due to full occupancy, the alternative would generate considerably more than the 9,000 gpd estimated under the Requested No Action Alternative, but 2,000 gpd less than proposed uses under the PTMP (Alternative 1). Existing sewer lines are adequately sized to handle increased flows from development under this alternative. Water conservation practices to minimize water usage within the PHSH district would reduce wastewater generation and flows.

Storm Drainage – Impacts on the storm sewer system under Alternative 2 would be similar to those of Alternative 1. Some infrastructure improvements would be required to minimize storm water runoff and comply with existing water quality standards and regulatory requirements. Designs or measures would be implemented to improve storm water management at Battery Caulfield and limit or eliminate impervious surfaces district-wide in order to reduce storm water runoff volumes and improve water quality.

Solid Waste – Under this alternative, almost all of the existing buildings (no less than 88 percent) would be adaptively reused, which would limit demolition and new construction waste. Demolition of the front connector, two-story rear additions, and (possibly) the two top levels of the non-historic wings of Building 1801, along with replacement construction and rehabilitation of historic buildings, would result

[26] See footnote 24.

in the disposal of up to 6,800 tons of debris. Cost-effective, environmentally protective alternatives to disposal of demolition debris would be implemented to minimize impacts on the regional waste stream. These measures would include developing and implementing a construction and demolition debris management plan with the aim to divert up to 75 to 80 percent of construction waste from landfills.

During operation, this alternative would generate up to 820 tons of solid waste per year. Solid waste would be reduced by as much as two-thirds through efficient resource use, recycling and reuse, diverting organic material from waste, and purchasing products composed of recycled materials.

Gas System – This alternative would consume more natural gas than the Requested No Action Alternative (28 thousand therms) and roughly the same amount as Alternative 1 (164 thousand therms annually). While existing services are adequately sized for the proposed development, some upgrades to the infrastructure may be required, which would temporarily inconvenience nearby residents. The development would adopt the principles of sustainable design and technology, and conservation measures would be implemented to minimize natural gas usage.

Electrical System – This alternative would consume 1.62 million kWh of electricity annually compared to 0.49 million kWh under the Requested No Action Alternative and 2.61 million kWh under the PTMP (Alternative 1). Similar to Alternative 1, the electrical system serving the district would require upgrading for safety and efficiency, including repair and rehabilitation of old cables and, where possible, undergrounding of on- and off-site overhead lines, which would temporarily inconvenience nearby residents. A number of energy conservation practices would be employed within the district to maximize energy efficiency.

Fire Protection and Emergency Response – Similar to Alternative 1, fire prevention under this alternative would occur through code-compliant new construction, upgrading of existing structures, and properly installed and maintained detection and suppression systems. The best available technology would be used to detect and provide early warning of fires and to prevent and suppress structural fires. Prior to occupancy, structural fire deficiencies would be addressed and corrected, including removing and replacing the existing fire escapes within Building 1801 with code-compliant exit stairs within the building, and installing automatic wet pipe sprinkler systems. The water supply and delivery system would be designed and maintained to provide sufficient flows to operate fire sprinkler systems and fire hydrants. For new construction, modification, and rehabilitation, construction documents and shop drawings would be submitted, reviewed, and approved by Presidio Fire Department fire inspectors prior to the start of work. All new and existing buildings and structures would be constructed, arranged, equipped, maintained, and operated in accordance with applicable codes and standards. The Presidio Fire Department fire inspectors would inspect construction in progress and provide life safety inspection of subsequent occupancy. As required by PTMP EIS Mitigation Measure CO-12 *Expansion of Public Safety Services*, firefighting staff, equipment, and/or facilities would be increased to provide the required levels of fire protection and emergency medical response to the PHSH district.

Law Enforcement – Similar to Alternative 1, this alternative would potentially increase the number of calls for police service while reducing the number of calls related to vagrancy and vandalism. The USPP

would make appropriate increases in staff, equipment, and facilities and scale up its operations as necessary to ensure that law enforcement services remain at adequate levels.

3.9.2.4 Alternative 3: No Infill Alternative

Water Supply and Demand – Water demand under this alternative would be 55,000 gpd annually, 16,000 gpd less than that taken into account in the PTMP EIS water demand calculations (Alternative 1), and less than Alternative 2 but more than Alternative 4. Therefore, projected water supply would be sufficient for expected needs. Should CCSF water be used as an alternative source, the Presidio's dependence on Lobos Creek for water supply would be reduced.[27] The physical condition and capacity of the feeds from both the Presidio and CCSF systems are generally adequate to serve the project; however, some upgrades and new backflow prevention devices, fire laterals, and meters would be required.

Water would be used efficiently and responsibly. The water system would be designed to maximally conserve water, water-efficient devices would be installed in all structures, and efficient methods would be used for outdoor irrigation.

Wastewater Treatment and Disposal – New uses at full occupancy under this alternative would generate 40,000 gpd of wastewater annually, or 15,000 gpd less than proposed uses under the PTMP (Alternative 1) and less than Alternative 2 but more than Alternative 4. Existing sewer lines are adequately sized to handle increased flows from development under this alternative. Water conservation practices to minimize water usage within the PHSH district would reduce wastewater generation and flows.

Storm Drainage – Impacts on the storm sewer system under Alternative 3 would be similar to those of Alternative 1. Some infrastructure improvements would be required to minimize storm water runoff and comply with existing water quality standards and regulatory requirements. Designs or measures would be implemented to improve storm water management at Battery Caulfield and limit or eliminate impervious surfaces district-wide in order to reduce storm water runoff volumes and improve water quality.

Solid Waste – Under this alternative, almost all of the existing buildings (no less than 88 percent) would be adaptively reused, and there would be no new construction waste. However, this alternative would generate the most solid waste during construction due to the amount of demolition involved. Demolition of non-historic buildings, including the additions to Building 1801, and rehabilitation of historic buildings would result in the disposal of approximately 12,000 tons of debris. Cost-effective, environmentally protective alternatives to disposal of demolition debris would be implemented to minimize impacts on the regional waste stream, including developing and implementing a construction and demolition debris management plan.

During operation, this alternative would generate roughly 540 tons of solid waste per year. Solid waste would be reduced by as much as two-thirds through efficient resource use, recycling and reuse, diverting organic material from waste, and purchasing products composed of recycled materials.

[27] See footnote 24.

Gas System – This alternative would consume 113 thousand therms of natural gas annually, roughly two-thirds the amount used under Alternative 1 (164 thousand therms) and the same as under Alternative 2 but less than under Alternative 4 (148 thousand therms). Existing services are adequately sized for the proposed development but some upgrades may be required, which would temporarily inconvenience nearby residents. The development would adopt the principles of sustainable design and technology, and conservation measures would be implemented to minimize natural gas usage.

Electrical System – This alternative would consume 1.24 million kWh of electricity annually, less than half the electricity that would be used under Alternative 1 (2.61 million kWh) and less than either Alternatives 2 or 4. Similar to Alternative 1, the electrical system serving the district would require upgrading for safety and efficiency, including repair and rehabilitation of old cables and, where possible, on- and off-site undergrounding of overhead lines, which would temporarily inconvenience nearby residents. Energy conservation practices would be employed within the district to maximize energy efficiency.

Fire Protection and Emergency Response – Similar to Alternative 1, fire prevention under this alternative would occur through code-compliant new construction, upgrading of existing structures, and properly installed and maintained detection and suppression systems. The best available technology would be used to detect and provide early warning of fires and to prevent and suppress structural fires. Prior to occupancy, structural fire deficiencies would be addressed and corrected, including removing and replacing the existing fire escapes within Building 1801 with code-compliant exit stairs within the building, and installing automatic wet pipe sprinkler systems. The water supply and delivery system would be designed and maintained to provide sufficient flows to operate fire sprinkler systems and fire hydrants. As required by PTMP EIS Mitigation Measure CO-12 *Expansion of Public Safety Services*, firefighting staff, equipment, and/or facilities would be increased to provide the required levels of fire protection and emergency medical response to the PHSH district.

Law Enforcement – As with Alternative 1, the increase in resident and employee population at the PHSH district would potentially increase the number of calls for police service from occupants and reduce the calls related to vagrancy and vandalism. USPP law enforcement services would be reviewed and expanded as necessary to ensure that adequate services are maintained.

3.9.2.5 Alternative 4: Battery Caulfield Alternative

This alternative would require extending utility services to Battery Caulfield, probably along Battery Caulfield Road.

Water Supply and Demand – Water demand under this alternative would be 43,000 gpd annually, 28,000 gpd less than that estimated for the PHSH district under the PTMP (Alternative 1) and less than either Alternative 2 or 3. Therefore, projected water supply would be sufficient for expected needs. Should CCSF water be used as an alternative source, the Presidio's dependence on Lobos Creek for water supply would be reduced.[28] The physical condition and capacity of the feeds from the Presidio and CCSF

[28] See footnote 24.

systems are generally adequate to serve the project; however, some upgrades and new backflow prevention devices, fire laterals, and meters would be required, including the installation of new infrastructure to support new construction at Battery Caulfield. While flow and pressure requirements would be sufficient within the PHSH complex, a booster pump may also be needed to meet fire flows within Battery Caulfield.

Water would be used efficiently and responsibly. The water system would be designed to maximally conserve water, water-efficient devices would be installed in all structures, and efficient methods would be used for outdoor irrigation.

Wastewater Treatment and Disposal – New uses at full occupancy under this alternative would generate 30,000 gpd of wastewater annually, or 45 percent less than proposed uses for the PHSH district under the PTMP (Alternative 1). Existing sewer lines are adequately sized to handle increased flows from development under this alternative. Additional infrastructure improvements would be required to support new construction at Battery Caulfield. Water conservation practices to minimize water usage within the district would reduce wastewater generation and flows.

Storm Drainage – Impacts on the storm sewer system under Alternative 4 would be similar to those of Alternative 1. Some infrastructure improvements would be required to minimize storm water runoff and comply with existing water quality standards and regulatory requirements. Designs or measures would be implemented to minimize changes to the local hydrology at Battery Caulfield and limit or eliminate impervious surfaces within the PHSH complex in order to reduce storm water runoff volumes and improve water quality (see also the discussion of hydrology and associated mitigation in Section 3.11.2.5).

Solid Waste – Demolition of the non-historic wings of Building 1801, replacement construction, and rehabilitation of historic buildings would result in the disposal of up to 11,580 tons of debris. Cost-effective, environmentally protective alternatives to disposal of demolition debris would be implemented to minimize impacts on the regional waste stream, including developing and implementing a construction and demolition debris management plan.

During operation, this alternative would generate roughly 405 tons of solid waste per year, of which as much as two-thirds would be diverted from regional landfills.

Gas System – This alternative would consume 148 thousand therms of natural gas annually, approximately 10 percent less than Alternative 1 (164 thousand therms). Existing services are adequately sized for the proposed development but some on- and off-site upgrades may be required, which would temporarily inconvenience nearby residents, including provision of new service lines to support new construction at Battery Caulfield. The development would adopt the principles of sustainable design and technology, and conservation measures would be implemented to minimize natural gas usage.

Electrical System – This alternative would consume 1.47 million kWh of electricity annually compared to 2.61 million kWh under Alternative 1. Similar to Alternative 1, the electrical system serving the PHSH

district would require upgrading for safety and efficiency, including repair and rehabilitation of old cables, installation of new lines at Battery Caulfield and, where possible, on- and off-site undergrounding of overhead lines, which would temporarily inconvenience nearby residents. A number of energy conservation practices would be employed within the district to maximize energy efficiency.

Fire Protection and Emergency Response – Impacts on structural fire protection at the PHSH complex would be similar to those of Alternative 1. However, new construction at Battery Caulfield would require that the loop road be designed and constructed to ensure fire and emergency vehicle access. Following occupancy of the project, reduction of fire loss would be accomplished through an ongoing fire prevention inspection program and public education. However, unlike Alternatives 1, 2, and 3, occupants of senior housing (Building 1801) or assisted living units (Building 1808) under this alternative who may rely upon skilled nursing or continuing care may not be capable of self-rescue in the event of a fire. This would result in an increased need for available Presidio Fire Department responders to assist with occupant evacuation, in addition to initiating search and rescue operations and conducting fire suppression operations. As required by PTMP EIS Mitigation Measure CO-12 *Expansion of Public Safety Services*, firefighting staff, equipment, and/or facilities would be increased to provide additional coverage to the PHSH district as needed. Also, unlike Alternatives 1, 2, and 3, in which the vast majority of building occupants would be ambulatory, this alternative would include an older population and an assisted living component, increasing emergency medical calls for service and placing an increased response load on the existing paramedic (ALS) ambulance staffed at the Presidio. The Presidio Fire Department has indicated that additional equipment and staff would be required in a suitable location in the southern portion of the Presidio to ensure the availability of paramedic (ALS) level care as well as the required four-minute response to emergency medical calls for service.

Law Enforcement – As with Alternative 1, the number of calls for police service from occupants would potentially increase under this alternative while the number of calls related to vagrancy and vandalism would decrease. The USPP would review and expand law enforcement services as necessary to ensure that services remain at adequate levels.

3.9.2.6 Park Presidio Boulevard Access Variant

Storm water control measures would be incorporated into the intersection design. Consideration would be given to avoiding storm water runoff impacts on Mountain Lake.

3.9.2.7 Cumulative Effects

The PTMP EIS analysis of cumulative impacts on utilities and services, including water, wastewater disposal, storm drainage, solid waste, electricity and natural gas, and fire protection and law enforcement took into account the combined demand of Presidio development (including new uses in the PHSH district) and other demands outside the park. The analysis concluded that the combined effect of Presidio and other local development would have a negligible effect on service providers. Many of the Presidio's older infrastructure systems have been subject to significant upgrading and replacement. The Trust has a capital investment program designed to bring these systems up to current standards so that they may serve

new uses. The PTMP lists safety, efficiency, and long-term sustainability as primary goals of upgrading and replacement work.

The Trust would provide utilities for new uses or would require its private development team(s) to secure necessary utilities at their own expense from outside the park. Utilities would be installed within development areas under requirements prescribed by the Trust and/or service providers. Private development team(s) would be charged no less than the full cost for the use of the services.

Presidio development would not contribute substantially to cumulative demands on outside service providers. The Presidio demand for off-site water represents less than ¼ percent of the projected total demand in the CCSF service area (PTMP EIS, page 372). The need for water purchases from the CCSF would be minimized by implementing aggressive water conservation and the use of recycled water. Future wastewater flows from the park to the CCSF sewage treatment system would represent less than ½ percent of the capacity of either of the CCSF plants where these flows are treated, and implementation of the proposed water recycling project would result in a direct reduction in flows that would otherwise go the CCSF system for treatment and disposal (PTMP EIS, page 373). Regional landfills have sufficient capacity to accept Presidio debris, and much of the debris would be diverted from the waste stream. With regard to energy management, Presidio development would occur in a way that uses energy wisely and economically through sustainable practices and design to minimize the park's impact on regional energy demand. The Presidio Fire Department would continue to adjust its operations in order to maintain reasonable levels of fire safety and emergency services consistent with NFPA standards. Similarly, USPP law enforcement services would be expanded as necessary to serve the increased demand for calls. Therefore, Presidio development is expected to have the least possible impact on park or outside service providers' resources, administration, management, or customers.

3.9.3 MITIGATION MEASURES

The following measures are adapted from the PTMP EIS and were adopted as conditions of approval at the end of the PTMP planning and environmental review process. These measures will address the proposed action's contribution to potentially significant impacts on utilities and services in all alternatives.

UT-1 *Demand Management Best Management Practices* – The Trust, in cooperation with all its tenants and residents, will continue to implement best management practices that encourage water conservation. including the following:

- Installing low-flush toilets, low-flow showerheads, and other water-saving devices in all buildings;
- Integrating non-invasive, drought-tolerant, low-maintenance landscaping into the development areas to the extent possible to promote efficient and effective water application;
- Retrofitting landscaped areas with low-flow irrigation devices; and

- Informing tenants and residents of water conservation practices.

UT-4 *Reduction of On-site Wastewater Generation* – The Trust will implement water conservation best management practices described in Mitigation Measure UT-1 to limit water usage at the Presidio, which will reduce wastewater generation as well. The on-site sewer infrastructure will also be rehabilitated (i.e., slip-lined and broken and cracked sections of pipe replaced) as necessary to reduce storm water infiltration into the wastewater system.

UT-6 *Storm Water Drainage System Upgrades* – To maintain adequate system capacity and to correct existing operational problems, the Trust will ensure that necessary upgrades to all storm drain piping that conveys storm water from the site to the CCSF storm water drainage system be performed. All surface water flow will be directed toward the CCSF combined sewer system and not to Mountain Lake or Lobos Creek.

UT-7 *Storm Water Reduction* – The Trust will implement designs or measures to limit or eliminate impervious surfaces in order to reduce storm water runoff volumes and improve water quality. The Trust will practice natural storm water reduction by using on-site vegetation and landscaping as filtration and retention systems to the extent feasible.

UT-8 *Waste Diversion* – Cost-effective, environmentally protective alternatives to disposal of demolition debris will be required, including the following:

- Maximizing reuse and recycling of construction and demolition materials consistent with a construction and demolition debris management plan (see Appendix C, PHSH EA);
- 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 co-mingling of the wastes and to maximize reuse of the uncontaminated materials;
- Bringing down buildings piece by piece to recover the maximum amount of reusable materials; and
- Size-reducing (especially concrete) and pre-sorting and segregating materials after demolition to increase salvage value of the recovered materials and to decrease tipping fees for different materials in the debris; and
- Recycling materials on-site to reduce both hauling and disposal costs.

UT-11 *Environmental Building Design* – The Trust will incorporate the site's environmental conditions in building design solutions, maximizing solar energy and utilizing natural light.

UT-12 and UT 13 *Energy Conservation* – The following practices will be employed within the district to minimize the environmental impacts of energy consumption:

- Develop specific measures to minimize building energy use for buildings to be renovated;
- 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;
- Carry out cost-effective energy conservation retrofits of buildings and utility infrastructure;
- Educate tenants and visitors about energy conservation;
- Develop energy conservation and efficient energy generation demonstration projects in individual buildings;
- Participate in energy-efficient appliance and computer purchasing programs; and
- Install energy management systems in all non-residential buildings both to monitor energy use and to enable remote troubleshooting and building controls.

The following measure is also adapted from the PTMP EIS, but its implementation is only partly within the control of the Trust. Implementation of this measure would be required to eliminate significant impacts related to police and fire services:

CO-12 *Expansion of Public Safety Services* – The Presidio Fire Department and the USPP will expand their service as necessary to adequately serve the PHSH district. The Trust currently pays for public safety services, and therefore will work with each agency to determine required service enhancements and a cost-effective approach to their implementation prior to occupancy of the district. The Presidio Fire Department has preliminarily identified a need for additional personnel, equipment, and facilities to improve deficient response times to southern areas of the Presidio (i.e., Wherry Housing and the PHSH district). At a minimum, the Trust has agreed to provide space within an existing building at Wherry Housing or the PHSH district to house an on-duty staff of two firefighter/paramedic positions and to provide adjacent space for a paramedic (ALS) ambulance. If these additions are not deemed sufficient to improve response times, the Trust will work with the Presidio Fire Department to identify and implement additional expansions in personnel, equipment, etc. Alternatively, the Trust may consider contracting with the San Francisco Fire Department for fire protection and emergency medical response to meet the needs of the PHSH district.

3.10 Geology and Soils

3.10.1 AFFECTED ENVIRONMENT

The geology of the Presidio is described on page A-5 (Volume III) of the PTMP EIS, which states that "site specific development projects implementing the Plan will require supplemental review to evaluate geologic and seismic hazards."

The project site is located in a seismically active region. Four major active faults lie near the site: the San Andreas Fault (about 5.2 miles southwest), the North San Gregorio Fault (about 7.8 miles west), the Northern Hayward Fault (about 13.0 miles northeast), and the Rodgers Creek Fault (21.7 miles north). The project site is expected to experience periodic minor earthquakes and possibly a major earthquake (Moment magnitude [Mw] greater than 6.7 [California Division of Mines and Geology 1996]) on one or more of these nearby faults during the life of the proposed development. Numerous earthquakes have been recorded in the region in the past, the largest of which was the 1906 San Francisco Earthquake (Mw of 7.9), which occurred on the San Andreas Fault. The most recent earthquake to affect the Bay Area was the Loma Prieta Earthquake of October 17, 1989, with a Mw of 6.9 km, in the Santa Cruz Mountains approximately 57.2 miles from the site.

The Working Group on California Earthquake Probabilities (2002) at the U.S. Geological Survey predicted a 62-percent probability of a Mw of 6.7 or greater earthquake occurring in the San Francisco Bay Area by the year 2032. More specifically, the estimated 30-year probabilities of a Mw of 6.7 or greater earthquake for the Hayward-Rodgers Creek, San Andreas, and San Gregorio Faults are 27, 21, and 10 percent, respectively. Historically, ground surface displacements closely follow the trace of geologically young faults. The project site is not located within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no known active or potentially active faults exist on the site. Therefore, the risk of surface faulting is very low (Treadwell & Rollo, Inc. 2003a).

Large earthquakes of the type likely to occur during the life of the project may be expected to cause very strong ground shaking at the site. This shaking can result in ground failure such as that associated with soil liquefaction, lateral spreading, seismically induced densification of natural or fill soils, and landsliding. The project site is expected to experience seismic shaking and possible damage in approximately the same proportion as the surrounding areas of the Presidio and San Francisco.

Settlement caused by seismic densification may be especially noticeable where thick bodies of poorly compacted fill occur, such as beneath the large parking lot southwest of Wedemeyer Street. This parking lot is partly supported on waste fill, known as Landfill 10, deposited over many years by the U.S. Army. The Trust is now evaluating options for stabilizing this fill. Preliminary analyses indicate the fill would be subject to some settlement and the southwestern face of the fill deposit might experience minor landsliding in a large earthquake, but the extent of these deformations would be in the range of one foot or less. Based on the analyses to date, deformations of this size are not expected to pose a significant threat to the project site, surrounding residences, or adjacent natural areas.

According to a building seismic analysis prepared for the City and County of San Francisco (Fong & Chan Architects 1990), the PHSH buildings are generally usable and in good condition, with no indication of serious structural damage to the primary structural systems from recent or past earthquakes, settlements, or overloads. Damage to interior finishes and some areas of exterior cladding and deterioration from age or other causes were observed. Also, neither the original 1932 hospital nor the 1952 addition meet current safety standards or conform to code requirements for seismic forces, and would require seismic upgrading (Fong & Chan Architects 1990; Architectural Resources Group 1991; Faye Bernstein & Associates 1999).

The Battery Caulfield site contains three underground storage areas (magazines) that were previously used as a Nike Missile facility. Each magazine is founded on 0.5- to 2.5-foot-thick concrete slabs, at depths of 14 to 23 feet below the existing ground surface, with perimeter walls consisting of 12-inch-thick reinforced concrete. The site is underlain by about 1 to 25 feet of fill (becoming thicker toward the south), consisting primarily of interbedded sand and clay. Beneath the fill is native sand and clay, extending to depths of 17 to 42 feet below the ground surface. Below these depths, the site is underlain by serpentinite bedrock of the Franciscan Complex. The groundwater is at 10 to 30 feet below the ground surface.

3.10.2 ENVIRONMENTAL CONSEQUENCES

The following impact evaluation is based in part on a structural engineering report for the main hospital building (Faye Bernstein & Associates 1999) and a geotechnical feasibility study for the Battery Caulfield site (Treadwell & Rollo, Inc. 2003).

3.10.2.1 Requested No Action Alternative

Unless the building is stabilized, the seismic joints between the 1932 main hospital building and the 1951 wings (being less than required by current code) would experience differential movement in a moderate to major earthquake resulting in “pounding” along the joints between the original building and the 1951 wings. Such pounding frequently results in extensive damage ranging from falling brick and terra cotta to collapse. Under this alternative, mothballing of Building 1801 and other vacant buildings would include bracing or added reinforcement of severely vulnerable structural components, which would improve their overall seismic resistance. Measures taken to strengthen buildings would only meet minimum performance objectives since it would be economically impractical to design otherwise in the absence of a project. Nonetheless, the levels of damage would be reduced and the lives of the buildings would be ensured following a seismic event.

3.10.2.2 Alternative 1: PTMP Alternative

Building rehabilitation for the proposed uses under this alternative would be geologically and geotechnically feasible. Rehabilitation of the buildings using standard structural engineering techniques for foundations and building structural features consistent with established practice would result in structural upgrades that would add lateral/seismic resistance in the event of a major earthquake. Seismic

design would be based on the criteria established in the California State Historical Building Code. Buildings that would be used for educational uses would be rehabilitated in compliance with applicable provisions of the California Education Code. While the buildings would not be expected to perform at the same level as a new building, rehabilitation and structural upgrading would reduce seismic risk to acceptable levels and would constitute a beneficial impact of Alternative 1.

3.10.2.3 Alternative 2: Infill Alternative

Building rehabilitation and new construction for the proposed uses under this alternative would be geologically and geotechnically feasible. Similar to Alternative 1, this alternative would use standard structural engineering techniques and would result in a successful retrofit for seismic safety purposes. Replacement construction under this alternative would be limited to the lower plateau and would be built to current standards and seismic design factors.

Excavations for the underground parking structure would encounter fill soils, native dune sands, or possibly sandy clay of the Colma formation, depending on location and depth. Fill soils would be segregated, profiled, and transported off-site for disposal at a licensed landfill. Native soil materials would be reused on the project site (if soil is required), stockpiled, and safeguarded for reuse with other dune restoration projects on the Presidio or nearby (if the native materials are deemed suitable), or disposed off-site in accordance with applicable regulations. Construction of the underground garage would result in the creation of up about 10,000 cubic yards of excess soil. If this soil cannot be reused within the park for landscaping or habitat restoration purposes or for compacted fill, removing the soil would require up to 2,000 truck round trips (evaluated under construction traffic impacts in Section 3.2, Transportation).

3.10.2.4 Alternative 3: No Infill Alternative

Building rehabilitation for the proposed uses under this alternative would be geologically and geotechnically feasible. Similar to Alternative 1, this alternative would use standard structural engineering techniques and would result in a successful retrofit for seismic safety purposes.

3.10.2.5 Alternative 4: Battery Caulfield Alternative

Building rehabilitation and new construction for the proposed uses under this alternative would be geologically and geotechnically feasible. Similar to Alternative 1, this alternative would use standard structural engineering techniques and would result in a successful retrofit of historic buildings for seismic safety purposes. Replacement construction would be built to current standards and seismic design factors. Within Battery Caulfield, new low-rise residential buildings would likely extend over the existing underground magazines. New buildings would be of light timber construction with plywood shear walls and roof diaphragms and concrete foundations with spread footings. The magazines may be used to support new improvements provided they can be backfilled with soil or concrete. Otherwise, they would have to be demolished and removed. In addition, existing fill within Battery Caulfield is likely not suitable for the support of proposed structures and associated improvements, and would be removed and reused/replaced as engineered fill. Settlement would be small and within acceptable limits. As recommended by the PTMP EIS and the geotechnical feasibility study, the stability of the fill slope would

be further evaluated during the final geotechnical investigation and may include measures to improve slope stability.

3.10.2.6 Park Presidio Boulevard Access Variant

The new direct access between the project site and Park Presidio Boulevard would not expose people or property to geologic or seismic hazards. Grading, excavation, and any fill operations during construction would minimize high cuts and fills. Slopes would be made as flat as possible both for embankment stability and to reduce slide potential in cuts. Designs for cut slopes, embankments, earthwork, sub-excavations, erosion control features, and any other pavement improvements would be built to standards set forth in the Highway Design Manual and subject to Caltrans geotechnical review to mitigate the potential for earthquake damage.

3.10.2.7 Cumulative Effects

All building rehabilitation and/or replacement construction within the Presidio is regulated by the Trust. The Trust would withhold development permits for any site with seismic hazards until geologic and soil conditions of the site are investigated and appropriate mitigation measures, if any, are incorporated into development plans. The California Geological Survey would provide additional policies and criteria to guide the Trust in evaluating and mitigating seismic hazards. Identifying and mitigating seismic hazards as part of the Trust's land use planning and permitting processes would reduce the threat to public health and safety and minimize the loss of life and property.

3.10.3 MITIGATION MEASURES

The PTMP EIS does not include mitigation measures related to geologic hazards, but indicates that site-specific engineering designs will be required of individual projects. For ease of compliance and monitoring, this requirement is presented here as a mitigation measure. This measure will apply to all alternatives and would effectively mitigate potentially significant seismic hazards.

GE-X *Geotechnical Report* – Prior to building rehabilitation and/or replacement construction, as part of a design-level site investigation report, a geotechnical engineer will investigate the site for seismic hazards and recommend measures for earthwork, seismic design, and other geotechnical issues to provide reasonable protection of structural and public safety given site-specific conditions. Removal or relocation of geologic resources of interest (such as dune sand, colma foundation or other native soil) will include documentation of the subsurface conditions, including stratigraphy and contact mapping, and consideration of academic research opportunities. The geotechnical report will also provide final recommendations by a structural engineer regarding necessary improvements to existing buildings and foundations. Evaluation and mitigation of seismic hazards will be conducted under guidelines established by the California Geological Survey (1997b). If construction is proposed at Battery Caulfield, the geotechnical report will include final recommendations for grading, foundation support, seismic design, and other geotechnical issues.

3.11 Hydrology, Wetlands, and Water Quality

3.11.1 AFFECTED ENVIRONMENT

The PTMP EIS describes wetlands, streams, and drainages of the Presidio on pages 118 to 121 and storm water runoff and water quality issues on pages 188 to 189. These descriptions are incorporated here by reference. The hydrologic environment and water quality of the PHSH district, including the Nike Swale wetland, are described in more detail below.

The PHSH district occupies a ridgeline and southward-sloping series of bluffs and plateaus. Maximum elevation is 330 feet in the north, descending to 150 feet at the southern project site boundary. This relatively open landscape sits over an ancient sand dune complex, which in turn lies over older rock of the Colma Formation (sedimentary sands and clays). Beneath these features, Mesozoic Franciscan bedrock (deformed sedimentary and volcanic mélange) is found in most of the district (Montgomery Watson 1996). Past grading activities have altered surface topography in several locations in the district, resulting in the placement of artificial fill (locally derived and imported).

The PHSH district primarily drains southward into the Lobos Creek catchment. Eastern portions of the district drain to the Mountain Lake catchment. On-site, there are no named streams or perennial flowing channels. The primary receiving watershed of Lobos Creek supplies roughly 85 percent of the domestic water supply to residents of the Presidio through withdraws from the Lobos Creek groundwater basin. In total, the PHSH district is estimated to consist of mostly pervious surfaces, with approximately 30 percent of the 42 acres occupied by buildings, paving, and other hardscape.

Figure 23 illustrates the district's physical structure, surface features, and drainage patterns. The northern portion of the upper plateau contains Battery Caulfield and Buildings 1449, 1450, and 1451. The southern portion is called the Nike Swale area, which contains the Nike Swale wetlands, Landfill 8, a parking lot, and Buildings 1819 and 1818. The PHSH complex includes Buildings 1801 through 1815 and 1828, parking, Landfill 10, and landscaped areas.

3.11.1.1 Surface Hydrology

Battery Caulfield – Surface runoff in this area primarily occurs from impermeable paved surfaces at Battery Caulfield. The three Nike Missile silos at Battery Caulfield occupy a paved plateau with service roads that drain into a storm water collection system. While surface inlets have been identified, a complete understanding of pipe and outfall locations is not possible because as-built drawings are unavailable. To address this uncertainty and better understand the apparent hydrologic connection between Battery Caulfield and the Nike Swale wetlands below, a field-based flow study was performed (Jones & Stokes 2003). Surface runoff collecting in Drains 1, 1a, 2, and 4 flows southward to hillslope outfalls, infiltrates into the soil through pipeline leaks, and flows farther southward as shallow subsurface flow (throughflow) down-gradient to the Nike Swale wetlands (see Figure 23). Other drains, such as Drain 5 at Battery Caulfield (see Figure 23), collect and direct surface flow to outfalls leading toward the Nike Swale area or toward the east outside of the district.

Nike Swale Area – The Nike Swale area is largely vegetated, except for a large paved parking area on the west side. The topography, soils, and geology of the Nike Swale area suggest high infiltration capacity of sandy soils, whereby most surface water infiltrates and likely flows down-gradient through the shallow subsurface soil horizon. As described above, the Nike Swale wetlands are supplied by surface water runoff from the Battery Caulfield upslope (see Figure 23). Blocked and leaking storm drain pipes, topography, and sandy soils direct runoff water from the paved Battery Caulfield subsurface, where it flows to the wetland. Runoff waters are also directed to the wetlands through outfalls off Battery Caulfield Road. The Nike Swale wetlands are further discussed in Section 3.11.1.4.

The southern portion of the Nike Swale area includes an historic landfill known as Landfill 8. The Landfill 8 area was used as a Marine Hospital Cemetery and later as a PHSH waste disposal site (Presidio Trust 2001, Montgomery Watson 1996). The original landfill is now covered by a combination of pervious and impervious surfaces, including vegetation, a paved parking lot, and a tennis court. Similar to areas farther north, surface water infiltrates through the native sandy soils and fill material. Surface waters can then either be absorbed by vegetation and released through transpiration, infiltrate deeper to groundwater, or move southward in the shallow subsurface horizon.

PHSH Complex – Like Battery Caulfield, the PHSH complex is largely paved, and surface waters run off into a storm drain collection network. The PHSH complex consists of 15 buildings, parking lots, paved sidewalks, and landscaped areas. A natural spring on the southwest side of the PHSH complex may have once fed into Lobos Creek before the area was filled with waste from the PHSH (Urban Watershed Project 2001). The landfill, known as Landfill 10, was graded, covered, and paved for use as a parking lot. Storm drains leading to the City and County of San Francisco's 17th Avenue combined sewer system and connecting to the Richmond combined sewer line capture runoff waters from the parking lot and nearby paved areas during normal storm events (Urban Watershed Project 2001). The far east portion of the PHSH complex (Buildings 1809 through 1815) drains to Mountain Lake through culverts that pass under Highway 1.

3.11.1.2 Groundwater Hydrology

Battery Caulfield – Groundwater elevations at Battery Caulfield are found 10 to 40 feet below ground surface (Treadwell and Rollo 2003b). Groundwater movement is mostly controlled by bedrock contact and topographic slope. Three underground missile silos interrupt the groundwater table. These silos contain collected surface and ground waters. Water levels monitored in the silos showed response to seasonal fluctuations in the surrounding water table (Montgomery Watson 1999). However, water level inside the silos is no longer monitored. The silos may have a minor influence on groundwater elevations, velocities, and direction.

The three underground missile silos once contained large amounts of hydraulic fluid. To monitor hydrocarbon contamination from Battery Caulfield, five groundwater monitoring wells were installed and numerous soil and groundwater samples were taken in and around the site from 1992 to the present (Treadwell and Rollo 2003b). Organic compounds in groundwater were not detected between 1994 and 1999 (Montgomery Watson 1999). However, benzene and toluene were detected in March 2003

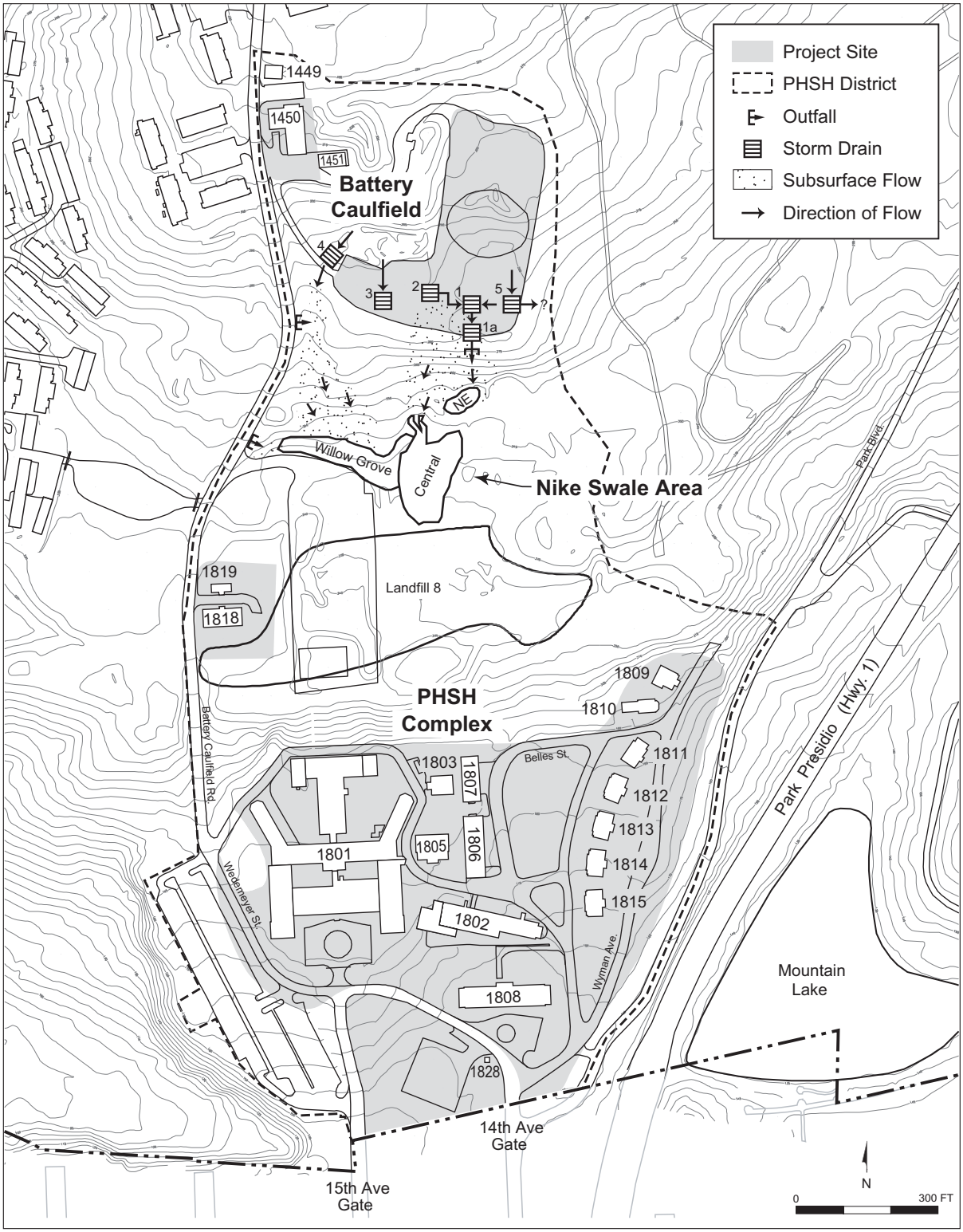

FIGURE 23. EXISTING SITE HYDROLOGY *Source: Presidio Trust, 2004*

(Treadwell and Rollo 2003b). Groundwater monitoring from 1995 through 2003 showed consistent flow to the south (and southeast) through Battery Caulfield.

Nike Swale Area – Groundwater has not been investigated in the Nike Swale area; however, studies at Landfill 8 have been conducted from 1994 to the present. Groundwater flow through the Landfill 8 area has consistently been south to southeast with hydraulic gradient occurring at a rate of 0.1 feet per foot (Treadwell and Rollo 2003b). The groundwater table is between 10 and 50 feet below the surface (Treadwell and Rollo 2003b). Figure 24 predicts the groundwater table elevation beneath the Nike Swale. Groundwater monitoring at Battery Caulfield and Landfill 8 shows that the groundwater table does not surface at the Nike Swale. Landfill 8 has been monitored for soil and groundwater contamination from wastes in the fill extending 15 feet beneath the surface. Organic compounds have not been detected at the site since 1996, with the exception of a cyanide detection in 2002 (Treadwell and Rollo 2003b). Contaminants were not detected in monitoring results from March and June 2003 (Treadwell and Rollo 2003b).

PHSH Complex – Avenues for groundwater infiltration at the PHSH complex are restricted because of the higher proportion of impervious surfaces from buildings and parking lots. Groundwater in the easterly portion of the PHSH complex flows toward Mountain Lake, while westerly flows descend toward Lobos Creek. Groundwater elevation in the PHSH complex is 40 to 50 feet below the surface (Treadwell and Rollo 2003b). The groundwater gradient, from the large parking area over Landfill 10 to the head of Lobos Creek, flows southwesterly 10 to 40 feet below the surface, while surface topography drops 60 feet.

3.11.1.3 Water Quality

Battery Caulfield – Surface water runoff from Battery Caulfield may convey pollutants from items stored in the area. The NPS and the Trust use the paved area to store tractors, landscaping materials, recycled asphalt, telephone poles, and other items potentially containing or leaking contaminants. During storm events, potential contaminants such as sediment, oils, creosote, and hydrocarbons from these stored items can infiltrate to soils and, ultimately, to the Nike Swale. Storm water runoff from Battery Caulfield is not treated with oil or sediment filters.

Nike Swale Area – Wetlands and native vegetation in the Nike Swale area retain, store, and filter runoff, sediment, and contaminants carried in surface water during storm events. This natural filtering system improves surface water and groundwater quality and provides habitat for birds and wildlife. The wetland area can be degraded from large deposits of sediments and high concentrations of contaminants washed from Battery Caulfield or the nearby road. The Trust currently conducts composting operations on the paved parking lot at the east end of the landfill, and has employed management practices to prevent water quality degradation from the migration of compost and manure via wind and rain (Presidio Trust 2001).

PHSH Complex – Storm drains collect and divert runoff water from the PHSH to a storm sewer line connected to the San Francisco Public Utilities Commission Richmond Transport Station (Presidio Trust 2003). The water quality of Lobos Creek is potentially threatened if storm drains at the project site

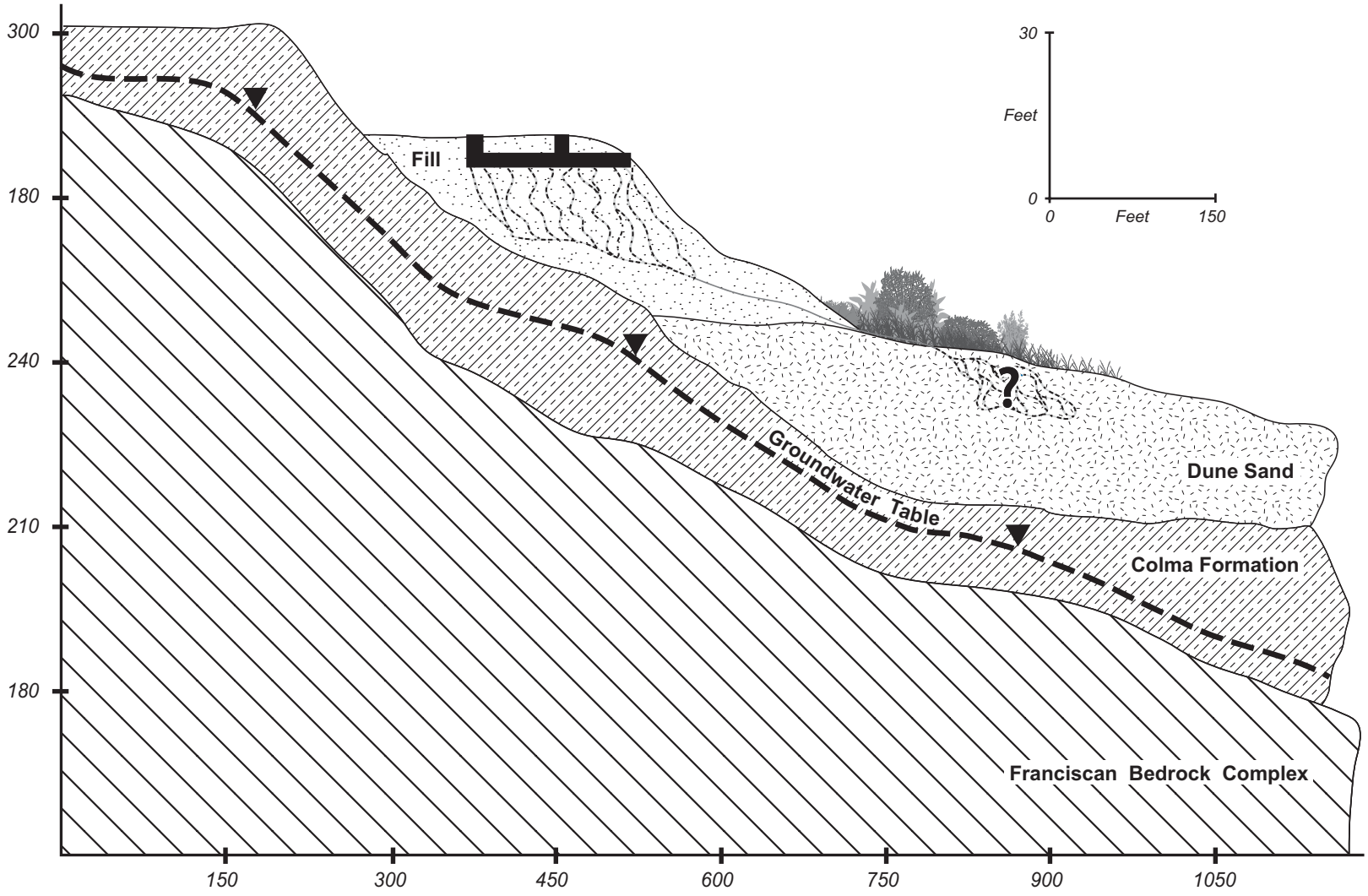

FIGURE 24. CONCEPTUAL CROSS-SECTION OF EXISTING HYDROLOGIC CONDITIONS AT BATTERY CAULFIELD

Source: Jones & Stokes, 2004