

# Chapter 2. Program Description

The City of San Mateo proposes to complete the CWP, a major capital program, to meet the objectives described in Chapter 1. Two alternatives are evaluated in this Draft PEIR at a programmatic level, pursuant to Title 14 of California Code of Regulations Section 15168: the In-System Storage Program and the Full Conveyance Program (collectively called the “Program alternatives”). Each of the two CWP alternatives addresses the collection system and the WWTP and includes multiple capital projects as described in this chapter. An overall discussion of CWP construction and operation is provided at the end of this chapter.

## 2.1 Program Alternatives

Each of the two CWP alternatives would provide wastewater treatment for the WWTP service area shown on Figure 2-1. Table 2-1 summarizes the two CWP alternatives.

TABLE 2-1  
**Summary of Program Alternatives Evaluated in the Draft PEIR**  
*Programmatic Environmental Impact Report, City of San Mateo Clean Water Program*

	<b>Full Conveyance Program</b>	<b>In-System Storage Program</b>
Collection system upgrades	Included, would require larger-capacity pipelines and pump station upgrades, especially for Dale Avenue Pump Station, compared to the In-system Storage Program.	Included; may require smaller-capacity pipelines and pump station upgrades, especially for Dale Avenue Pump Station, compared to Full Conveyance Program.
Equalization storage basin upstream from Dale Avenue Pump Station	Not included.	One or more underground storage basins included, with total capacity of approximately 4 million gallons (for a flow reduction of approximately 20 mgd, based on the design storm).
Equalization storage within WWTP	Up to two basins with capacity of approximately 8 million gallons included (for flow of approximately 38 mgd); storage provided before or after primary clarifiers.	One basin with capacity of approximately 4 million gallons included (for a flow reduction of approximately 18 mgd, based on the design storm), located after the headworks or the primary clarifier.
Addition of headworks to treatment train	Included, with treatment capacity of 78 to 98 mgd, depending on treatment configuration.	Included, with treatment capacity of 78 mgd.
Upgrade and replacement of other WWTP facilities	Included, to create 60 mgd of effluent meeting discharge requirements.	Included, to create 60 mgd of effluent meeting discharge requirements.

### 2.1.1 In-System Storage Program

As discussed in Chapter 1, the PWWF in 2035 is projected to be 98 mgd (Carollo Engineers, Inc., 2014). The existing collection system and treatment facility capacity are insufficient to address these flows. The In-System Storage Program would address the expected PWWF of 98 mgd. This CWP alternative would include construction of one or more underground, in-system storage basins upstream from the Dale Avenue Pump Station. These basins would store up to approximately 20 mgd of the wet weather flows. One or more new pipelines may be required to connect the storage basin(s) to the collection system. The in-system storage would reduce the needed capacity and size of pipelines and pump stations downstream from the storage basin.

The WWTP facilities would be sized to handle up to 78 mgd of influent. Approximately 4 million gallons of storage would be provided within the WWTP for flow equalization, because the WWTP outfall hydraulic capacity is 60 mgd. Wastewater exceeding 60 mgd would be stored until flows through the WWTP are low enough to treat and discharge the stored water. The equalization basin is expected to be located directly

downstream from either the headworks or the primary clarifier. The location of the equalization basin within the WWTP would affect the size of the preliminary treatment processes.

The In-System Storage Program would include all projects listed in Section 2.2.1, except for the new Dale Avenue Pump Station. This CWP alternative also could include the projects described in Section 2.2.2.

### 2.1.2 Full Conveyance Program

The Full Conveyance Program would address the expected peak wet weather flows of 98 mgd. Preliminary WWTP facilities would be sized to handle up to the full 98-mgd influent. As a result, this CWP alternative would require larger-capacity pipelines and pump station upgrades, especially for Dale Avenue Pump Station, compared to the In-System Storage Program. Approximately 8 million gallons of storage, likely in two separate equalization basins, would be provided within the WWTP for flow equalization, because the WWTP outfall hydraulic capacity is 60 mgd. Wastewater over 60 mgd would be stored until flows through the WWTP are low enough to treat and discharge the stored water. The equalization basins could be located directly upstream or downstream from either the headworks or directly downstream from the primary clarifier. The location of the equalization basins would affect the size of the preliminary treatment processes.

The Full Conveyance Program alternative would include all projects listed in Section 2.2.1, except for the in-system storage basin(s). As previously discussed, the size and capacity of many of the pipelines and pump stations would be greater for the Full Conveyance Program than the In-System Storage Program. Under the Full Conveyance Program, pipelines would have larger diameters in some cases, and pump stations could require larger pumps or larger wet wells where water is held before pumping.

The Full Conveyance Program alternative could include any of the projects described in Section 2.2.2.

## 2.2 Project Descriptions

This section describes primarily at a programmatic level the individual projects included in the two CWP alternatives. It also describes typical construction and operation approaches.

### 2.2.1 Collection System Projects

San Mateo plans to upgrade numerous components of its collection system. The City is performing ongoing studies, including an I/I study and a pump station and flow monitoring condition assessment, to provide additional information about the capacity and condition of the collection system. As this information is developed, some currently proposed collection system projects may be modified or determined to be unnecessary. [Figure 2-2 provides an overview of the location of all collection system projects currently proposed.](#) The final collection system upgrades to be performed and their specific locations would be known after these studies are completed and after the CWP alternative is selected.

#### 2.2.1.1 Proposed New, Extended, and Upsized Sanitary Sewer Relief Pipeline Projects

The City prepared an initial assessment of potentially needed collection system improvements (Carollo Engineers, Inc., 2014) that was further evaluated and refined. The following collection system projects are currently proposed and are shown on Figure 2-2a; the descriptions are approximate and may change based on the CWP alternative chosen and additional design effort:

- **17th Avenue Relief:** Install 4,250 feet of new 18-inch diversion pipe.
- **28th Avenue Relief:** Upsize 840 feet of 10-inch pipe to 15-inch pipe and 420 feet of 6-inch pipe to 12-inch pipe.
- **41st Avenue/Pacific Pump Station New Force Main:** Install 3,600 feet of new 12-inch force main to redirect discharge from El Camino Real Trunk Sewer to Delaware Street Trunk Sewer.
- **5th Avenue Relief Extension El Camino Real to Railroad:** Upsize 1,730 feet of 12-inch pipe to 15-inch pipe and connect to existing 18-inch pipe.

- **Barroilhet/El Camino Real Relief:** Upsize 1,900 feet of 12-inch pipe to 15-inch pipe.
- **Casanova Drive Relief:** Install 1,000 feet of parallel 15-inch pipe and 1,650 feet of parallel 18-inch pipe.
- **Colegrove Relief Extension from 39th Avenue to 36th Avenue:** Upsize 740 feet of 8-inch pipe to 10-inch, 12-inch, and 15-inch pipe. Upsize 350 feet of 10-inch pipe to 15-inch pipe.
- **Cypress Avenue Relief:** Upsize 820 feet of 10-inch pipe to 15-inch pipe.
- **Dale Avenue Pump Station Force Main Replacement:** Rehabilitate the force main from Dale Avenue Pump Station to the WWTP.
- **Dale Avenue Relief:** Install 730 feet of new 12-inch diversion pipe and upsize 900 feet of 10-inch pipe to 12-inch pipe.
- **Edinburgh/Sonora Relief Extension:** Install 122 feet of new 8-inch pipe. Upsize 795 feet of 6-inch pipe to 8-inch pipe and 120 feet of 8-inch pipe to 12-inch pipe.
- **El Camino Real/Poplar Relief:** Install 2,650 feet of new 15-inch diversion pipe.
- **El Camino Real Relief:** Upsize 310 feet of 8-inch pipe and 1,030 feet of 10-inch pipe to 15-inch pipe.
- **El Camino Real Relief Extension from 38th Avenue to 36th Avenue:** Upsize 310 feet of 8-inch pipe and 1,030 feet of 10-inch pipe to 15-inch pipe.
- **Franklin Relief Fairfax to Virginia:** Upsize 600 feet of 8-inch pipe to 10-inch pipe.
- **Glendora/Shasta Relief:** Install 600 feet of parallel 10-inch pipe and upsize 1,670 feet of 8-inch pipe to 10-inch pipe. Extend project downstream to end of Shasta and connect to sewer.
- **Hacienda/Flores Relief:** Install 3,150 feet of new 21-inch and 1,250 feet of new 24-inch diversion pipe. Intercept flows at 27th and 28th Avenues.
- **Hillsdale Relief Extension Alameda de las Pulgas to Hacienda:** Upsize 1,200 feet of 18-inch pipe to 12-inch pipe. Upsize 350 feet of 8-inch pipe to 12-inch pipe.
- **Idaho Relief Extension from 3rd Avenue to 5th Avenue:** Upsize 1,120 feet of 24-inch pipe to 27-inch pipe.
- **Idaho Relief Extension Mt. Diablo to Tilton:** Upsize 660 feet of 15-inch pipe to 24-inch pipe.
- **Kehoe-Norton Relief:** Upsize 1,420 feet of 8-inch, 10-inch, and 12-inch pipe to 15-inch pipe and upsize 270 feet of 12-inch pipe to 18-inch pipe.
- **Kehoe-Van Buren Relief:** Install 1,500 feet of new 15-inch diversion pipe. Install 2,950 feet of new parallel 18-inch pipe to connect to Los Prados Trunk. Install 140-foot connection from MH 371-46X to new sewer.
- **Laurie Meadows/Suzie Street Relief:** Upsize 380 feet of 10-inch pipe to 12-inch pipe.
- **Los Prados #3 to Bahia:** Upsize 1,040 feet of 8-inch pipe to 10-inch pipe.
- **Los Prados Replacement:** Upsize 2,100 feet of 21-inch pipe to 24-inch pipe.
- **Maple Street Relief:** Upsize 2,000 feet of 12-inch pipe to 18-inch pipe.
- **Mt. Diablo Avenue Relief Extension El Dorado to Humboldt:** Upsize 1,150 feet of 12-inch pipe to 15-inch pipe.
- **Santa Clara Relief:** Upsize 110 feet of 10-inch pipe to 12-inch pipe and 270 feet of 8-inch pipe on Pasadena Drive to 12-inch pipe.

- **South Delaware/Bay Meadows Parallel:** Install 3,250 feet of new 36-inch sanitary sewer parallel to existing line.
- **South Trunk Phase I:** Install 54-inch-diameter sanitary sewer relief line from the intersection of Idaho and Sunnybrae, micro-tunneling under US-101, to the Dale Avenue Pump Station easement immediately west of Patricia Avenue. Includes 66-inch steel casing under US-101.
- **South Trunk Phase II:** Potential upsize of 7,000 feet of 30-inch pipe to 36-inch, 42-inch, or 48-inch pipe.
- **Yew Street Relief Barneson to State Route 92 (SR-92):** Upsize 910 feet of 8-inch pipe to 10-inch pipe. Upsize 79 feet of 10-inch pipe to 12-inch pipe.

In addition, two subbasin collection system rehabilitation projects are proposed:

- **Subbasin Collection System Rehabilitation Phase I:** Focused rehabilitation of subbasins in San Mateo Village South and/or Los Prados to reduce I/I into the wastewater collection system, with the goal of reducing the PWWF to Dale Avenue Pump Station and the WWTP. This project may include replacing lower and/or upper laterals, rehabilitating manholes, and rehabilitating or replacing pipe using open cut, pipe bursting, and cured-in-place pipe (CIPP) lining in portions of the Los Prados C-4 subbasin, south of SR-92 and/or San Mateo Village South.
- **Subbasin Collection System Rehabilitation Phase II:** Focused rehabilitation of subbasins in San Mateo Village North and/or Shoreview to reduce I/I into the wastewater collection system, with the goal of reducing the PWWF to Dale Avenue Pump Station and the WWTP. The project also may help reduce salinity in the WWTP influent. This project may include replacing lower and/or upper laterals, rehabilitating manholes, and rehabilitating or replacing pipe using open cut, pipe bursting, and CIPP lining in portions of the Los Prados C-4 subbasin north of SR-92 and/or San Mateo Village North.

### 2.2.1.2 Pipeline Project Construction

The City may construct new sanitary sewer relief pipelines and extend or upsize existing relief pipelines as part of the CWP. These new pipelines would provide relief capacity to the existing sanitary sewer lines to minimize the potential of sanitary sewer overflows. The large majority of existing and proposed pipelines are located in City rights-of-way, primarily in roadways.

Several technologies are available for installation of the sewer relief pipelines. The appropriate technology would be determined on a case-by-case basis as determined by location, right-of-way restrictions, soil conditions, depth, and other site-specific factors. The following sections describe the technologies.

#### Open Trench

Prior to construction, the contractor would complete potholing to identify utility conflicts, survey the alignment, and mark the work limits. Construction of a pipeline using open trenches is typically done in segments of approximately 200 to 500 feet, with each segment taking approximately 2 to 5 workdays to complete. Construction typically begins at the downhill end and proceeds to the uphill end. Depending on local conditions, the site, and the project, one or two lanes of a roadway would be closed during construction; traffic would be detoured using appropriate traffic controls.

The contractor would cut the pavement and demolish the asphalt before beginning soil excavation. Contractors would remove pavement materials from the site for reuse or recycling at other locations, in accordance with a construction waste diversion plan that would be prepared prior to the start of construction of each project. The trench typically would be a minimum of 5 feet deep, and its width would be restricted to 2.5 times the pipe diameter. Most pipes would be 10 to 12 inches in diameter, with trenches up to 30 inches wide. The largest pipes would be up to approximately 54 inches in diameter, with a trench less than 8 feet wide. All soils would be hauled to a staging area if they would be used for backfill or to an area recycling center (see Figure 2-3) for use by others. Stockpiling of soils would not typically occur at the project site. Trenches would be shored, as required, for safety and protection of existing improvements. If

an existing pipeline is to be removed, which is typically done if the new pipeline is in the same location or same right-of-way, a temporary sewer bypass would be installed so that the existing pipeline is not in use during construction. Old pipeline would be disposed of at an appropriate location. If the new pipeline would be placed in a new right-of-way, the existing pipeline would be abandoned in place.

To install a new pipeline, the contractor would place a layer of permeable gravel to provide a firm bedding to support the pipe. This also allows the contractor to manage water that gets into the trench; the water would be pumped out and discharged to the sanitary sewer system. The new pipeline would then be placed in the trench and connected to the system, usually at manholes. Service laterals would also be reconnected as needed. Granular material and soil appropriate for structural backfill would then be placed in the trench. The soils used would either be the soils stockpiled at the designated staging areas, if suitable for structural backfill, or soils obtained from an offsite location. A cement-based, low-strength concrete fill could also be used. The contractor would backfill the trench and in some cases install a concrete trench cap. The contractor would then pave the disturbed area with asphalt or concrete to match the existing area. Roadways would be re-stripped as needed.

Construction equipment that could be used includes an excavator, backhoe with a jackhammer, skid steer loader, dump trucks (street size would dictate truck size), street sweeper, compactors (typically small enough to fit in back of a pickup truck), paving machine, roller, pickup trucks, and pumps and pipes for dewatering and sewer bypassing. Up to approximately 10 construction workers would be required to construct each open-trench pipeline project.

### **Trenchless Installation**

Trenchless installation would be used where site constraints, such as utility and traffic-related conflicts and highway, railroad, and creek crossings, prevent open-trench excavations. In general, trenchless installation would entail cutting a plug of soil and pushing or pulling the new pipeline through the hole vacated by the soil plug. A pit would be excavated at both ends of the new pipeline alignment. The pits would typically be 12 feet wide by 12 to 25 feet long, depending on site-specific conditions and equipment used, and 5 to 30 feet deep, depending on depth of collection system at that location. Shoring would be installed to secure the sides of the pits, as needed, for worker safety and to protect existing improvements. Specialized trenchless installation machinery would be placed in the pit at one end of the alignment; the other pit would serve as the receiving pit.

Trenchless technologies include micro-tunneling, jack-and-bore, and pipe bursting in which a machine would travel through the existing pipeline, destroy it, push pipe fragments into adjacent soils, and pull the new pipeline in. Some trenchless technologies use water for lubrication or cooling in a closed-loop system that separates slurry. Excess water at construction completion, typically several thousand gallons, would be discharged into the sanitary sewer system in accordance with the City's NPDES permit requirement. In addition, groundwater may be encountered in excavations during installation of the pipelines and would be tested and disposed of in the sanitary sewer system or at another location, as appropriate.

Site preparation activities, such as potholing and asphalt removal, and site closure activities, such as backfilling and repaving, would be similar to those described for open-trench construction. Up to approximately 10 construction workers would be required to construct each trenchless pipeline project.

### **In-place Rehabilitation**

Some pipelines may be rehabilitated in place through techniques including cure in place and slip lining, which would place a new pipe inside the old pipe. A temporary sewer bypass would be installed prior to installation. In some cases, hot water or steam would be used to cure the resin in the liner and would be treated prior to discharge to the sanitary sewer. Installation is typically done through manholes, so minimal ground disturbance would be required. Temporary lane closures for several days may be needed for manhole access.

### 2.2.1.3 Rehabilitation or Upgrade of Pump Stations

Existing pump stations in the collection system may require repair or upgrades to increase capacity to convey peak flow to Dale Avenue Pump Station and the WWTP or to improve operability or condition. [The pump station projects that are currently proposed are shown on Figure 2-2b.](#) Specific pump station projects may include the following:

- **38th Avenue/El Camino Pump Station Upgrade:** Expand the pump station's firm capacity to meet PWWFs by replacing two 1.15-mgd pumps with two 1.8-mgd pumps; adding VFDs and a grinder; rehabilitating the wet well; and upgrading the discharge piping, electrical supply, telemetry and controls, and odor control equipment.
- **41st Avenue/Pacific Pump Station Upgrade:** Expand the pump station's firm capacity to meet PWWFs by replacing two 1.3-mgd pumps with two 1.8-mgd pumps; adding VFDs and a grinder; rehabilitating the wet well; and upgrading the discharge piping, electrical supply, telemetry and controls, and odor control equipment.
- **Dale Avenue Pump Station Rehabilitation:** Rehabilitate the existing pump station, which pumps directly to the WWTP.
- **Dale Avenue New Pump Station and Force Main:** Construct a new pump station and force main on the existing Dale Avenue Pump Station parcel between S. Norfolk Street and Patricia Avenue. The new pump station would supplement the capacity of the rehabilitated existing Dale Avenue Pump Station. This project would be implemented only for the Full Conveyance Program.
- **Kehoe-Kelly Pump Station Upgrades:** Expand the pump station's firm capacity by installing two duty pumps and one standby pump to meet the new design flow.
- **Los Prados No. 1 Pump Station Upgrades:** Expand the pump station's firm capacity by installing two duty pumps and one standby pump to meet the new design flow.
- **Los Prados No. 2 Pump Station Upgrades:** Replace the pumps; rehabilitate the wet well; and upgrade the discharge piping, electrical supply, telemetry and controls, and odor control equipment.
- **Los Prados No. 3 Pump Station Upgrades:** Expand the pump station's firm capacity and replace two duty pumps and one standby pump to meet new design flow.
- **Mongini Pump Station Upgrades:** Expand the pump station's firm capacity. Install a bypass pumping connection and install backup pump controls.
- **Santa Clara Pump Station Upgrade:** Expand the pump station's firm capacity to meet PWWFs by replacing three 1.44-mgd pumps with three 2.7-mgd pumps; adding variable-frequency drives (VFD) and a grinder; rehabilitating the wet well; and upgrade the discharge piping, electrical supply, telemetry, and controls.

Other pump stations may require upgrades, depending on the results of a future condition assessment to be performed on all pump stations. The majority of the rehabilitation projects would include the replacement of pumps and minor upgrades of other existing equipment and would require minimal ground disturbance or activities outside the pump station footprint.

Some pump stations would require rehabilitation of the concrete wet wells, which are underground vaults for sewage storage until it is pumped into the system. Prior to the start of rehabilitation, sewage flows would be diverted around the pump station through a bypass, either the existing sewer system or a temporary small pump and bypass pipe installed aboveground or belowground. Construction staging would be done on City off-street rights-of-way, as available, and along adjacent streets; lane closures may be required. Wet well access, including transport of equipment, materials, and workers, would be through existing pump station entrances.

Some pump station projects would require that wet wells be demolished and reconfigured or enlarged. These projects would require excavation of several feet of soil to reach the existing wet well, which would be demolished. The concrete would be transported to a recycling facility. The wet well area would then be enlarged or reconfigured to the size of the new wet well, which typically ranges from approximately 5 to 50 feet square and up to 35 feet deep. A new Dale Avenue Pump Station could be up to 76 feet long by 50 feet wide by 36 feet deep. Shoring would be installed as needed for safety and to protect existing improvements. Excavations would generally be within City off-street rights-of-way, although construction staging may use adjacent streets. As described for the pipeline projects, soil would be stored in stockpile areas that typically are not on site. Concrete would be poured to create the new wet well, followed by backfilling with appropriate stockpiled or imported soil that would be revegetated or paved at the surface. Construction would take approximately 1 to 4 months, depending on the size of the wet well. Construction equipment could include, but is not limited to, excavators, backhoes, dump trucks, and cement mixers. Up to approximately five construction workers would be required to construct each new wet well. Prior to start of rehabilitation, the sewage flow would be diverted around the pump station through a temporary pump and bypass pipe installed above or below the ground.

#### 2.2.1.4 In-system Storage Basin

San Mateo may construct up to approximately 4 million gallons of belowground, in-system flow equalization storage in one or more locations. The goal of in-system storage would be to equalize flows upstream from Dale Avenue Pump Station. Several sites have been identified as potential in-system storage basin locations. Further hydraulic analysis would be performed to evaluate the potential site(s) and identify those that adequately address system storage and overflow issues. Other factors that would be considered include site size, land ownership, cost, and other site constraints. Suitable existing site uses may include, but are not limited to, recreation fields, parks, and parking lots. The following locations (listed in alphabetical order) were selected from a longer list of alternatives, based on potential system benefits (see Appendix A). [The sites that are currently under consideration are shown on Figure 2-2c.](#) Additional sites may be identified.

- Abbott Middle School at 600 36th Avenue
- Bay Meadows Phase II Park at 28th Avenue, between Saratoga Avenue and South Delaware Street
- California Water Services Company (parking lot) at 341 North Delaware Street
- Caltrain Station – Park Green Development at South Delaware Street and Concar Drive
- Central Park at 50 East 5th Avenue
- Fiesta Meadows Park at 1141 Bermuda Drive
- Hillsdale High School at 3115 Del Monte Street
- Hillsdale Shopping Center (parking lot) at 60 31st Avenue
- Martin Luther King Jr. Park at 725 Monte Diablo Avenue
- San Mateo County Expo Center at 2495 South Delaware Street
- San Mateo County Hospital (parking lot) at 222 West 39th Avenue
- Trinta Park at 150 19th Avenue

Prior to excavation of an in-system equalization basin, potholing to locate utilities and surveying would be performed. Vegetation or pavement would be removed and recycled, as feasible. The specific dimensions of the basin would be determined during design; typical dimensions may be an 8-foot depth of usable storage, 2 feet of freeboard, and 5 feet of cover. To provide 4 million gallons of storage in one basin with these typical dimensions, an area approximately 230 by 230 feet and 15 feet deep would be excavated. Concrete would be poured to create the basin. Pumps, maintenance and cleaning equipment, and odor control equipment would be installed and are typically placed underground. The basin would be covered with 5 feet of compacted, structurally appropriate backfill that would then be vegetated or repaved. Access hatches and vents for treated air would be on the ground surface. Minor appurtenances would be located on the ground surface, typically hatches set into the ground to access ventilation and odor control equipment and a small building containing an elevator for people and equipment to enter the basin belowground. Hatches could

cover approximately 200 square feet, and an elevator building approximately 100 square feet, for a total of approximately 300 square feet of aboveground appurtenances. A typical cross-section of an equalization basin and a photograph of the exterior of the Windemere Combined Sewer Overflow Storage Facility in Seattle are shown in Figure 2-4.

## 2.2.2 Wastewater Treatment Plant Projects

The City plans to upgrade or replace much of its wastewater treatment facilities to meet current and anticipated future regulatory requirements and to better manage wet weather flows. Proposed improvements for the WWTP are expected to include replacement of the failing influent junction box and primary clarifiers, construction of a headworks with grit and screening, improvements to or replacement of the secondary treatment facilities to meet the Cease and Desist Order requirements, construction of an equalization storage basin, and rehabilitation of other aging infrastructure.

In this report, the WWTP Site includes the following (see Figure 2-5):

- The existing WWTP property
- The City-owned Detroit Drive site across from the existing WWTP
- Three privately owned parcels (referred to as the Bayfront parcels) northeast of the existing WWTP (currently used by a trucking business)
- A City-owned Dale Avenue parcel west of the existing WWTP (currently unused)
- Roadways around the existing WWTP that the City may incorporate into the WWTP

### 2.2.2.1 Wastewater Treatment Plant Configuration

San Mateo is evaluating different types of treatment processes and locations within the WWTP Site for WWTP facilities. The following three main treatment processes under consideration could be used with either the Full Conveyance alternative or In-System Storage Program:

1. Baseline treatment
2. Conventional activated sludge (CAS) system
3. Membrane bioreactor (MBR) system

All three processes would provide treatment to meet current and future regulatory requirements. In addition, all three processes would produce effluent that meets Title 22 regulations and could be available for reuse.

Potential layouts for the three processes are shown on Figures 2-6 through 2-8. Figure 2-9 compares the individual treatment facilities that would be included for the three treatment processes. As the evaluation continues, these layouts may change; however, all facilities would be located within the site boundaries shown on Figure 2-5. The final facilities and layout would meet all wet weather flow and regulatory requirements. The three treatment processes under consideration are described in more detail below.

#### Baseline Treatment Process

The baseline treatment process would include a combination of upgrades at existing WWTP facilities and construction of new facilities. The process would consist of headworks, primary treatment, flow equalization/storage, secondary treatment, tertiary treatment, disinfection, solids handling, and various in-plant support facilities and utilities. The baseline treatment process is similar to the treatment described in the *City of San Mateo Integrated Wastewater Master Plan* (Carollo Engineers, Inc., 2014), with some modifications including advanced treatment:

- The new headworks structure to house screening, grit removal, flow measurement, screenings compaction and handling, and flow splitter structure to divert flows to the next step of treatment. The new headworks project is described in Section 2.2.2.2.
- Primary treatment would take place in primary clarifiers, which could have a rectangular or circular footprint. The primary clarifiers are described in Section 2.2.2.2. Primary treated water would then gravity flow (or potentially pumped) to the secondary treatment facilities under normal operations.
- Under high-flow conditions typically experienced under wet weather events, flows would be diverted to new flow equalization storage basins at the WWTP Site, which could be aboveground or underground, for storage of the flows that exceed the WWTP outfall capacity. The sizing of the basins would depend on the Program alternative implemented; the Full Conveyance Program would have greater equalization storage at the WWTP than the In-System Storage Program. Each basin would include associated facilities, such as pumping, odor control, and cleaning features. If built underground, the equalization basin would have aboveground structures, such as parking and mechanical equipment, constructed over it. The stored flows would be diverted to the secondary treatment system as the incoming flows subside below the outfall capacity.
- Secondary treatment would consist of biological treatment after primary treatment. Secondary treatment would be sized to provide treatment under all flow conditions that are at or below the outfall flow capacity of the WWTP (60 mgd). Biological treatment would take place in concrete tanks called aeration basins that are separated into parallel tanks with inlets and outlets to divert flow through the tanks. Microorganisms are naturally present in wastewater and require food and oxygen to survive. Mechanical equipment in the aeration basins (e.g., air diffusers, submersible mixers, and recycle flow pumps) would support biological treatment by providing a supply of dissolved oxygen so the microorganisms metabolize soluble organic matter in the influent. The mechanical equipment may be automated. The secondary treatment system would use existing tanks and equipment, which may need structural and mechanical upgrades. In addition, new secondary treatment tanks would be needed to pass the highest expected flows during wet weather conditions.

After treatment in the aeration basins, the wastewater would flow into concrete clarifiers (both existing and new) to remove settleable solids. Each clarifier tank would contain an inlet and an outlet for the treated wastewater flow. Captured solids, referred to as “waste activated sludge,” that settle to the bottom of the clarifiers would be collected and pumped from each clarifier and diverted to the existing solids handling facility for further treatment. The treated flow passing through the clarifier outlet would be diverted to tertiary treatment, the next step in the treatment process.

- Tertiary treatment would use a filter system to remove additional solids. The existing tertiary filtration facilities would be upgraded or replaced by using a different filtration technology than currently used. The filter system could contain sand, cloth, stainless steel, or similar filtration media and may require the use of coagulants such as ferric chloride or alum and/or polymers. Coagulants and polymers would cause the remaining solids to clump together, making them easier to filter. Filtered water would then flow through concrete disinfection tanks where it would be disinfected with sodium hypochlorite and dechlorinated with sodium bisulfite prior to final discharge or reuse. Disinfection facilities would include existing or new chlorine contact basins, chemical metering pumps, and chemical storage tanks. Dechlorination facilities would include existing or new bisulfite feed pumps and bulk storage tanks.
- Existing solids handling facilities would be used for treatment of primary solids, waste activated sludge, and solids from the tertiary treatment process.

### **Conventional Activated Sludge System**

The CAS system would include a combination of upgrades to existing WWTP facilities and construction of new facilities. The system would consist of headworks, flow equalization/storage, primary treatment, secondary treatment with conventional activated sludge system, tertiary treatment, disinfection, solids

handling, and various in-plant support facilities and utilities. The CAS system would be similar to the baseline treatment process, but it would use a new, different secondary treatment technology and the existing aeration basins would still be used for equalization storage instead of new storage facilities.

- The new headworks would consist of a structure to house screening, grit removal, flow measurement, screenings compaction and handling, and flow splitter structure to divert flows to the next step of treatment. The new headworks project is described in Section 2.2.2.2.
- During wet weather events, flows that exceed the outfall flow capacity would be stored after passing through the headworks in a flow equalization storage basin. The existing secondary treatment aeration basins would be converted and upgraded to be flow equalization tanks. If needed, additional equalization storage would be constructed belowground, potentially on the Dale Avenue parcel. The stored flows would be diverted to the primary treatment as the incoming flows subside below the outfall capacity.
- Primary treatment would take place in primary clarifiers that have a circular footprint. The primary clarifiers are described in Section 2.2.2.2. Primary treated water would then be pumped or gravity flow to the secondary treatment facilities.
- Secondary treatment would consist of biological treatment of the primary treated wastewater. Biological treatment would take place in concrete tanks that are separated into parallel tanks with inlets and outlets to divert flow through the tanks. Microorganisms are naturally present in wastewater and require food and oxygen to survive. Mechanical equipment in the aeration basins (e.g., air diffusers, submersible mixers, and recycle flow pumps) would support biological treatment by providing a supply of dissolved oxygen so the microorganisms metabolize soluble organic matter in the influent. The mechanical equipment may be automated. Secondary treatment for the CAS system would use new tanks with sufficient capacity to treat design wastewater flows; the existing aeration basins would not be used for treatment. The new secondary treatment system would be sized for a 42 mgd peak flow and a 21 mgd maximum month. During peak wet weather events, when the capacity of the secondary system is exceeded, a wet weather treatment scheme would be implemented using a biological treatment tank and two of the primary clarifiers as secondary clarifiers. The biological treatment tank, also referred to as a contact stabilization tank, would only be used during peak flows that exceed the secondary capacity.

After biological treatment, the water would flow into existing and new concrete clarifiers for removal of settleable solids. Each clarifier tank would contain an inlet and an outlet for the treated wastewater flow. Captured solids, referred to as “waste activated sludge,” that settle to the bottom of the clarifiers would be collected and diverted to the existing solids handling facility for further treatment. The treated flow would be diverted to tertiary treatment, the next step in the treatment process.

- Tertiary treatment would use a filter system to remove additional solids. The existing tertiary filtration facilities would be upgraded or replaced by using a different filtration technology than currently used. The filter system could contain sand, cloth, stainless steel, or similar filtration media and may require the use of coagulants such as ferric chloride or alum and/or polymers. Coagulants and polymers would cause the remaining solids to clump together, making them easier to filter. Filtered water would then flow through concrete disinfection tanks where it would be disinfected with sodium hypochlorite and dechlorinated with sodium bisulfite prior to final discharge or reuse. Disinfection facilities would include existing or new chlorine contact basins, chemical metering pumps, and chemical storage tanks. Dechlorination facilities would include existing or new bisulfite feed pumps and bulk storage tanks.
- Existing solids handling facilities would be used for treatment of primary solids, waste activated sludge, and solids from the tertiary treatment process.

## Membrane Bioreactor System

The MBR system would include a combination of upgrades to existing WWTP facilities and construction of new facilities. The MBR system would consist of headworks, flow equalization/storage, primary treatment, secondary treatment with membrane bioreactors, disinfection, solids handling, and various in-plant support facilities/utilities.

- The new headworks would consist of a structure to house screening, grit removal, flow measurement, screenings compaction and handling, and flow splitter to divert flows to the next step of treatment. The new headworks project is described below in Section 2.2.2.2.
- During wet weather events, flows that exceed the outfall flow capacity would be stored after passing through the headworks in a flow equalization storage basin. The existing secondary treatment aeration basins would be converted and upgraded to flow equalization tanks. If needed, additional equalization storage would be constructed below ground, potentially on the Dale Avenue parcel. The stored flows would be diverted to the primary treatment as the incoming flows subside below the outfall capacity.
- Primary treatment would take place in primary clarifiers that would have a circular footprint. The primary clarifiers are described below in Section 2.2.2.2. Primary treated water would then be pumped or gravity flow to the secondary treatment facilities.
- Secondary treatment would consist of biological treatment of the primary treated wastewater. The biological treatment would take place in new concrete tanks that are separated into parallel tanks with inlets and outlets to divert flow through the tanks, as well as mechanical equipment that would support biological treatment such as air diffusers and recycle flow pumping. After passing through biological tanks, the wastewater would flow into concrete membrane tanks housing the MBR membranes that would filter the biological treatment sludge and pollutants. Each membrane tank would contain an inlet for the treated wastewater flow and pumps that would pull treated water through the membranes. Captured solids, referred to as “waste activated sludge,” would be pumped from the membrane tanks/sludge piping and diverted to the solids handling facility for further treatment. The MBR system would be equipped with automated membrane maintenance system components such as pumps, water treatment chemicals such as citric acid for scaling or sodium hypochlorite for biofilm (fouling), chemical storage and feed facilities, air blowers, system monitoring devices, and sludge recycle pumps. Treated flows passing through membranes would be diverted to the next step in treatment, disinfection, consisting of concrete disinfection tanks and/or ultraviolet light disinfection system. Following disinfection, the treated wastewater would be discharged or reused. The new secondary treatment system would be sized for a 42 mgd peak flow. During peak wet weather events, when the capacity of the secondary system is exceeded, a wet weather treatment scheme would be implemented using a biological treatment tank and two of the primary clarifiers as secondary clarifiers. The biological treatment tank, also referred to as a contact stabilization tank, would only be used during peak flows that exceed the secondary capacity.
- Existing solids handling facilities would be used for treatment of primary and waste activated sludge (secondary treatment solids).

### 2.2.2.2 New Headworks and Primary Clarifier Projects

All three treatment processes under consideration would include new headworks and new primary clarifier projects. These projects would be the first WWTP projects to be constructed and are planned for construction in 2017.

#### New Headworks Project

The existing WWTP does not have a headworks, which is required for reliability and to increase the capacity of the preliminary treatment facilities. A new headworks with capacity of 78 to 98 mgd would be constructed as a preliminary treatment facility. The new headworks would consist of a structure to house

screening, grit removal, flow measurement, screenings compaction and handling, and flow splitter structure to divert flows to the next step of treatment. Mechanical screening of the wastewater would remove coarse solid materials for disposal. Grit removal would consist of a system to capture and remove grit from the wastewater flow. The removed coarse solid materials, grit, debris, and trash would be washed, compacted, and transported to an appropriate landfill facility for disposal. The flow measurement and flow splitter would then divert the wastewater to the primary treatment or to equalization storage during wet weather events. The new headworks would replace the existing influent junction box, which would be demolished after flows are re-routed to the new headworks.

The new headworks could be partially or completely enclosed. It may be a two-story facility, with the treatment and flow splitting functions located on the top level, and the screening and grit management units on the lower level. The structure may allow truck or forklift access to remove or empty waste bins. Foul air in enclosed areas of the headworks, including the headspace of the influent channels, splitter boxes, and water conveying structures, would be captured through a ductwork and fan system and transferred to an odor control treatment system. For proper control of odors, the covered and enclosed areas would be under negative air pressure. The interior of enclosures that require worker access would be ventilated in accordance with National Fire Protection Association regulations. Figure 2-10 shows an example headworks.

### **Primary Clarifier Project**

The Primary Clarifier Replacement Project would include construction of new primary sedimentation tanks and associated equipment. Primary clarifiers would receive screened and de-gritted wastewater from the headworks facility. The primary clarifiers may be similar in construction to the existing primary clarifiers (see Figure 2-11) and could have a rectangular or circular footprint. The primary clarifiers would be covered to allow capture and treatment of foul air from the wastewater as it goes through primary treatment. Solids in the water would settle to the bottom of concrete tanks, which would be constructed side-by-side or at a distance from each other; the settled solids are referred to as “primary sludge.”

The clarifiers would be capable of receiving chemicals that promote settling of solids during treatment under high flow conditions and could receive recycles from downstream treatment facilities. The design of the primary clarifiers may include an option to add chemicals such as ferric chloride, alum, and a polymer to the primary influent. These chemicals bond with suspended solids in the water, causing them to settle to the bottom of the sedimentation tanks. The chemicals would typically be used for short periods during peak flow conditions. This option could allow the facility to better handle the wet weather flow conditions. If used, the chemicals would be stored in a chemical facility with proper containment, enclosures, safety features, access for deliveries, and pumps to deliver the chemicals to the feed points. The chemical facility could be under a canopy or enclosed in a building. Each clarifier tank would have an inlet and an outlet for the treated wastewater flow, as well as collection and removal systems for the captured solids, referred to as “primary sludge.” The primary sludge would be pumped from each primary clarifier and diverted to the solids handling facility for further treatment. Primary treated flow would gravity flow or be pumped through the outlet to the next step in treatment, which could be a flow equalization basin or secondary treatment system. The primary clarifiers would be completely covered to prevent the emission of odors, and air in the headspace would be treated to remove the odors. Once the new facilities become operable, existing Primary Clarifiers 1 through 4 would be demolished.

## **2.2.2.3 Other Wastewater Treatment Plant Capital Projects**

### **Onsite Stormwater Improvements Project**

The Onsite Stormwater Improvements Project includes construction of new stormwater collection piping and a new stormwater pump station for pumping to the new headworks facility or new flow equalization basins.

## New Administration Building and Laboratory

The existing administration and laboratory buildings at the WWTP are inadequately sized for the plant staff and laboratory functions, and they are located in the center of the WWTP, which limits how new treatment facilities could be designed. New administration and laboratory buildings would likely be constructed on the City property, as previously defined, or they would be collocated with the City's Corporation Yard facilities. These facilities may be in a single building and could be multistory.

## Ancillary Facilities

The CWP may also include construction of a Fund 72 Corporation Yard (the wastewater system portion of the City's Corporation Yard), with maintenance shops, employee and visitor parking, and other City or public facilities. These facilities would be located on the existing WWTP property, the Detroit Drive parcel, or the Bayfront parcels (see Section 2.2.2 and Figure 2-5) and could be split into multiple locations within the WWTP property to accommodate space requirements. The facilities could be multistory. Recreational facilities, such as bicycle and pedestrian improvements, could be installed at the Dale Avenue parcel.

### 2.2.2.4 Repair and Rehabilitation Projects

San Mateo plans to implement several major repair and rehabilitation projects to maintain operations until new facilities come online and to upgrade treatment facilities that are not planned for replacement. It is anticipated that the new equipment would result in similar or lower energy use because of the improved efficiency while providing the same capacity of service. The repair and rehabilitation projects ultimately implemented would depend on the treatment process selected and the construction timeframe. Repair and rehabilitation projects may include the following:

- **Tank Drain Pump Replacement Project:** Replace eight tank drain pumps with two new tank drain pumps.
- **Aeration Blower Replacement Project:** Annually replace one aeration blower for several years.
- **New Standby Generator Project:** Replace existing standby generators.
- **Sodium Hypochlorite Replacement Project:** Replace sodium hypochlorite tanks, transfer pumps, day tanks, and bisulfite feed pumps.
- **Effluent Pump Station 2 Replacement Project:** Annually replace one pump for several years.
- **Electrical Equipment Replacement Projects:** One project would replace the main 21-kilovolt switchgear, motor control center (MCC) F, and MCC 1P3; the other project would replace the main outdoor switchgear; power distribution panels; Transformers 1 and 2; MCCs P1, P2, P3, P4; and the blower.
- **Digester Equipment Replacement Project:** Replace equipment in the digester complex, such as mechanical mixers, four digested sludge pumps, foam suppression pumps, and digested sludge storage recirculation pumps.
- **New Site Waste Pump Station Project:** Demolish and relocate the site waste pump station.
- **Digester Heating Equipment Replacement Project:** Replace some digester heating equipment, including hot water loop pumps, spiral heat exchangers, sludge heating hot water circulation pumps, and sludge heating recirculation pumps.
- **Dissolved Air Flotation Thickener Replacement Project:** Replace some equipment, including the drive unit, pressurization pumps, air compressor, pressurization tank, and digester feed pumps.
- **Secondary Clarifier 5 Drive Unit Replacement Project:** Replace the drive unit.
- **Digester Feed Pump and Blower Replacement Project:** Replace digester Feed Pumps 1 through 3 and the digester booster blowers.

- **Recycled Water Pump Replacement Project:** Replace recycled water pumps that supply water to the WWTP.
- **Thickening Equipment Replacement Project:** Replace thickened primary sludge pumps and VFDs, mixed sludge recirculation pumps, and mixed sludge transfer pump.
- **Dewatering Equipment Replacement Project:** Replace all centrifuge feed pumps and polymer system equipment.
- **Waste-activated Sludge Pump Replacement Project:** Replace pumps and related equipment.
- **Surge Tank Replacement Project:** Replace the surge tank that protects the outfall line from surges.

## 2.3 Overall Program Construction and Operation

### 2.3.1 Program Construction

The CWP would be constructed over a 10- to 20-year period starting in ~~2016~~2017. Project scheduling would be based on technical requirements, financing, and other implementation considerations.

Construction approaches for individual collection system projects are discussed in Section 2.2.1.

Construction work for WWTP projects is expected to be continuous over long periods. Up to approximately 50 construction workers may be at the WWTP vicinity for as long as 10 years. The City would identify one or more dedicated parking areas for construction workers. If space is not available on the Detroit Drive parcel or existing WWTP parcel, the City would develop a temporary agreement for use of another site, such as the Anchor Road parking lot owned by City of San Mateo Parks and Recreation, or it may widen the shoulder of Joinville Park Street north of the Detroit Drive parcel and re-stripe it to accommodate street parking (see Figure 2-5).

Several activities would be completed to prepare the WWTP Site for project construction. These activities may be completed as a single preconstruction project, completed separately, or completed as parts of other WWTP projects. These activities may include, but are not limited to, the following.

- Performing geotechnical surveys to collect data on soils
- Removing or remediating soils containing hazardous materials (if any)
- Removing existing concrete and asphalt
- Grading
- Demolishing existing WWTP facilities that are not in use
- Preparing staging areas, including locations for trailers, equipment laydown, and construction worker parking
- Installing construction trailers and temporary utilities
- Constructing new electrical substation, including transformer and new transmission or distribution lines
- Installing a new utility corridor (trench box)
- Installing a perimeter wall or security fencing
- Constructing temporary and permanent roads and site drainage facilities
- Installing pipe and conduit between the Detroit Drive site and the existing WWTP Site
- Constructing new temporary and permanent site entrances, including paving, gates, and signage

Construction contractors would generally be responsible for establishing staging and stockpiling locations for individual projects. To support this, the City would identify areas that could be used for temporary

stockpiling of excavated soil and for equipment staging for CWP projects. These areas may include the existing WWTP parcel, the Detroit Drive parcel, or the Dale Avenue parcel (see Figure 2-5), or other City property in San Mateo such as the Dale Avenue approach corridor between S. Norfolk Street and US-101.

Multiple CWP projects are expected to be under construction concurrently. On any given day, the following projects would be the maximum construction activity to be expected:

- Construction of two new large wastewater treatment capital projects, such as the New Headworks Project, Primary Clarifier Project, or the new administration building.
- Construction of two large replacement or new pipeline projects (large diameter and/or over approximately 1,500 feet in length).
- Construction of three small to medium pipelines projects (under approximately 1,500 feet in length).
- Construction of two pump station projects with a new or expanded wet well; this would be considered equivalent to construction of an in-system equalization basin in terms of the type and scale of construction activities.

At a maximum, it is estimated that the concurrent construction described above would generate up to 409 daily trips and 110 peak hour trips. Additional details are provided in Chapter 16. Construction worker vehicles would typically be gasoline powered, but may also include diesel, electric, or other types of cars. Construction equipment would use diesel fuel or gasoline.

### 2.3.2 Program Operation

The general operation of the new wastewater treatment processes under consideration is described in Sections 2.1.1, 2.1.2, and 2.2.2. The new WWTP would be more highly automated than the existing WWTP, so an increase in operations staff is not expected. Automation would increase reliability. Because the WWTP facilities would be new or rehabilitated, they would require less frequent maintenance and repair than the current facilities.

Similarly, because many collection system facilities would be new or rehabilitated, less frequent maintenance and repair would occur compared to current conditions.

Equalization basins, both in-system and at the WWTP, would be cleaned after each wet-weather event use, typically several times each year. Cleaning would be automated or done manually. If automated, the system would be activated after the wastewater has been drained. If done manually, workers would enter the basin through a secure, aboveground entrance after wastewater has drained and wash the surfaces of the basin with water. The wash water would be pumped into the sewage system. Air from the basins would be treated by an odor control system before being vented from the basin.

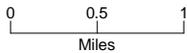
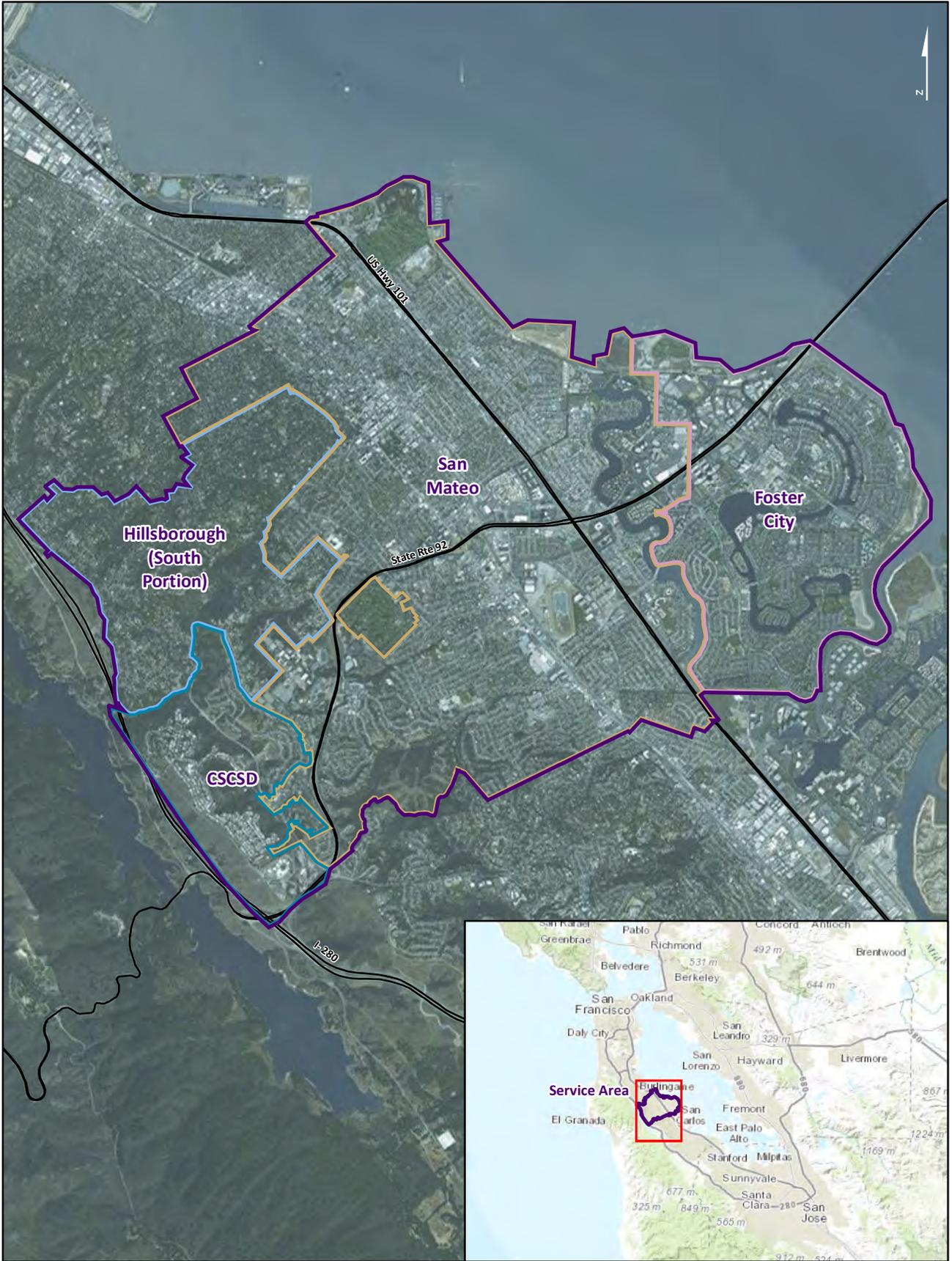
The CWP would include new equipment such as pumps and interior facility lighting that would be more energy efficient than existing equipment. However, the WWTP would treat wastewater to a higher level for recycled water use; as a result, electricity use would increase approximately 12 percent compared to current use. Electricity would be provided by Pacific Gas & Electric (PG&E). In 2012, PG&E's power mix consisted of non-emitting nuclear generation (21 percent), renewable resources including solar, wind, geothermal, biomass, and small hydroelectric (19 percent), large hydroelectric facilities (11 percent), natural gas/other (27 percent), and unspecified/untraceable (21 percent) (PG&E, 2015). No new vehicle trips for CWP operations would be expected, because of reduced maintenance requirements and increased automation.

## 2.4 References

Carollo Engineers, Inc. 2014. *City of San Mateo Integrated Wastewater Master Plan*. Prepared for City of San Mateo. October.

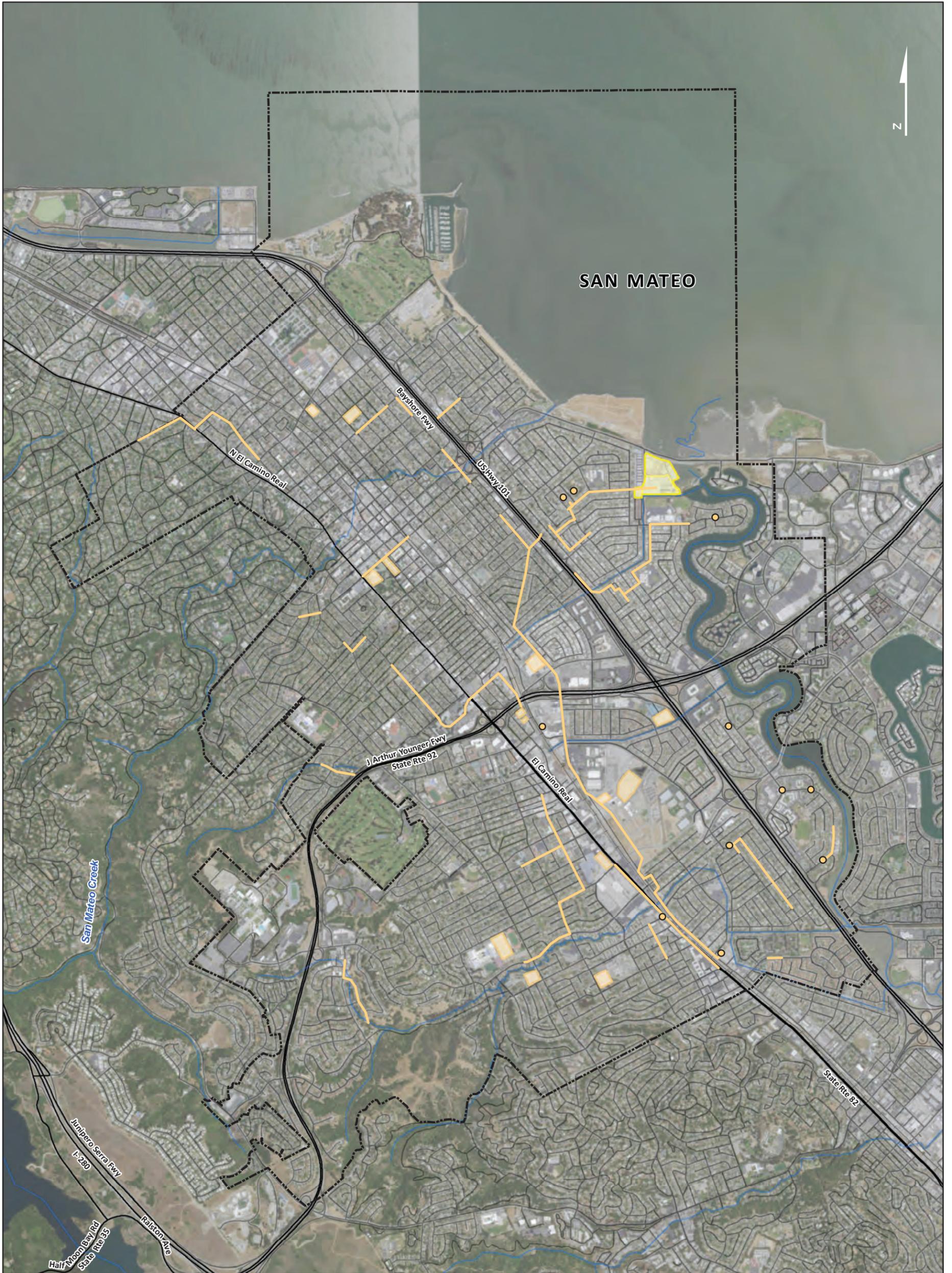
Pacific Gas & Electric (PG&E). 2015. *Clean Energy Solutions*.

<http://www.pge.com/en/about/environment/pge/cleanenergy/index.page>. Accessed October 11.



**Figure 2-1**  
**Service Area**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program

Source: Esri Map Services, County of San Mateo



- Legend**
- Pump Station Project
  - Pipeline Project
  - In System Storage Location
  - Program Area
  - WWTP Site
  - Road
  - ++ Railroad
  - Watercourse

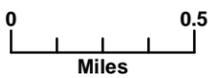
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**FIGURE 2-2**  
**Collection System Projects**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program  
**CH2MHILL.**



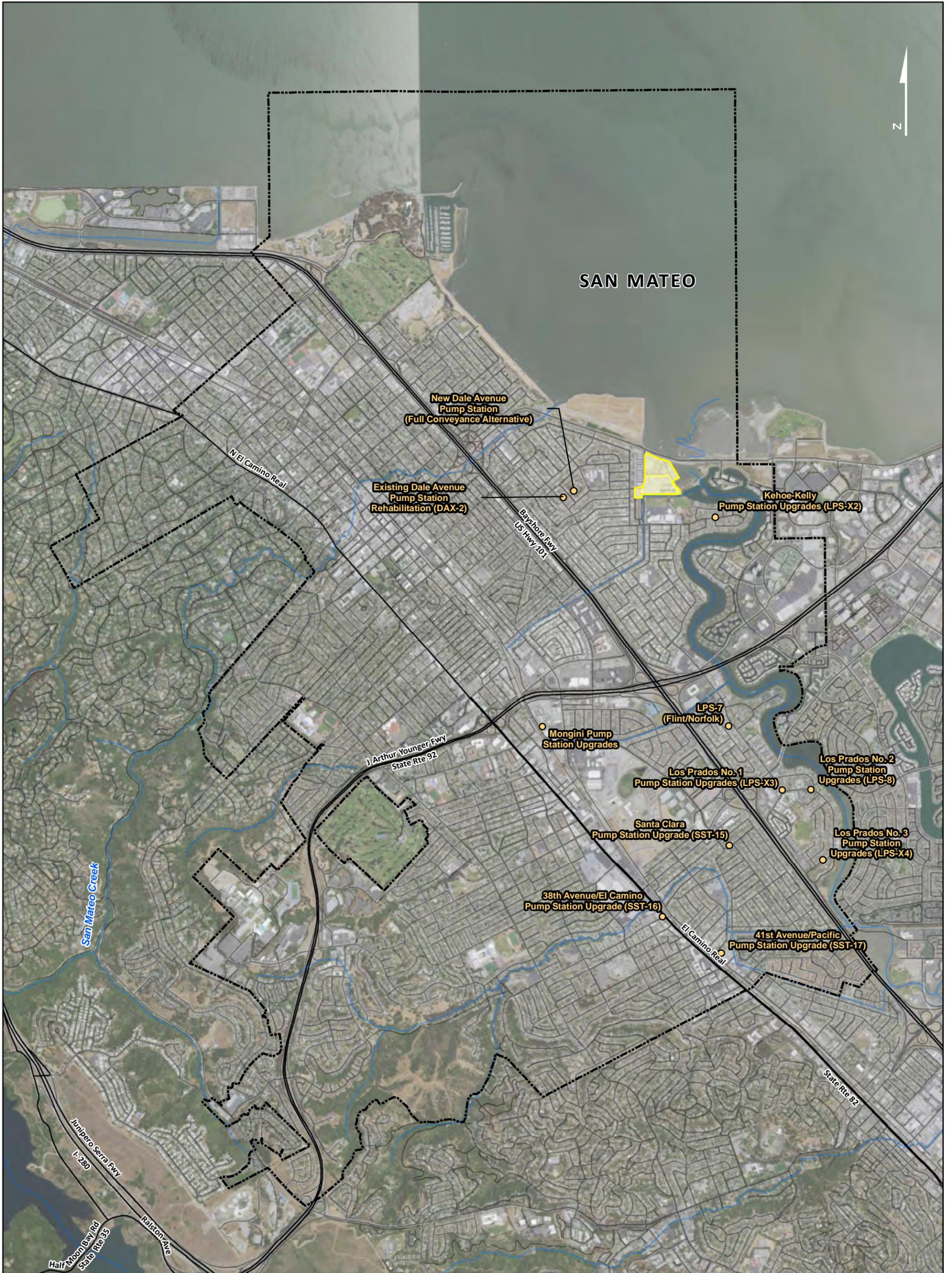
- Legend**
- Pump Station Project
  - Pipeline Project
  - WWTP Site
  - ▭ Program Area
  - Road
  - +— Railroad
  - Watercourse

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



**FIGURE 2-2a**  
**Collection System Projects**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program





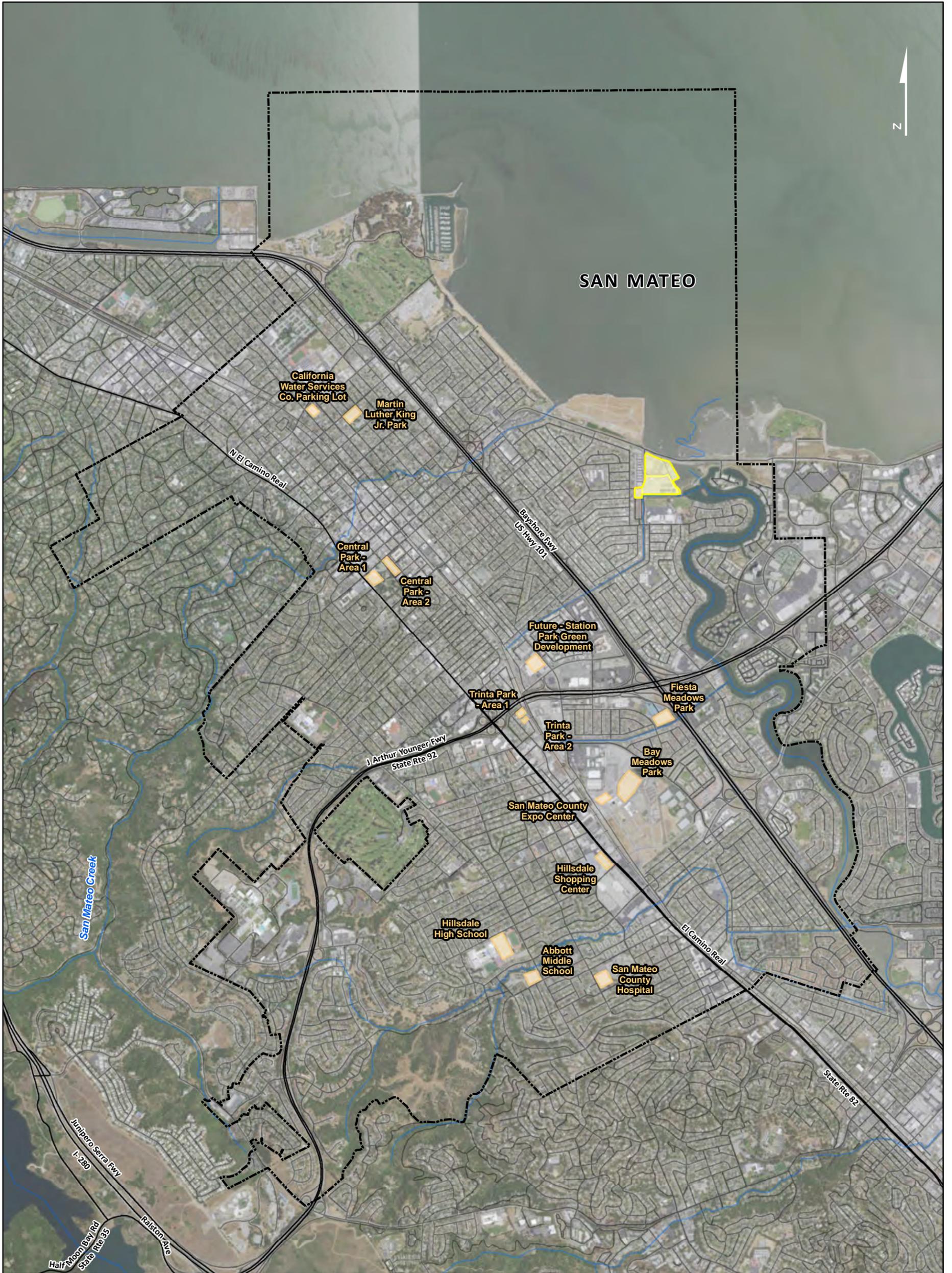
- Legend**
- Pump Station Project
  - WWTP Site
  - ▭ Program Area
  - Road
  - +— Railroad
  - Watercourse

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



**FIGURE 2-2b**  
**Pump Station Projects**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program

**CH2MHILL.**

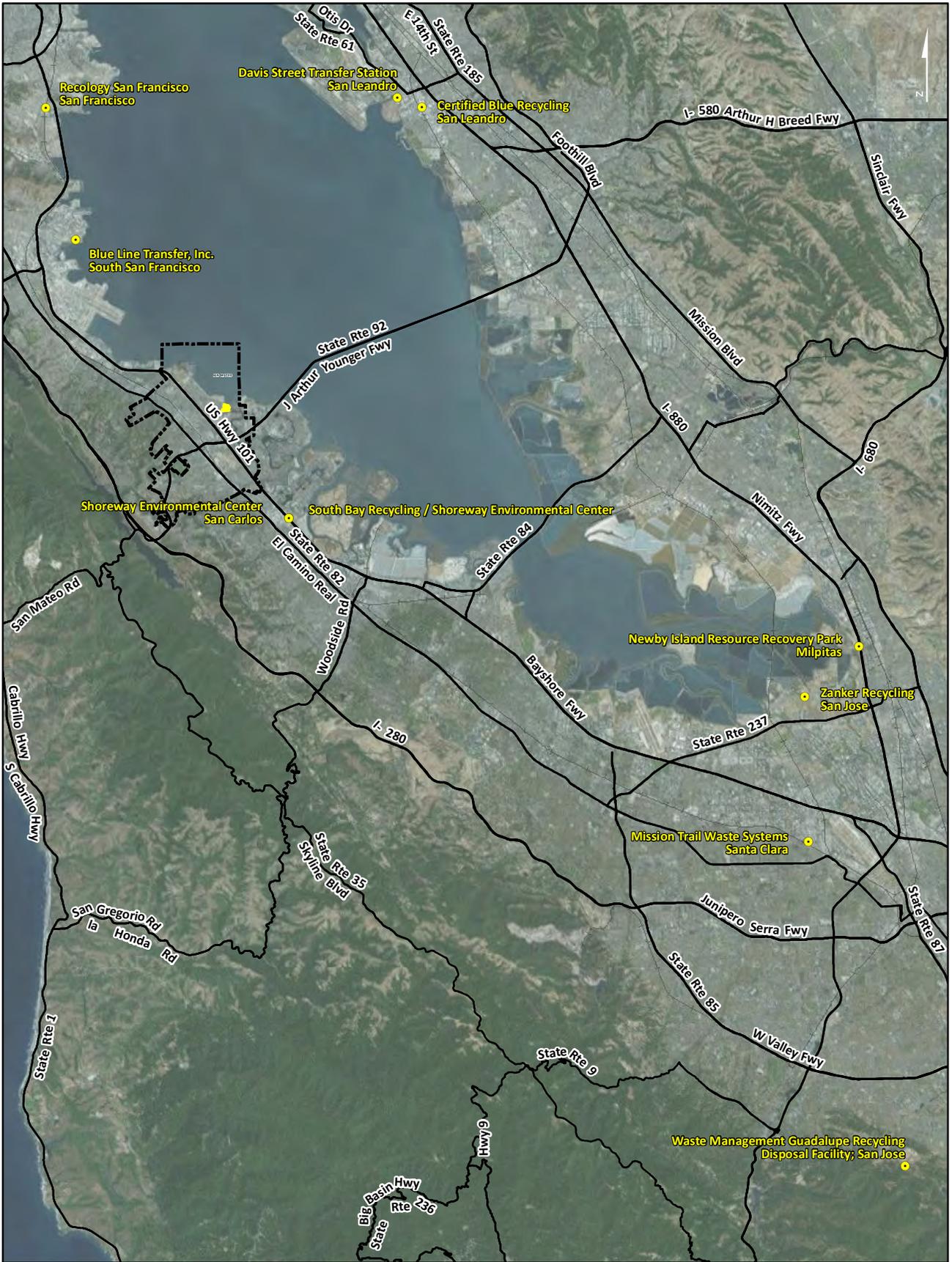


- Legend**
- In System Storage Location
  - WWTP Site
  - Program Area
  - Railroad
  - Watercourse

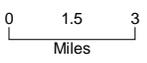
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**FIGURE 2-2c**  
**In System Storage Projects**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program





- Recycling Center
- WWTP Site
- Major Road
- Railroad
- San Mateo City Limits

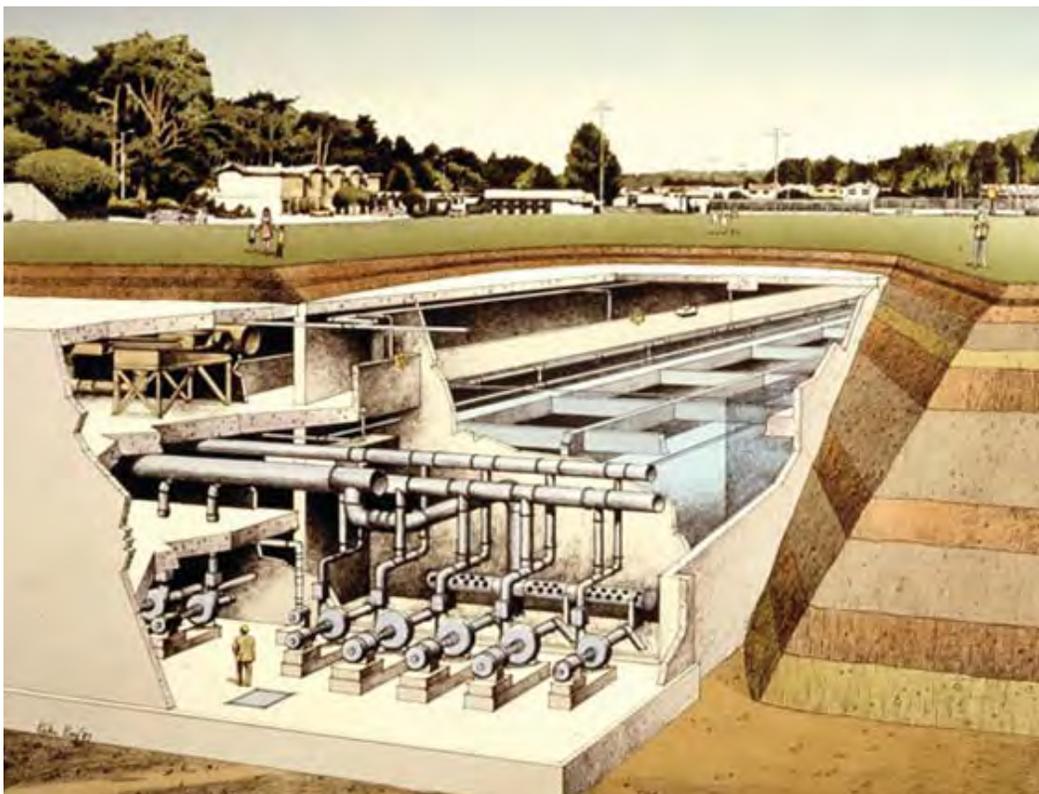


**Figure 2-3**  
**Recycling Centers for Construction Material and Soils**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program

Coordinate System: NAD 1983 UTM Zone 10N. Source: Esri Map Services, County of San Mateo



Windemere Combined Sewer Overflow Underground Storage Facility, Seattle Public Utilities

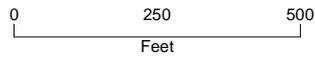


Typical cross section of an equalization storage basin

**FIGURE 2-4**  
**Examples: In-System Equalization Basin**  
*Programmatic Environmental Impact Report*  
*San Mateo Clean Water Program*



- P Potential Construction Parking
- Existing WWTP Facility
- Dale Avenue Parcel
- Detroit Drive Parcel
- Bayfront Parcels



**Figure 2-5**  
**WWTP Site Parcels**  
 Programmatic Environmental Impact Report  
*City of San Mateo Clean Water Program*

Coordinate System: NAD 1983 UTM Zone 10N. Source: Esri Map Services, County of San Mateo



**Legend**

- CCC=Chlorine Contact Basin
- CNG=Compressed Natural Gas filing station
- DPR= Direct Potable Reuse
- EQ=Equalization Storage
- Mech=Mechanical Building
- PC = Primary Clarifier
- SC = Secondary Clarifier

Aerial from Google Earth Pro © 2015. Additional information added by CH2M HILL.

**FIGURE 2-6**  
**WWTP Potential Layout 1 Baseline**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program



Aerial from Google Earth Pro © 2015. Additional information added by CH2M HILL.

### Legend

- Bio=Biological contact tank
- CCC=Chlorine Contact Basin
- Chem= Chemical building
- CNG=Compressed Natural Gas filing station
- DPR= Direct Potable Reuse
- EQ=Equalization Storage
- Mech=Mechanical Building
- PC = Primary Clarifier
- SC = Secondary Clarifier

**FIGURE 2-7**  
**WWTP Potential Layout 2 CAS**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program

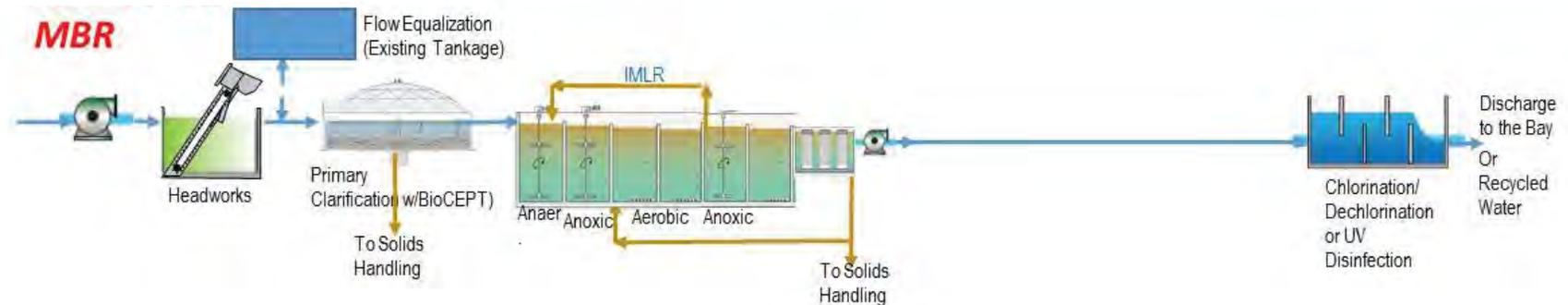
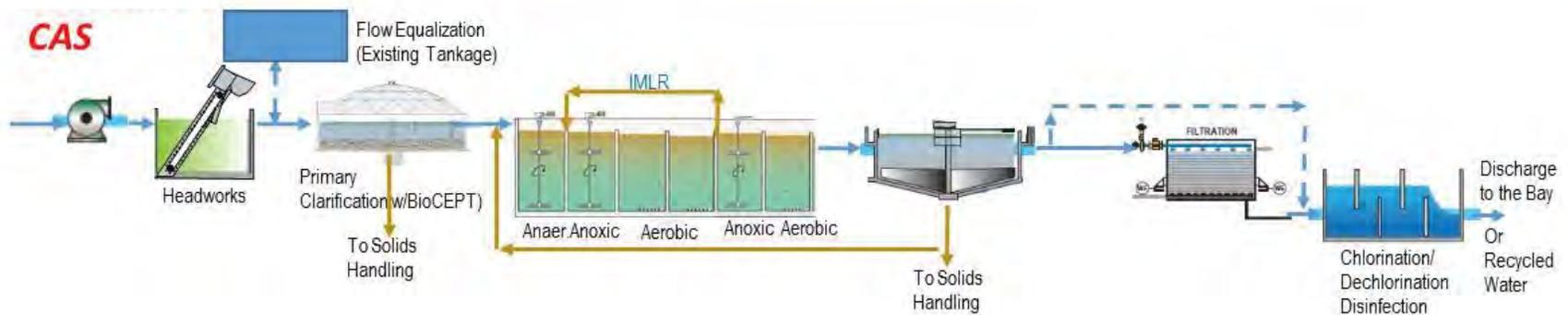
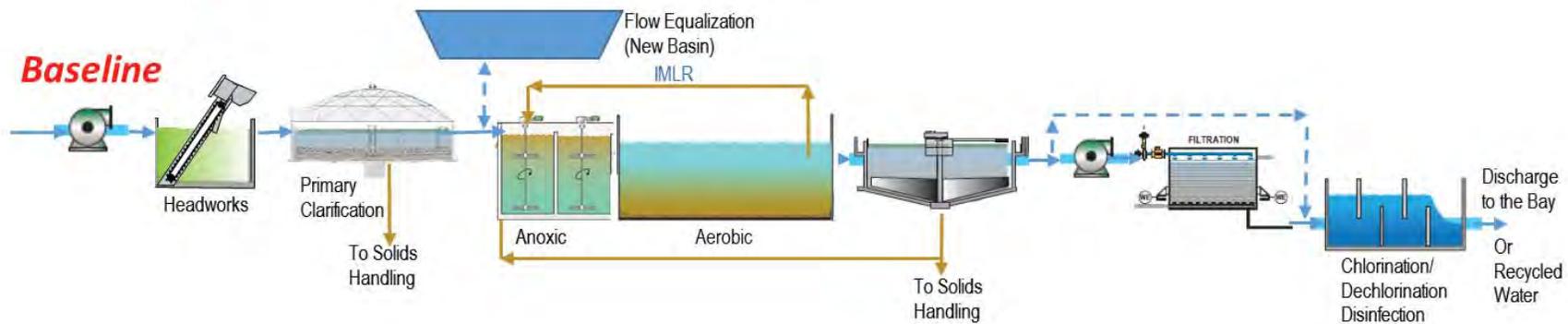


**Legend**

- Bio=Biological contact tank
- CCC=Chlorine Contact Basin
- Chem= Chemical building
- CNG=Compressed Natural Gas filing station
- DPR= Direct Potable Reuse
- EQ=Equalization Storage
- Mech=Mechanical Building
- PC = Primary Clarifier
- SC = Secondary Clarifier

Aerial from Google Earth Pro © 2015. Additional information added by CH2M HILL.

**FIGURE 2-8**  
**WWTP Potential Layout 3 MBR**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program



**FIGURE 2-9**  
**Comparison of Potential Treatment Processes**  
 Programmatic Environmental Impact Report  
 City of San Mateo Clean Water Program



**FIGURE 2-10**  
**Example of Headworks Facility**  
*Programmatic Environmental Impact Report*  
*San Mateo Clean Water Program*



**FIGURE 2-11**  
**Existing Primary Clarifiers**  
Programmatic Environmental Impact Report  
*City of San Mateo Clean Water Program*