# 3.3 WATER RESOURCES

## 3.3.1 AFFECTED ENVIRONMENT

### *PRIMARY WATER BODIES*

The major surface water bodies within the Presidio are Lobos Creek, Crissy Marsh, Mountain Lake, Tennessee Hollow, El Polin Spring (and associated tributaries located between Rodriquez and Sanchez Streets), and Dragonfly Creek. The locations of these water features are presented in Figure 3.3-1; additional detail is presented in Section 3.4, Biological Resources. Although these water features have undergone alteration from their natural state based on past human uses, they existed at the Presidio prior to European settlement and development. Mountain Lake, for instance, is smaller than it was before the western portion was filled for the construction of Highway 1.

Lobos Creek, the primary potable water source at the park, is just over one mile in length and is the only remaining naturally occurring surface water drainage in the Presidio. Originating near the southern boundary of the Presidio and discharging to the Pacific Ocean, Lobos Creek is recharged by groundwater released from springs and seeps. Crissy Marsh is an 18-acre tidal salt marsh that was restored as part of the larger 100-acre Crissy Field Restoration Project. Mountain Lake, is a natural, unlined lake occupying approximately four acres and likely fed by groundwater, with some contribution from surface water runoff. The area around El Polin Spring, also referred to as Tennessee Hollow, contains three tributaries and is currently being studied for restoration opportunities.

### *WATER QUALITY*

Water quality at the Presidio has been affected by historical activities, such as the creation of landfills, installation of underground storage tanks, and use of herbicides, fungicides and insecticides while the U.S. Army managed the Presidio (please refer Section 3.6, Hazardous Materials, for additional detail). Other uses of the park contribute to water quality degradation, such as nonpoint-source runoff from roads and parking lots that contains organic chemicals and heavy metals, and ongoing use of fertilizers and herbicides. The Trust is in the process of preparing an interim Storm Water Pollution Prevention Plan (SWPPP) for the Presidio. The SWPPP will adhere to the general guidelines for storm water management as established under the National Pollutant Discharge Elimination System (NPDES), and will remain in effect until the Trust receives its Phase II NPDES permit. The SWPPP will include a sampling and reporting program for storm water quality, as well as Best Management Practices (BMPs) consistent with the California Stormwater Best Management Practices Handbook. BMPs include the installation of oil/water separators on discharge lines where appropriate, four of which have been installed at drain systems that discharge into the Crissy Field marsh.

## *GROUNDWATER RESOURCES*

The Presidio's underlying stratigraphy consists primarily of unconsolidated sediment of the Colma formation, which overlies a complex assemblage of sandstone, siltstone, shale, and metamorphic rock known as the Franciscan formation. The Colma formation consists of fine-to medium-grained sand with moderate amounts of clay and silt. Sediments are generally unconsolidated, being deposited in estuarine and coastal environments. Groundwater occurs in both the Franciscan bedrock and overlying Colma formation. Franciscan bedrock aquifers have low yield and are poorly defined because the majority of the groundwater flows through the rock within fractures. Aquifers in Colma Formation materials may produce higher yields than the bedrock aquifers or the shallower groundwater contained in the dune sand aquifers. The Lobos Groundwater Basin within the Colma Formation underlies portions of the Presidio. This groundwater basin formed within alluvial sediments deposited in a depression in the underlying Franciscan Assemblage. Depth to groundwater in the vicinity of Crissy Field is typically about five feet, and the groundwater generally flows north toward the bay (San Francisco County Transportation Authority 2001).

The Trust, in coordination with the National Park Service, is performing park-wide groundwater monitoring to evaluate and document existing groundwater conditions. In areas where the groundwater has been affected by the Army's operations or disposal practices, the Trust is working with regulatory agencies to ensure levels that are protective of human and ecological receptors. Additionally, a surface- and groundwater-monitoring program is underway within the Tennessee Hollow watershed to provide data necessary to support restoration design alternatives. Fifteen wells in the area are continuously monitored to gather data, including depths of aquifers and changes in elevation of groundwater in response to surface water recharge.

## *WATER SUPPLY AND DEMAND*

The water supply for the Presidio is primarily met by diversions from Lobos Creek, which are treated at the Presidio Water Treatment Plant. Diversions from Lobos Creek are limited by natural stream flow volumes and by resource protection objectives (Philip Williams and Associates 1995). Historically, the Army, National Park Service and now the Presidio Trust have purchased supplemental water from the City and County of San Francisco (CCSF) on an as-needed basis. The use of this source has been reduced in recent years due to the partial occupation of the Presidio, and subsequent decrease in water demand. However, supplemental water is still purchased from the City by the Trust. Current average daily water use within the Presidio is estimated at 0.8 MGD, of which approximately half is used for landscape irrigation. The amount purchased from the City varies from year to year, and in 2001 represented approximately 15 percent of the total supply.

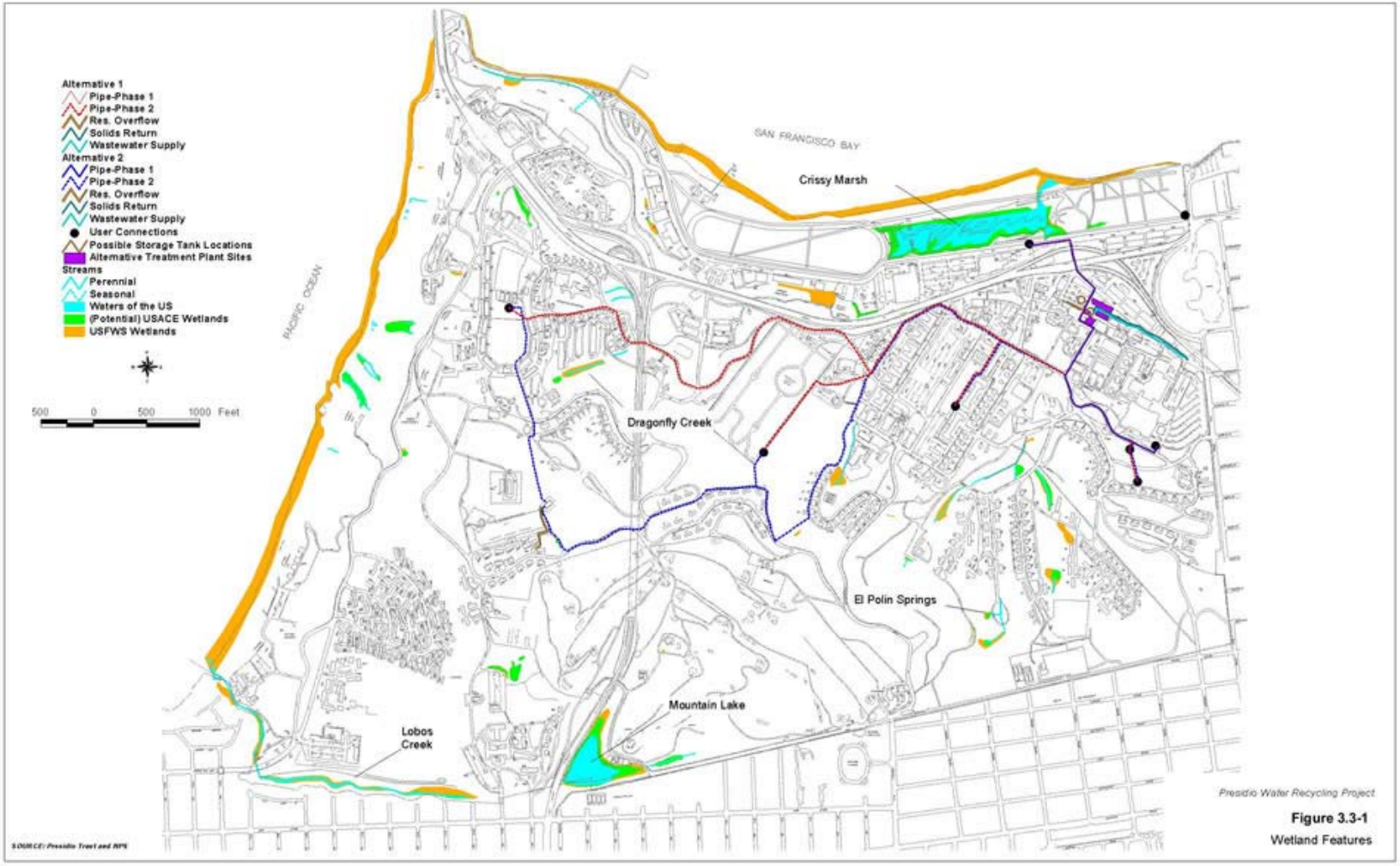


**Figure 3.3-1**
Wetland Features

### *WASTEWATER TREATMENT AND DISPOSAL*

The storm and sanitary sewer collection systems within the Presidio are two separate systems, in contrast to the CCSF combined sewer system. Storm water at the Presidio is collected in storm sewers and routed to outfalls that discharge into the Crissy Field Marsh, the San Francisco Bay, or the Pacific Ocean. Sanitary sewage is collected from buildings and discharged to the CCSF combined sewer system at one of five locations. These flows are metered by the City and the Trust, and the Trust pays the City for this service. In 2000, average daily flows were approximately 0.4 MGD. Generally, wastewater generated on the east side of the Presidio is routed to the CCSF's Southeast Water Pollution Control Plan (SEWPCP). Wastewater generated on the west side of the Presidio is routed to the CCSF's Oceanside Water Pollution Control Plant (OWPCP). Presidio flows to both plants represent less than one half of one percent of the dry and wet weather capacities of each plant.

## 3.3.2 REGULATORY BACKGROUND

The major federal legislation governing the water quality aspects of the proposed project is the Clean Water Act, as amended by the Water Quality Act of 1987. The federal Environmental Protection Agency (EPA) is the federal agency responsible for water quality management nationwide.

The State of California's Porter-Cologne Water Quality Control Act provides the basis for water quality regulation within California. The State Water Resources Control Board (SWRCB) administers water rights, water pollution control, and water quality functions, while the Regional Water Quality Control Board (RWQCB) conducts planning, permitting, and enforcement activities. The Porter-Cologne Water Quality Control Act designates the SWRCB responsible for formulating and adopting state policy for water reclamation, while the California Department of Health Services (DHS) is responsible for establishing uniform statewide reclamation criteria to ensure that the use of recycled water would not be detrimental to public health.

There are no federal standards governing wastewater reclamation and reuse in the United States, although the EPA has sponsored the preparation of *Guidelines for Water Reuse*. Many states, including California, have developed wastewater reclamation regulations. In all cases, the regulations have been established with the objective of protecting public health and allowing for the safe use of recycled wastewater. The DHS established water quality criteria, treatment process requirements, and treatment reliability criteria for reclamation operations, which are set forth in Title 22, Division 4, Chapter 3, of the California Code of Regulations (CCR) Water Recycling Criteria. The RWQCB has responsibility for reviewing proposed recycled water projects and for issuing water recycling requirements through the waste discharge permit process. DHS has the responsibility for reviewing proposed water recycling projects and for providing comments and/or recommendations to the RWQCB.

The existing Water Recycling Criteria address treatment requirements for three main types of recycled water uses: landscape irrigation, recreational impoundments, and industrial uses. The

treatment requirements are based on the expected degree of human contact with recycled wastewater under each type of use. Treatment requirements are expressed as treatment process requirements (e.g., bio-oxidation, coagulation) as well as performance standards (e.g., disinfection standards and contaminant reduction).

The existing Title 22 standards are among the most stringent standards for public health protection, and can be more stringent than comparable standards established by the World Health Organization. Since the adoption of Title 22 in 1978, the use of recycled water for nonpotable uses has expanded throughout the state, and is projected to continue to grow over the next several decades. Under Title 22, the proposed use of recycled water for landscape irrigation would fall under the guidelines for "landscape irrigation with high public contact." To be used as a supply source for this designation, the recycled water must be at all times adequately oxidized, coagulated, clarified, filtered, and disinfected wastewater; this process requirement constitutes the most stringent treatment practicable (disinfected tertiary recycled water). To be considered adequately disinfected, the median number of coliform organisms in the wastewater may not exceed a Most Probable Number (MPN) of 2.2 per 100 milliliters over a seven-day period.

## *WATER RECYCLING PERMIT*

Implementation of one of the action alternatives would require that the Trust obtain a water recycling permit from the RWQCB, consistent with the requirements of the California Code of Regulations, Title 22, Division 4 (Environmental Health). As part of the permitting process, an Engineering Report will be submitted to the DHS for initial review and comment, and subsequently to the RWQCB. The Engineering Report will document how the Trust will comply with a variety of requirements as specified in Division 4, Chapter 3 (Water Recycling Criteria), and Article 7 (Engineering Report and Operational Requirements). A summary of these requirements, as well as operational and design stipulations presented in Title 22, are summarized below.

### Engineering Report Preparation

Any water recycling project would be required to prepare an Engineering Report, which would address the following items:

- preparation of a contingency plan, which assures that no untreated or inadequately treated wastewater be delivered to use areas;
- implementation of a preventive maintenance program to ensure that all equipment is kept in a reliable operating condition;
- ongoing maintenance of operating reports that document operational practices, maintenance, corrective actions and other analyses specified in the reclamation criteria as established in Title 22 – including monthly reporting requirements with the RWQCB;
- documentation of the installation, maintenance and regular testing of alarm systems at the plant for various functions to ensure against leaks or failures; and

- daily sampling of recycled water and documentation requirements to ensure that applicable water quality criteria are consistently met.

### Other Title 22 Compliance Actions

Article 4 of Title 22 provides for a number of standard conditions that would be required for any project in California that uses disinfected tertiary recycled water for landscape irrigation. The proposed project would comply with these provisions, including:

- Posting signs to inform the public in areas where recycled water is in use;
- Prohibition of surface runoff from the area being irrigated as a result of over-application of recycled water, and allowing landscape areas to dry between applications;
- Prohibition on the spray, mist, or runoff from entering dwellings, designated outdoor eating areas, or food handling areas;
- Prohibition of contact between drinking water fountains and recycled water;
- Confining recycled water to authorized use areas;
- Prohibition of physical connections between recycled water systems and potable water systems (except for when backflow preventors are included);
- Prohibition of hose bibs in portions of the recycled water distribution system accessible to the general public;
- Use of purple recycled water distribution and transmission system piping to indicate that it contains recycled water; and
- Other requirements designed to ensure that recycled water use does not adversely affect public health.

The RWQCB will monitor and periodically inspect facilities at the Presidio to ensure that these and other measures required by Title 22 are adequately implemented by the Trust.

## 3.3.3 ENVIRONMENTAL CONSEQUENCES AND MITIGATION

### *ALTERNATIVE 1 (CENTRALIZED STORAGE)*

#### Construction Effects on Water Quality

Construction of proposed facilities would involve earthmoving activities such as excavation, grading, and soil stockpiling. Project construction would occur within the relatively flat areas adjacent to one of the three building sites under consideration, and along the pipeline routes. Unless adequately controlled, project construction could result in soil erosion and subsequent discharge of suspended sediments to nearby surface waters or drainages, including Crissy Marsh.

Sedimentation to the waterways could degrade water quality for beneficial uses by increasing channel sedimentation and suspended sediment levels (turbidity), reducing the flood-carrying capacity, and adversely affecting associated aquatic and riparian habitats. Without mitigation, these impacts would be considered potentially significant.

Hazardous materials associated with construction activities, such as fuels, oils, antifreeze, coolants, paints, solvents, and other substances, could adversely affect water quality if released to surface waters. Implementation of the SWPPP as part of the project's BMP-1 (see Section 2.3) for erosion/runoff control would reduce erosion of disturbed soils and release of hazardous materials into watercourses. Implementation of the SWPPP would reduce potential impacts to less-than significant levels.

### Pipelines

Construction of the pipelines would be done primarily by open-trench construction. Excavated spoils would be stockpiled along the trench, then utilized for backfill, and excess or unsuitable materials would be transported from the alignment, as necessary. Large-scale stockpiling of spoil materials is not anticipated. Unless adequately controlled, potential impacts associated with open-trench construction techniques could increase downstream sedimentation during trenching activities, potentially impacting water quality by increasing turbidity and sediment deposition. Construction activities would include implementation of BMPs for erosion control along the pipeline routes. No dewatering is anticipated during pipeline construction. Incorporation of standard BMPs, as required under the project Standard Conditions (see Section 2.3, BMP-1: Erosion/Runoff Control) would reduce potential erosion and water quality impacts to less-than significant levels.

### Underground Reservoir Construction

Construction of the underground storage tank would be coordinated with planned remediation activities; thus, much of the excavation necessary for construction would already be completed. Excavation at the storage reservoir site would likely encounter groundwater, and may require dewatering to lower local groundwater levels to dry the area for construction. Common practices employed to facilitate construction include either de-watering the excavation (remove groundwater by pumping) or shoring the sides of the excavation to reduce groundwater inflow. If de-watering methods are used, groundwater would be pumped out of the excavation to the surface and then discharged to the sanitary sewer, in accordance with the conditions contained in the Trust's existing Industrial Discharge Permit (IDP). Water extracted during de-watering may contain chemical contaminants (either from pre-existing sources or from equipment) or may become sediment-laden from construction activities, and would be monitored and managed in accordance with applicable regulations. The area of groundwater reduction is generally in the immediate construction area, and the effect on groundwater conditions would be expected to be localized, temporary, and minor.

*The impacts to water quality from project construction would be less-than significant, with the implementation of BMP-1.*

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**Operational Effects on Water Quality**

Both project alternatives would involve the use of recycled water for landscape irrigation. The proposed treatment process would meet the highest quality recycled water criteria as established by Title 22, which means that the recycled water would be suitable for unrestricted (subpotable) use. This type of recycled water ("tertiary disinfected") can be used for unrestricted irrigation of food crops, parks, playgrounds, school yards and residences, and is acceptable for body contact. In comparison with the potable water presently being used for irrigation, recycled water would have elevated concentrations of a number of constituents, including salts (total dissolved solids, or TDS), nutrients, and other constituents as described below.

## Salts

TDS is the sum of all soluble salts, including sodium, chloride, calcium, etc. At elevated levels, TDS can be harmful to plants. However, the predicted level of 410 mg/L in the recycled water associated with this project is relatively low for recycled water, and would not be expected to adversely affect landscape turf or groundwater resources. During the irrigation season, salts may accumulate in the soil column of areas being irrigated with recycled water. These accumulated salts are then flushed from the root zone during the rainy winter months, thereby relieving any salt stresses on landscape vegetation. Once in the local groundwater, the salts would be expected to migrate north toward the Bay for eventual discharge; this portion of the Bay near the Golden Gate is quite turbulent, and any groundwater containing salts or other constituents would be expected to disperse rapidly.

In addition to TDS, another potential concern regarding recycled water is the sodium adsorption ratio (SAR), which is calculated from the proportion of sodium to calcium plus magnesium. Elevated SAR values can be unfavorable to plant growth. However, the predicted SAR value for the recycled water from this project is 2.9, which is within the range of values considered to have no adverse effects on plant growth (Kennedy/Jenks Consultants 2002).

## Nutrients

Recycled water typically contains elevated concentrations of plant nutrients, including nitrogen, phosphorus, and potassium. Nitrogen is an essential plant nutrient and a key component of fertilizer; if current landscape fertilization practices were to continue after the implementation of the proposed recycled water project, landscape areas could become stressed due to excess nutrients. However, the Trust and NPS would monitor and modify fertilizer application accordingly (see the Mitigation Measure for WR-1). Potassium does not appear to accumulate in soils, suggesting that its concentration is low compared to the plant requirement. Phosphorus

concentrations may increase in soils over time, indicating that it could be supplied in excess of plant needs. However, similar to other salts, phosphorus would be flushed through the soil column and past the root zones during winter rainy periods (Dames & Moore 1996). The phosphorus would be highly diluted by rainfall and mixing with groundwater, and subsequently would discharge (along with natural groundwater flow) to the turbulent near-shore waters of San Francisco Bay.

### Other Constituents

Metals would not be expected to be of concern in the recycled water because no industrial wastewater dischargers exist within the Presidio, and an analysis of the raw wastewater indicated that metals were either not detected or below levels of concern (Kennedy/Jenks Consultants 2002). In addition, any metals present in the recycled water would not be expected to affect groundwater quality because metals are typically removed from water in soils through a complex process of adsorption, precipitation, ion exchange, and complexation (U.S. EPA 1981).

The recycled water could potentially contain trace amounts of pharmaceutical compounds such as antibiotics, steroids, antidepressants, pain killers, estrogen and other hormones (endocrine disruptors). These compounds can pass through the body unmetabolized or partially metabolized, and can be present in domestic wastewater in the range of a few parts per billion to a few parts per trillion. These and other compounds are collectively known within the water industry as "emerging contaminants", and are not presently regulated at the federal, state or local level, although their environmental fate, transport, and health effects are the subject of on-going research (Debroux 2002).

Approximately 500 million gallons of treated wastewater are presently discharged to the San Francisco Bay on a daily basis, and consequently these emerging contaminants are presumed to presently exist in the Bay water at extremely low levels. The proposed recycled water treatment processes (membrane bioreactor and UV disinfection) would remove a greater portion of these compounds from the wastewater than are typically removed in conventional wastewater treatment processes. Therefore, these compounds would likely be present in the recycled water at concentrations less than that of typical wastewater treatment plant discharges, and near or below current analytical detection limits. The presence of trace amounts of these compounds in the recycled water would not adversely affect landscape irrigation or any other proposed uses of the recycled water at the Presidio. If present, these compounds would likely be further broken down by natural processes in the soil column, and would not be expected to adversely affect groundwater quality. During the irrigation season, the recycled water would be applied to landscaped turf areas only to meet the evapotranspiration requirements, and would not produce surface runoff or percolate through the soil to groundwater. It is unlikely that the minute quantities of these compounds, if present, could migrate through the soil and into groundwater during the wet weather season, and then subsequently migrate to the near-shore waters of San Francisco Bay and Crissy Marsh. If this migration were to occur, the concentrations would be extremely low, if even detectable, and would be unlikely to increase existing background levels in the Bay water.

Operation of the proposed project would comply with all pertinent requirements of the RWQCB, DHS, and Title 22. Compliance with applicable regulations would ensure that high quality water is consistently produced, monitored, and carefully applied, and that the potential impacts to water quality from landscape irrigation of recycled water would be less-than significant.

> **Mitigation Measure WR-2:** The Trust would monitor the total nitrogen levels in the recycled water, and adjust the applied fertilizer to turf or landscape vegetation downward accordingly. This would avoid potential problems associated with excess nutrients stressing the turf areas irrigated with recycled water, and would reduce the amount of nitrogen contributed to local groundwater.
>
> *The impacts to water quality from landscape irrigation would be less-than significant, with the implementation of Measure WR-2.*

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**Effects on Water Resources Management**

Implementation of Alternative 1 would generate up to 0.5 MGD of recycled water for irrigation or other non-potable uses at the Presidio. Current average daily water demands at the park are approximately 0.8 MGD – and roughly half of this total is used for irrigation. The availability of a drought-proof, high quality source of water for landscape irrigation would reduce the amount the potable water consumed for non-potable uses. Over time, as buildings are rehabilitated and occupied at the Presidio, the demand for water is expected to increase and the use of recycled water would provide an alternate, sustainable source of water.

> *This would be considered a beneficial effect, and no mitigation is recommended or required.*

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**Effects on Wastewater Flows**

Implementation of Alternative 1 would reduce the amount of Presidio wastewater flows entering the City's system. During peak irrigation periods, roughly 80 percent of the sanitary flows currently leaving the park for treatment and disposal via the City's SEWPCP would be captured and reused on–site. During the winter months when demand for irrigation is low, the need for sanitary flows at the water recycling plant would also be low. During this period, wastewater flows would either continue to flow as they currently do to the City's system for treatment and disposal, or could be treated and temporarily stored on-site during peak wet weather events. During these events, it would be possible to treat and store on-site up to 500,000 gallons of recycled water. This type of storage is included in this alternative at the request of the City to assist in the reduction of flows during major storm events. During these events, the City's SEWPCP combined sewer and stormwater system can experience overflows. In addition to this temporary storage capacity, several other actions have been taken (independent of this project) to

further reduce the amount of wet weather flows entering the City's system. The Trust has and continues to repair the existing sanitary sewer system and implement aggressive domestic water conservation measures that will help to reduce the Presidio's contribution to sanitary flows. Overall, the amount of current Presidio flows contributed to the SEWPCP represents less than one half of one percent of the plant's wet-weather capacity.

*Implementation of Alternative 1 would reduce amount of annual Presidio sanitary flows entering the City's system. This would be considered a beneficial effect, and no mitigation is required or recommended.*

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**Effects on Groundwater Flow**

Construction of an underground storage reservoir (either Option A or B) would result in the placement of a cylindrical steel or concrete tank approximately 80 feet in diameter and 20 feet deep. This structure could impede the natural flow of groundwater. Groundwater in this area flows north, toward the Bay, and would be expected to be present approximately five feet below ground surface. Groundwater would be intercepted on the upstream (south) side of the tank, and would then flow under or laterally around the tank. Subsurface areas immediately down-gradient of the tank may have interrupted flow, but within one to two tank diameters groundwater flow conditions would be expected to return to their natural state. Given the size and circular structure of the proposed tank, groundwater would be expected to flow easily around the tank, and continue to deliver a similar quantity of water to down-gradient areas, including Crissy Marsh and the Tennessee Hollow restoration area, which are located approximately 1,000 feet north (down-gradient) of the proposed tank locations.

*This would be considered a less-than significant effect, and no mitigation is recommended or required.*

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## *ALTERNATIVE 2 (MULTIPLE STORAGE SITES)*

**General Effects on Water Resources**

Implementation of Alternative 2 would be essentially the same as described above for Alternative 1. The main difference would be regarding the potential for wet-weather flow reduction to the CCSF Eastside system. A potential alternative for the re-routing of wet weather flows may provide additional benefits; however, this option would require additional analysis and discussion with the City. If possible to implement this re-routing option, there could be additional beneficial effect when compared to Alternative 1. Based on the relative size of the Presidio's contribution to wet weather flows (less than one half of one percent of the City's plant capacity), this additional benefit would be small.

*Alternative 2 would have no significant impacts on water resources, with implementation of mitigation measures identified under Alternative 1. Beneficial effects would also be similar and possibly greater than those described under Alternative 1.*

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## *ALTERNATIVE 3 (NO ACTION)*

### Effects on Water Resources

Under the No Action Alternative, recycled water would not be used at the Presidio and all of the park's water needs would continue to be met 100 percent by potable water. The Trust would, however, implement aggressive water conservation practices to maximize water savings. None of the systems/facilities described above for the two action alternatives would be constructed. Implementation of the No Action alternative would therefore avoid all impacts (both adverse and beneficial) described above for the project alternatives.

*The No Action Alternative would avoid all effects (beneficial and adverse) as described above for Alternative 1.*