Appendix A - Recycled Water Facilities Plan

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West Bay Sanitary District

Recycled Water Facilities Plan

WEST BAY
SANITARY DISTRICT

RMC
water and environment

Final - August 2015

WEST BAY
SANITARY DISTRICT

Recycled Water Facilities Plan
Final Report

Prepared by:

RMC
water and environment

REGISTERED PROFESSIONAL ENGINEER
DAVID L. RICHARDSON
No. 37097
exp. 6/30/16
CIVIL
STATE OF CALIFORNIA

David L. Richardson

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List of Abbreviations

AFY	acre feet per year
BAIRWMP	San Francisco Bay Area IRWM Plan
BOD	Biochemical Oxygen Demand
CCF	hundred cubic feet
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CWSRF	Clean Water State Revolving Fund
DAC	disadvantaged community
DDW	Division of Drinking Water
DWR	Department of Water Resources
gpd	gallons per day
gpm	gallons per minute
hp	horsepower
IRWM	Integrated Regional Water Management
IS/MND	Initial Study/Mitigated Negative Declaration
ISRF	Infrastructure State Revolving Fund
LF	lineal feet
Market Survey	Recycled Water Market Survey
MBR	Membrane Bioreactor
MDD	maximum day demand
mg/L	milligrams per liter
mgd	million gallons per day
mJ/cm^2	millijoule per square centimeter
mm	millimeter
MPMWD	Menlo Park Municipal Water District
MPN	most probable number
NEPA	National Environmental Policy Act
NTU	Nephelometric Turbidity Units
PEIR	Program Environmental Impact Report
PHD	peak hour demand
Plan	Recycled Water Facility Plan
Project	Recycled Water Project
psi	pounds per square inch
RWQCB	Regional Water Quality Control Board
SBR	Sequencing Batch Reactor
scfm	standard cubic feet per minute
SF	square feet
SFPUC	San Francisco Public Utilities Commission
Sharon Heights G&CC	Sharon Heights Golf & Country Club
SLAC	Stanford Linear Accelerator Center
SRF	State Revolving Fund

SVCW	Silicon Valley Clean Water
SWRCB	State Water Resource Control Board
TDS	total dissolved solids
Title 22	Title 22 California Code of Regulations
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TSS	total suspended solids
USBR	US Bureau of Reclamation
UV	Ultraviolet
UWMP	Urban Water Management Plan
WBSD	West Bay Sanitary District
WRFP	Water Recycling Funding Program
WSIP	Water System Improvement Program

Chapter 1 Introduction

West Bay Sanitary District (WBSD) is embarking on a critical water supply evaluation which will help the District define its role in utilizing its wastewater resource now and into the future. This Recycled Water Facility Plan (Plan) documents the District's efforts to begin to define this important role.

This chapter of the report includes background on the District and the Recycled Water Facility Plan, documentation of the goals and drivers for considering implementation of a Recycled Water Project (Project) in the service area, discussion of the Plan objectives and approach, description of stakeholder involvement during the course of the Plan, and summary of the report organization.

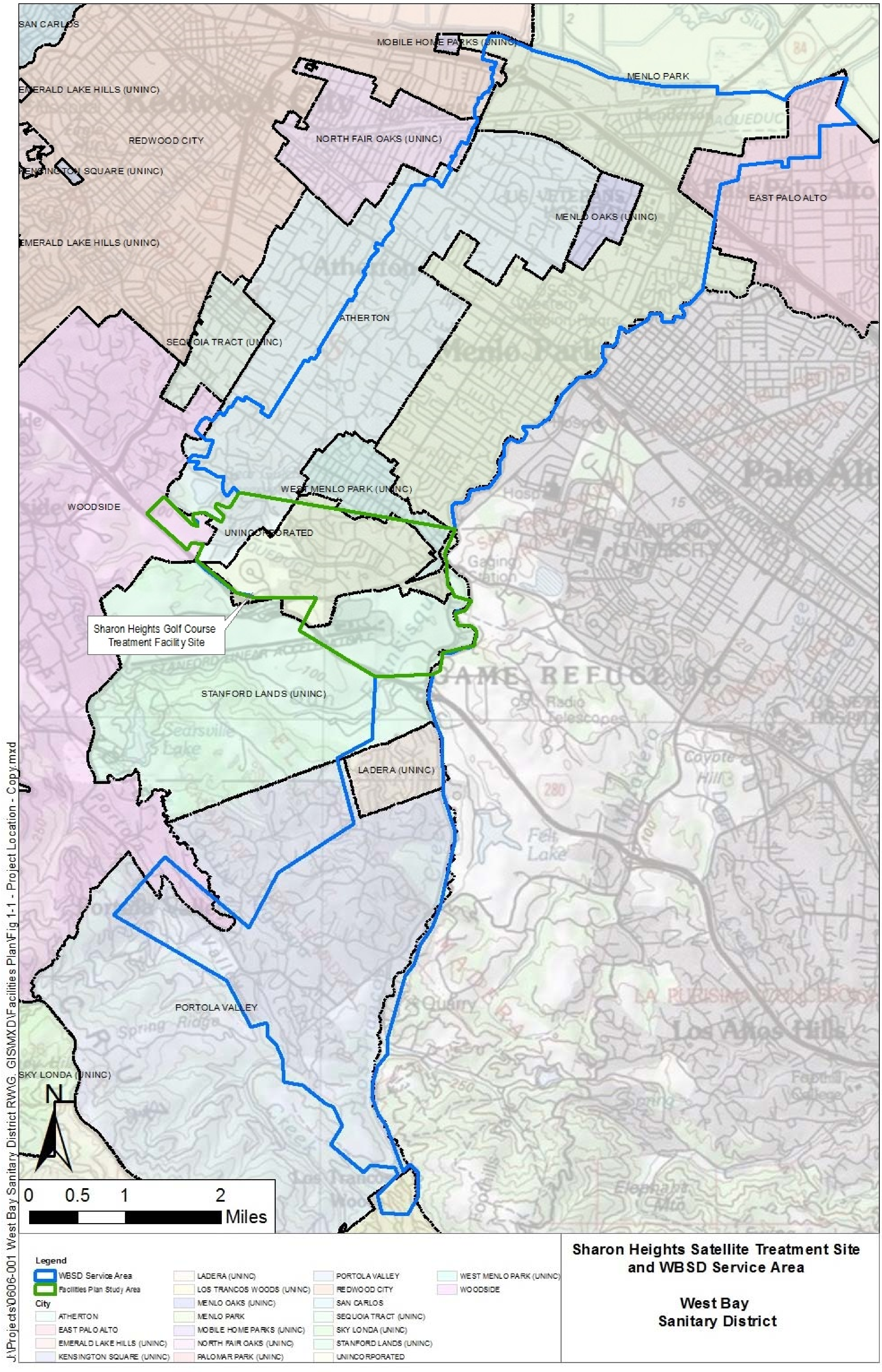
1.1 Background

West Bay Sanitary District (WBSD) maintains and operates over 200 miles of main line sewer in the City of Menlo Park and portions of the Cities of East Palo Alto, Redwood City, the Towns of Atherton, Woodside and Portola Valley and portions of Unincorporated San Mateo and Santa Clara Counties. The raw wastewater collected by WBSD is conveyed to Silicon Valley Clean Water (SVCW) where the wastewater is treated and discharged or reused. Figure 1-1 illustrates the WBSD boundaries and project location.

In 2014, WBSD completed a Recycled Water Market Survey (Market Survey) (RMC 2014), including preliminary market and recycled water supply assessment and evaluation of three conceptual alternatives to serve recycled water customers to assess overall feasibility of expanding the service area water supply portfolio to include recycled water.

The WBSD decided to further evaluate a satellite treatment plant at Sharon Heights Golf & Country Club (Sharon Heights G&CC) and recycled water use at the golf course and other potential users in the vicinity of the golf course.

Figure 1-1: Project Location



1.2 Feasibility Study and Facilities Plan Objectives and Approach

The objectives of this Study and Plan are:

1. Refine the recycled water market assessment in the vicinity of Sharon Heights GC&CC;
2. Evaluate wastewater diversion pump station locations, treatment alternatives, and distribution alternatives;
3. Identify a recommended project, including target customers, planning-level design criteria, and planning-level cost estimate;
4. Prepare an implementation plan for the recommended project, including implementation schedule, construction financing plan and preliminary environmental checklist

1.3 Stakeholder Involvement

During the preparation of this Plan, stakeholder involvement and outreach focused on individual meetings with Sharon Heights G&CC and Stanford Linear Accelerator (SLAC) National Accelerator Laboratory. Should WBSD decide to move forward with a recycled water project, it would initiate more extensive public involvement – at a minimum, through the environmental review and public project approval process.

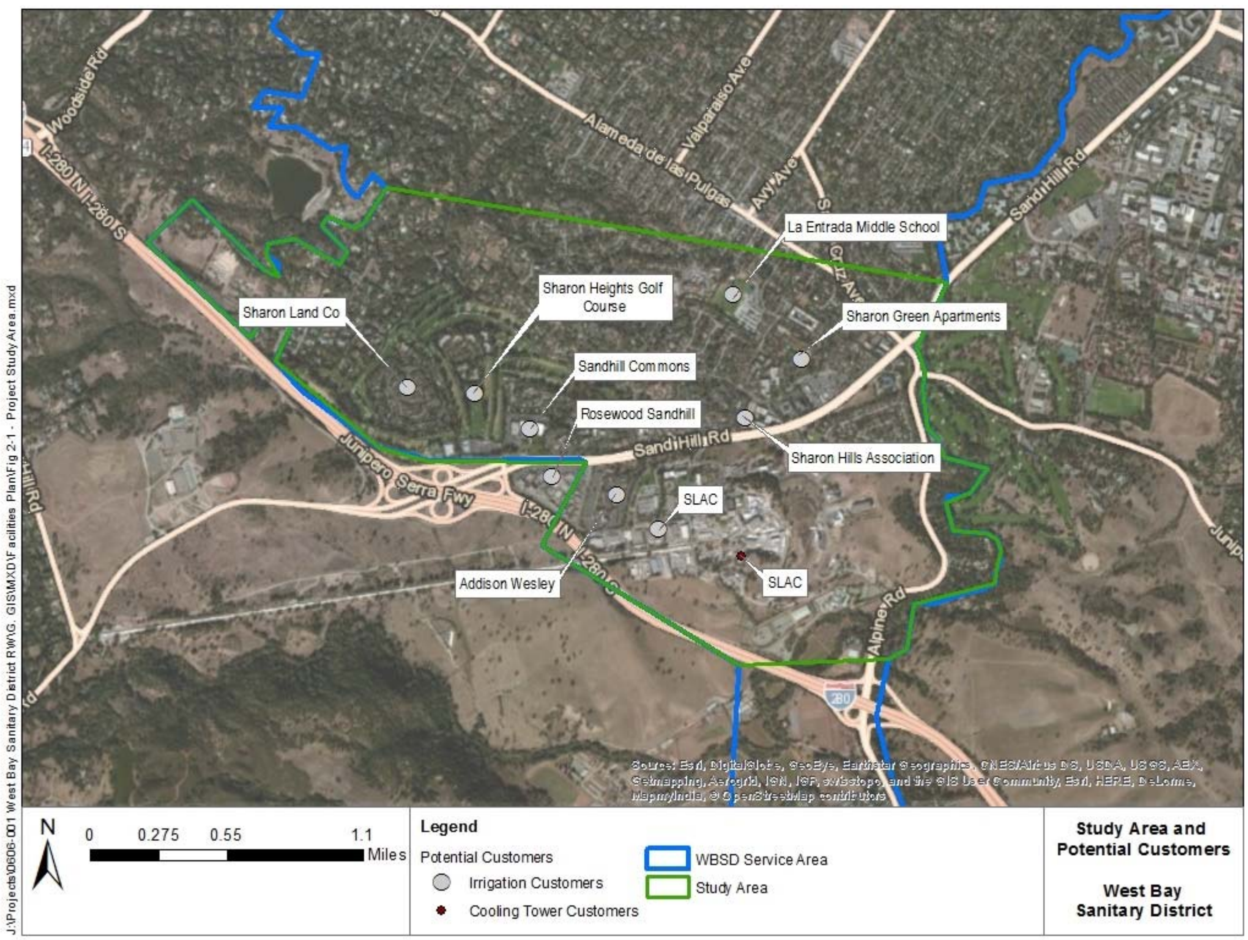
Chapter 2 Study Area Characteristics

This chapter provides additional background information on the characteristics of the WBSD Study Area including a discussion of water demand and supply, and a characterization of the underlying groundwater basin.

2.1 Study Area

The Study Area for this Plan is defined as the estimated 2.5-square-miles shown on Figure 2-1 including Sharon Heights G&CC and potential users in the WBSD service area. The majority of Study Area is situated in the City of Menlo Park. Wastewater in the Study Area flows in from the upper watershed from Portola Valley. Potable water in this portion of Menlo Park is supplied by the Menlo Park Municipal Water District (MPMWD) (water retailer) and the San Francisco Public Utilities Commission (SFPUC) (water wholesaler).

Figure 2-1: Project Study Area



2.2 Water Demand

The population of the City of Menlo Park served by the MPMWD is expected to increase by approximately 8.6% between 2015 and 2035. In addition to residential growth, the City is anticipating commercial development in the near-term. Table 2-1 is a summary of the current and projected water demands in the MPMWD service area between 2005 and 2035 from the *Final 2010 Urban Water Management Plan and Update to the Water Shortage Contingency Plan (Amended June 2014)* prepared by Winzler & Kelly for the City of Menlo Park. Projected water demands take into account per capita demand reductions required by Senate Bill x7-7 and planned growth. Values are shown as acre-foot per year (AFY).

Table 2-1: Current and Projected Water Demands

	2005	2010	2015	2020	2025	2030	2035
Demand (AFY)	4,004	3,391	3,745	3,400	3,471	3,549	3,630

Source: UWMP, 2010 (Amended 2014)

2.3 Water Supply

With increasing water demands forecasted over the next 20 years and the Study Area's exclusive dependence on the SFPUC water, adequate water supply for the region is an issue that recycled water could help address.

2.3.1 Water Supply

Since the 1960's, the City's sole source of potable water has been the City and County of San Francisco's regional system, operated by the SFPUC. The SFPUC system supply is predominantly snowmelt from the Sierra Nevada Mountains, delivered through the Hetch Hetchy aqueducts. The SFPUC wholesales water to MPMWD which is the water retailor for customers within the City.

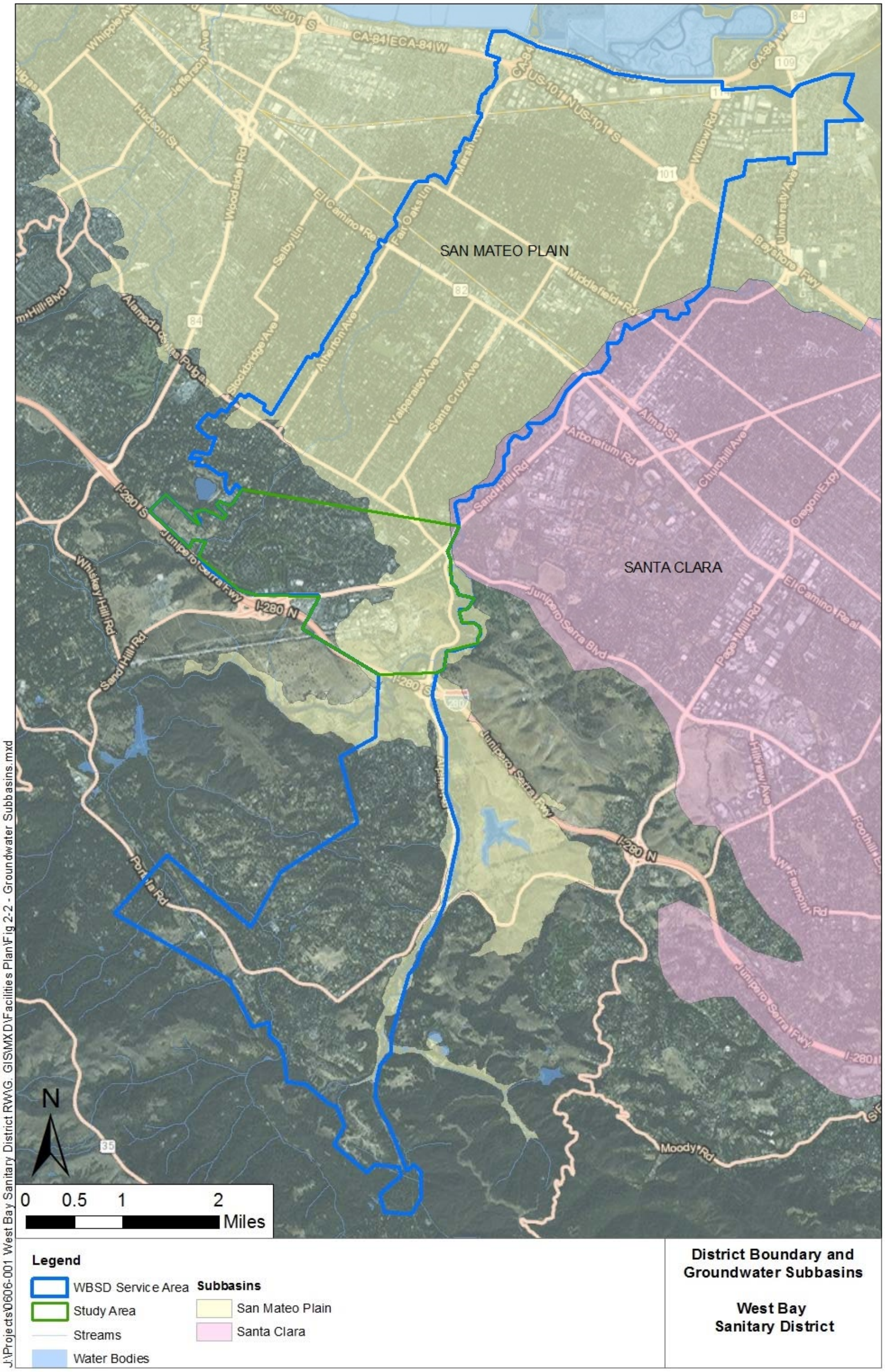
The MPMWD's dependence on SFPUC for potable water supplies leads to several potential issues that may be addressed or reduced by the use of recycled water in the City:

- **Water Supply Availability during Average Year.** Per the MPMWD's contract with SFPUC, the MPMWD has an Individual Supply Guarantee of approximately 4,993 AFY through 2034.
- **Water Supply Reliability during Periods of Drought.** The majority of SFPUC water supplies are surface water and susceptible to drought conditions. Supplying recycled water to non-potable demands would dampen drought impacts on potable water supply.
- **Water Supply Reliability during Service Disruptions.** The majority of SFPUC water supplies are piped in from outside the City's immediate area. The City's exclusive dependence on the SFPUC for potable water leaves the City in a vulnerable position to service disruptions and outages if an event (e.g. earthquake) damages the transmission system. To address this issue, SFPUC is in the midst of undertaking the WSIP to address reliability, and seismic protection in their system. In addition, recycled water would allow for the use of a local, reliable water supply for non-potable demands in the event of service disruptions.
- **Water Supply Cost.** In addition to the consumption charge, there is a capital surcharge and a fixed monthly service charge based on meter size. Current water costs for Sharon Heights G&CC range based on usage, however on recent bills (July 2015 and March 2015) which included water basic charges, water consumption, services fees and user taxes equated to approximately $2,611 - 2,713/AF. Consumption charges are based on four tiers ranging from $2.68/CCF to $5.39/CCF. The majority (> 93%) of Sharon Heights G&CC is from the most expensive tier, Tier 4.

2.3.2 Groundwater Basin Characterization

The majority of the District's service area overlies the San Mateo Plain groundwater subbasin, as shown on Figure 2-2. The San Mateo subbasin borders the Santa Clara Valley subbasin along its eastern boundary where it follows the county-line along San Francisquito Creek.

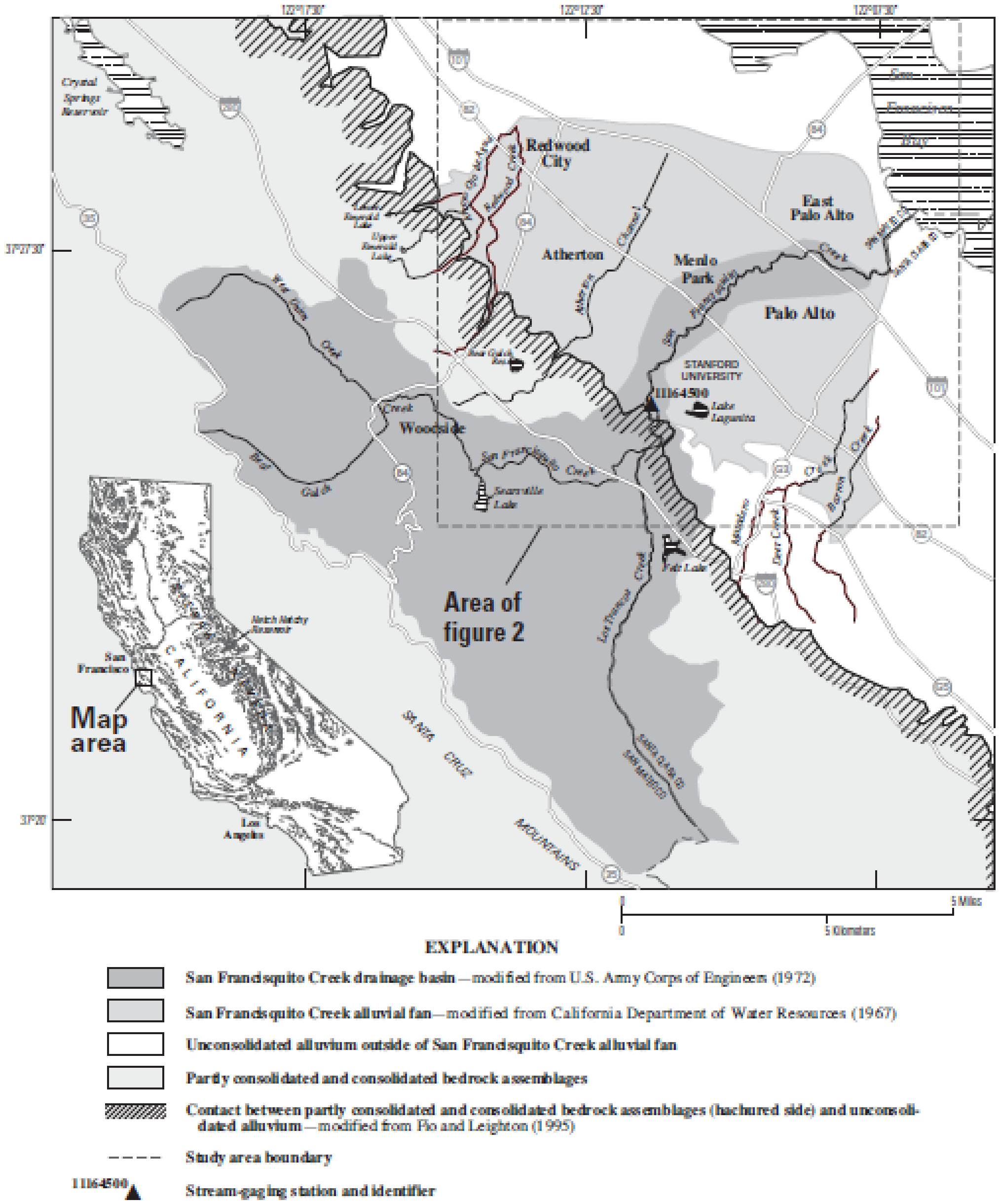
Figure 2-2: District Boundary and Groundwater Subbasins



J:\Projects\0606-001 West Bay Sanitary District RWG. GIS\MXD\Facilities Plan\Fig 2-2 - Groundwater Subbasins.mxd

This area is also known as the San Francisquito Cone, San Francisquito Creek subbasin, or San Francisquito Creek alluvial fan, shown in Figure 2-3.

Figure 2-3: San Francisquito Cone Area (USGS, 2002)



Currently, there is no Groundwater Management Plan or groundwater managing authority within the San Mateo Plain basin, which is dissimilar to the highly managed, neighboring Santa Clara Valley Groundwater subbasin. The City of East Palo Alto is beginning a Groundwater Management Plan process for areas within the jurisdiction of the City; and there is an active stakeholder group for groundwater management of the San Francisquito Creek subbasin operating under a draft Memorandum of Understanding.

Beneficial uses of the groundwater subbasin include irrigation, public and private drinking water. Of the wells installed within the basin, approximately 90% are solely used for irrigation purposes (RWQCB, 2003). In the area underlying the District's service area, two aquifer systems are present; a shallow aquifer located up to 120 feet below ground surface (ft bgs) and a deeper aquifer located between 200-400 ft bgs (RWQCB, 2003). The densest clustering of wells is within Atherton and Menlo Park, and these wells are typically installed within the deeper aquifer, where the more northern wells are generally installed within the shallow aquifer (RWQCB, 2003). During the 1987-92 drought, over 100 residential wells were installed in the town of Atherton, raising concerns related to overpumping such as land subsidence and salt-water intrusion (USGS, 1997).

Chapter 3 Market Assessment

A preliminary recycled water market assessment was conducted as part of the *Recycled Water Market Survey*. The assessment consisted of three major tasks: preliminary demand assessment, preliminary water supply assessment, and preliminary water quality assessment.

For the purpose of this Plan, the preliminary recycled water market assessment will be refined as follows:

- **Refine customer demand estimates and identify demand characteristic, and identify other potential customers near Sharon Heights G&CC** – the Market Survey only considered the largest existing potable water customers. Other potential customers (existing and future) in the Study Area will be considered.
- **Confirm/refine the water quality needs** – the Market Survey identified cursory water quality needs based on typical water quality objectives for certain category of customers; this assessment will be refined based on additional monitoring and will consider both planned treated water quality and an identification of customer needs related to water quality.

This refined market assessment will form the basis for evaluating recycled water distribution alternatives.

3.1 Potential User Base and Demand Assessment

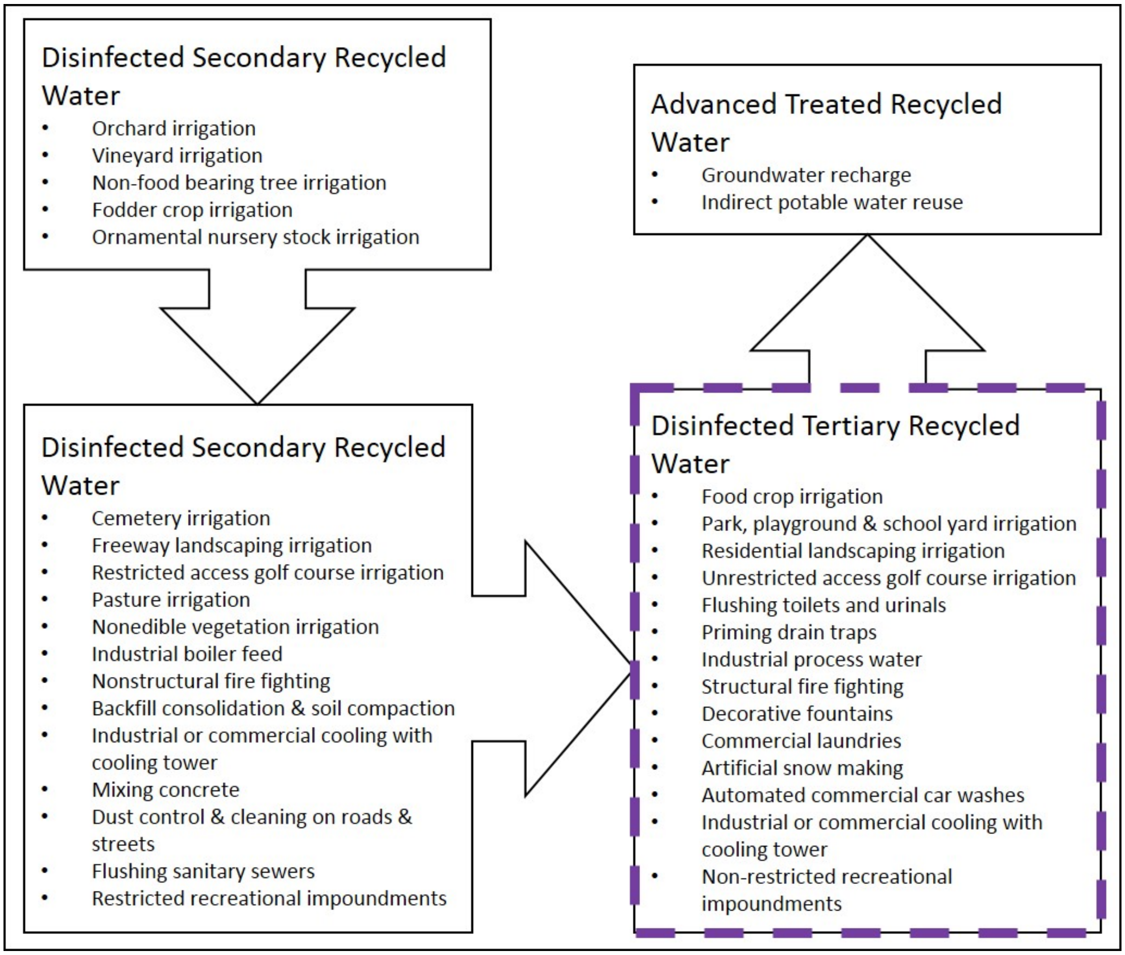
Based on discussions with Sharon Heights management, WBSD has decided to further develop the "Near-Term Conceptual Project – Sharon Heights Satellite Treatment" identified in the *Market Survey*. Refinements to potential uses, customers and recycled water demands discussed in the following sections apply specifically to the development of a satellite treatment plant at Sharon Heights.

3.1.1 Potential Uses

A list of potential uses was developed in the Market Survey based on recyclable water uses allowable under Title 22 of the California Code of Regulations with disinfected tertiary recycled water as the target level of treatment. A preliminary database of potential recycled water customers based on the identified uses was developed in the Market Survey. No other uses other than those identified in the Market Survey were considered herein.

Figure 3-1 includes a list of potential recycled water uses allowed by the Department of Drinking Water (DDW) (formerly the Department of Public Health) for various levels of treatment, with disinfected tertiary recycled water highlighted as the target level of treatment for this project. Potential uses in WBSD's service area are categorized as irrigation and commercial cooling tower uses.

Figure 3-1: Accepted Treatment Levels for Water Reuse under California's Title 22



Notes:

1. "Disinfected Tertiary Recycled Water" is the category most commonly referred to as recycled water in California under Title 22.

This figure does not represent an all-inclusive list of recycled water uses. See Statutes for Regulations Related to Recycled Water, (SWRCB, 2015) for requirements for impoundment, cooling and other uses:

(http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWregulations_20150625.pdf).

3.1.2 Refinement of Potential Recycled Water Demands

Facilities for conveying treated recycled water are sized based on peak demand periods. Two peak flow situations were defined as criteria for development of the recycled water distribution system in the market assessment: maximum day demand (MDD) and peak hour demand (PHD). MDD is defined as the average daily demand of a customer during the peak month of the year. PHD is defined as the maximum anticipated flow rate delivered to a customer (in gallons per minute) during MDD conditions. MDD and PHD factors were updated from the market assessment based on use type and are discussed below. Revised MDD and PHD values are summarized in Table 3-1.

Irrigation Demand Peaking Demand Factors

Based on data from the Western Regional Climate Center, July is the peak demand month for the WBSD service area for irrigation users. The following describes refinements to irrigation MDD and PHD factors:

- Maximum day demand – The irrigation MDD was refined using data from the MPMWD monthly irrigation water records for Sharon Heights G&CC in 2013. A monthly peaking factor was estimated at 2.5. MDD was estimated at 20 percent more than the monthly peaking factor for a value of 3.0.
- Peak hour demand – Irrigation-only customers typically operate at night for an 8-hour irrigation period. Therefore, the PHD factor was estimated at 3.0 (24-hour/8-hour irrigation = 3.0). This value did not change from the market assessment.

Cooling Demand Peaking Demand Factors

Cooling Tower MDD and PHD were provided by SLAC and are shown in Table 3-1.

Table 3-1: Standard Peaking Factors

Peaking Factors	Type of Use			
	Prelim. Irrigation Factors	Revised Irrigation Factors	Prelim. Cooling Tower Factors	Revised Cooling Tower Factors[1]
Max Day Demand to Avg. Annual Demand Factor	2.0	3.0[1]	1.0	2.3
Peak Hour Demand to Max Day Demand Factor	3.0	3.0[1]	1.0	1.7
Peak Hour Demand to Avg. Annual Demand Factor	6.0	9.0[1]	1.0	4.0

Footnotes:

1. Estimated from 2013 monthly irrigation meter data for Sharon Heights G&CC
2. Peaking factors provided by SLAC

3.1.3 Refinement of Potential Customers

In the Market Survey, Sharon Heights was the sole targeted user for the Near-Term Conceptual Project. As part of this Plan, the list of potential recycled water customers was extended to include customers in the preliminary database in the vicinity of Sharon Heights. Potential users are summarized in Table 3-2 and shown in Figure 3-2.

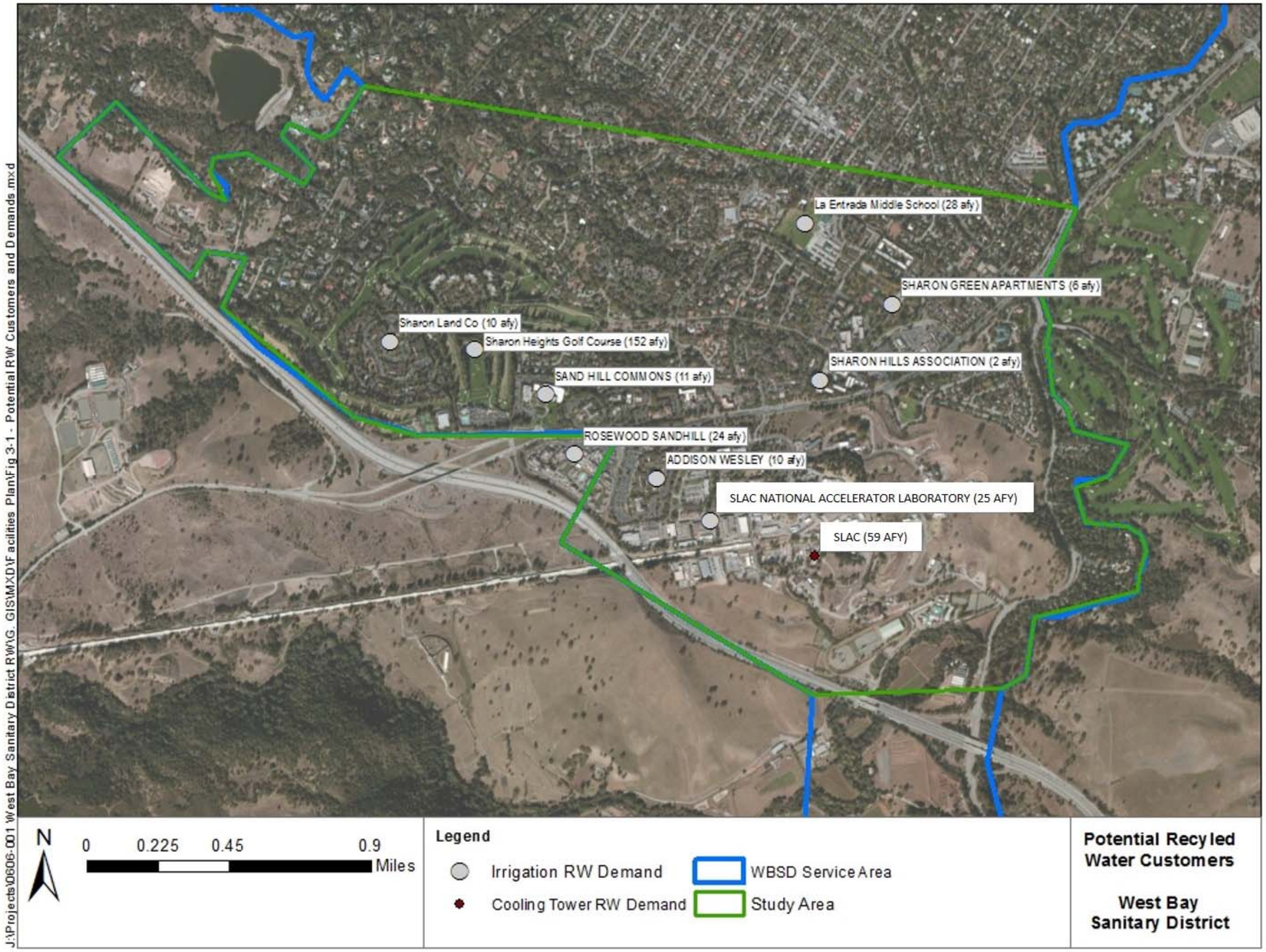
Table 3-2: Potential Recycled Water Customers

Customer Name	Customer Type	Recycled Water Use Type	Prelim. Average Demand (AFY)	Revised Planning Demand (AFY)
Sharon Heights Golf Course	Farm – Irrigation	Irrigation	152	152
SLAC National Accelerator Laboratory	Commercial – Industrial	Cooling Tower	N/A	59[1]
SLAC National Accelerator Laboratory	Commercial – Industrial	Irrigation	N/A	25[1]
La Entrada Middle School	Commercial – Business	Irrigation	28	28
Rosewood Sand Hill	Commercial – Business	Irrigation	46	24
Sand Hill Commons	Commercial – Business	Irrigation	22	11
Addison Wesley	Commercial – Business	Irrigation	10	10
Sharon Land Co	Commercial – Business	Irrigation	10	10
Sharon Green Apartments	Residential – Multi	Irrigation	4	6
Sharon Hills Association	Residential – Multi	Irrigation	2	2

Footnotes:

1. Based on assumed seven months of recycled water delivery

Figure 3-2: Potential Recycled Water Customers and Demand Estimates



3.1.4 Refinement of Potential Recycled Water Demands

The recycled water demand methodologies described in the market assessment were refined by a reexamination of the City of Menlo Park meter data from 2011 to 2013 for the extended list of potential users and are described below. All recycled water demand except for a portion of SLAC's demand for its cooling towers was assumed as irrigation demand.

To determine average annual demand for each user, monthly records for each applicable meter were summed together for yearly totals and converted from hundred cubic feet (CCF) units to acre-feet per year (AFY). Yearly totals were averaged to determine average annual demand. Revised annual demands are summarized in Table 3-2.

Sharon Heights and Rosewood Sand Hill

Irrigation meter data were separated from commercial meter data. Demand for Sharon Heights and Rosewood Sand Hill was estimated based on the assumption that 100 percent of their water use recorded on the separate irrigation meters could be converted to recycled water.

SLAC

Cooling tower demands were provided by SLAC. Irrigation demand was estimated based on the assumption that 50 percent of the difference between total potable demand (estimated from meter data) and cooling tower demand could be converted to recycled water.

Other Users

Irrigation demand for the remaining commercial and multi-family residential users were based on the assumptions that 50 percent and 10 percent, respectively, of water use could be converted to recycled water.

Chapter 4 Recycled Water Supply Characteristics

This section describes the potential recycled water supplies available for production of recycled water generated in the WBSD service area.

4.1 Recycled Water Quality Requirements

Potential irrigation customers have different water quality needs according to their intended use. The following section describes water quality guidelines for landscape irrigation, the primary type of demand within WBSD. The section also describes the recommended level of treatment based on these requirements.

4.1.1 Irrigation Water Quality Requirements

Water quality guidelines for landscape use are well established. Table 4-1 characterizes three degrees of restriction (none, slight to moderate and severe) for use of recycled water in landscaped irrigation based on various water quality constituents (although specific requirements vary depending on the type of plant) and provides a comparison to the proposed satellite treatment plant tertiary effluent water quality.

Table 4-1: Landscape Irrigation Water Quality Comparison

Constituent	Units	Degree of Restriction on Use[1]		
		None	Slight to Moderate	Severe
Salinity				
TDS	mg/L	< 450	450 - 2,000	> 2,000
Specific Ion Toxicity				
Sodium (Na) [2,3]	mg/L	< 70	> 70	
Chloride (Cl) [2,3]	mg/L	< 100	> 100	
Boron (B)	mg/L	< 0.7	0.7 - 3.0	> 3.0
Miscellaneous Effects				
pH	-	6.5 - 8.4		
Total Nitrogen [4]	mg/L	< 5	5 - 30	> 30
Bicarbonate [5]	mg/L	< 90	90 - 500	> 500

Footnotes:

1. Adapted from Metcalf and Eddy, 2007
2. Values apply to most tree crops and woody ornamentals which are sensitive to sodium and chloride
3. With overhead sprinkler irrigation and low humidity (< 30%), sodium or chloride levels greater than 70 or 100 mg/L, respectively, have resulted in excessive leaf adsorption and crop damage to sensitive crops
4. Total nitrogen should include nitrate-nitrogen, ammonia-nitrogen, and organic-nitrogen. Although forms of nitrogen in wastewater vary, the irrigated plant responds to the total nitrogen
5. Overhead sprinkling only

With the exception of nitrogen, the constituents in Table 4-1 are not removed by conventional wastewater or tertiary treatment processes. Therefore, recycled water constituent levels are likely to similar to the source wastewater constituent levels. Based on preliminary water quality monitoring data presented in Section 5.1, sodium and chloride levels in the influent wastewater to the Sharon Heights satellite plant fall within the “None or No Problem” guideline category.

Sodium and chloride are of primary concern when woody ornamentals or trees are the irrigated plant species, causing ion toxicity resulting in problems with root absorption of water. This may result in stunted growth, wilting, leaf burn, leaf drop and maybe plant death. However, there are multiple management strategies that parks and other facilities can implement (see discussion below).

For the Sharon Heights satellite treatment concept, no adverse effects to turf would be anticipated based on the chloride and sodium levels in the WBSD recycled water, although turf used for golf greens can be more sensitive to water quality because the grass is stressed due to being cut very short.

Chapter 5 Wastewater Characteristics and Facilities

Sharon Heights G&CC has an available site for a satellite treatment facility and is the target facility location. Sharon Heights G&CC managers have previously investigated alternative sources of water for irrigation at the course and have a high desire to use recycled water as an alternative to the Hetch-Hetchy water supply.

5.1 Preliminary Wastewater Characteristics

Water quality has been investigated at several locations throughout the WBSD service area including Portola Valley at the 36-inch sewer in Alpine Road, 10-inch sewer in Sand Hill Road at Leland Avenue, and at the Main Meter Effluent location. Figure 5-1 shows the 36-inch Alpine Road and 10-inch Sand Hill Road sampling locations. The Main Meter Effluent sampling location is located at the downstream end of the WBSD collection system near Marsh Road and is not shown on Figure 5-1.

Figure 5-1: Water Quality Sampling Locations

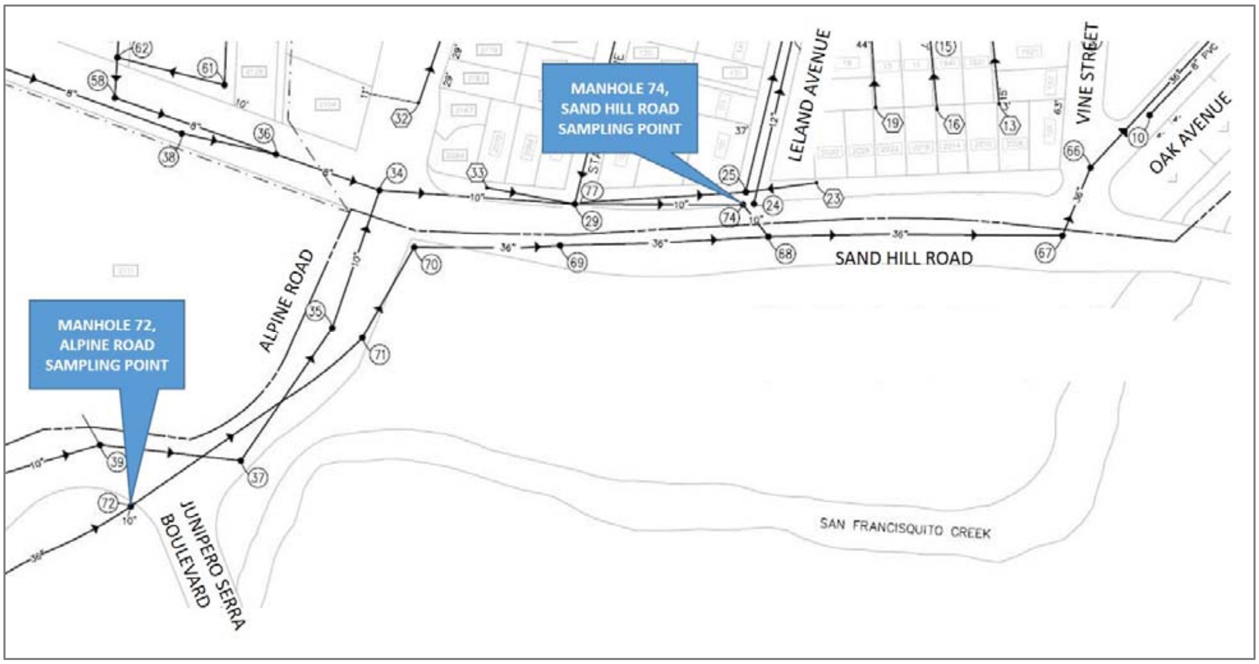


Table 5-1 summarizes the average of the analysis results from three sampling events in May 2014 at Alpine Road and at the Main Meter Effluent sampling location. Table 5-2 and Table 5-3 summarize the water quality results from sampling events in December 2014 and in April and May 2015 at Sand Hill Road and Alpine Road, respectively.

Table 5-1: Water Quality Sampling Results

Constituent	Unit	Alpine Road at Junipero Serra Boulevard	Main Meter Effluent Location
Silica	mg/L	8.2	11
Sodium	mg/L	51	333
Chloride	mg/L	43	647
Alkalinity	mg/L as $CaCO_3$	320	327
Bicarbonate Alkalinity	mg/L as $CaCO_3$	320	327
Total Dissolved Solids (TDS)	mg/L	320	1,500
Total Nitrogen (TN)	mg/L	66	50

Table 5-1 shows a significant difference between Portola Valley wastewater and the District's Main Meter wastewater salinity (TDS, chloride, and sodium) levels. It is believed that majority of the salinity increase is due to infiltration from saline groundwater into the collection system in the lower elevation portions of the system near San Francisco Bay.

Table 5-2 shows the minimum, maximum and average values for constituents from sampling events in December 2014 and April and May 2015 at Sand Hill Road. Water quality sampling data at Sand Hill Road are included in Appendix A. An elevated salinity level occurred on December 12, 2014 and is attributed to a cooling tower blowdown event by SLAC. SLAC is required to notify WBSD of all blowdown events.

Table 5-2: Sand Hill Road Water Quality Sampling Summary

Constituent	Unit	Minimum	Maximum	Average
Boron	mg/L	0.12	0.32	0.21
Calcium	mg/L	15	54	23
Magnesium	mg/L	5.3	27	12
Sodium	mg/L	41	220	72
Ammonia as NH_3	mg/L	22	150	60
Biochemical Oxygen Demand (BOD)	mg/L	220	460	332
Total Dissolved Solids (TDS)	mg/L	320	870	423
Total Suspended Solids (TSS)	mg/L	160	560	362
Silica	mg/L	13	22	18
Total Kjeldahl Nitrogen (TKN)	mg/L	38	83	65
Total Nitrogen (TN)	mg/L	39	83	65
Phosphorus	mg/L	4.1	9.7	7.1
Chloride	mg/L	0.82	310	72
Nitrate	mg/L	ND	1.1	NA
Nitrite	mg/L	ND	ND	NA

Notes:

1. Composite samples were collected on 12/10/14-12/11/14, 4/16/15, 4/21/15-4/22/15, 5/6/15-5/11/15, 5/14/15-5/19/15 at Manhole 74 in Sand Hill Road
2. NA: not applicable
3. ND: Non-detect

Table 5-3 shows the minimum, maximum and average values for constituents from sampling events in December 2014 and April and May 2015 at Alpine Road. Water quality sampling data at Alpine Road are included in Appendix B.

Table 5-3: Alpine Road Water Quality Sampling Summary

Constituent	Unit	Minimum	Maximum	Average
Boron	mg/L	0.14	0.32	0.24
Calcium	mg/L	11	51	29
Magnesium	mg/L	5.6	23	9
Sodium	mg/L	48	280	79
Ammonia as NH_3	mg/L	22	290	74
Biochemical Oxygen Demand (BOD)	mg/L	230	1,500	492
Total Dissolved Solids (TDS)	mg/L	310	1,000	443
Total Suspended Solids (TSS)	mg/L	230	3,300	804
Silica	mg/L	13	22	18
Total Kjeldahl Nitrogen (TKN)	mg/L	46	110	76
Total Nitrogen (TN)	mg/L	46	110	76
Phosphorus	mg/L	5.0	15	9
Chloride	mg/L	47	380	92
Nitrate	mg/L	ND	0.83	NA
Nitrite	mg/L	ND	ND	NA

Notes:

1. Composite samples were collected on 12/10/14-12/11/14, 4/16/15, 4/21/15-4/22/15, 5/6/15-5/11/15, 5/14/15-5/19/15 at Manhole 72 in Alpine Road
2. NA: not applicable
3. ND: Non-detect

The 10-inch sewer in Sand Hill Road and 36-inch sewer in Alpine Road intersect at Manhole 58 where the combined flow continues north in a 36-inch sewer in Oak Avenue. The proposed influent pump station (discussed in Section 8.1) would divert flow from the 36-inch sewer in Oak Avenue.

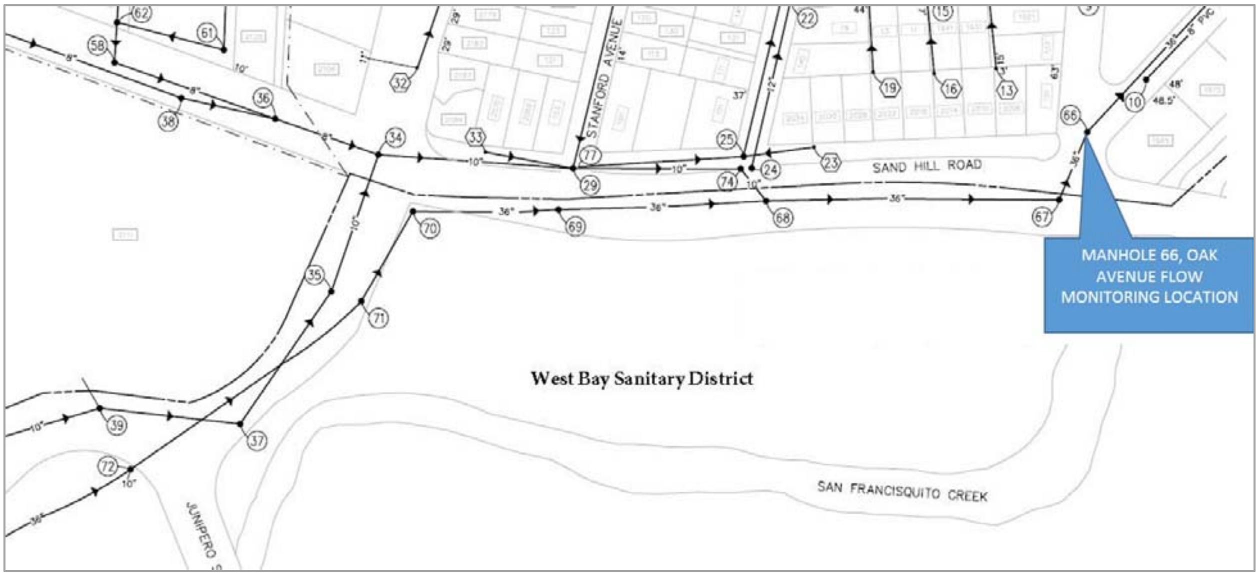
The preliminary Sand Hill Road and Alpine Road sampling results for the 10-inch and 36-inch sewers, respectively, show that TDS and chloride fall within the “No Use Restriction” guideline categories listed in Table 4-1. Average sodium values for the two locations are slightly higher than the “No Use Restriction” value of less-than 70 mg/L. For the Sharon Heights satellite plant, no adverse effects to turf would be anticipated based on the TDS, chloride and sodium levels found during preliminary sampling of the proposed influent wastewater flows.

5.2 Available Wastewater Flows

The satellite treatment project requires diversion of wastewater flow from the existing collection system to the new treatment facilities. As the Sharon Heights G&CC treatment facility is located at the upper end of the WBSD collection system, there is minimal flow available adjacent to the facility. Therefore, wastewater needs to be diverted from a trunk line further downstream where adequate flows are available to support the project. Figure 5-4 shows the Sharon Heights treatment location and the existing collection system. Figure 5-4 also shows average wastewater flows determined from the sewer system model prepared in May 2014 for the Market Survey. Based on the model results, the 36-inch trunk line located in Oak Avenue was identified as the target line from which to divert flow.

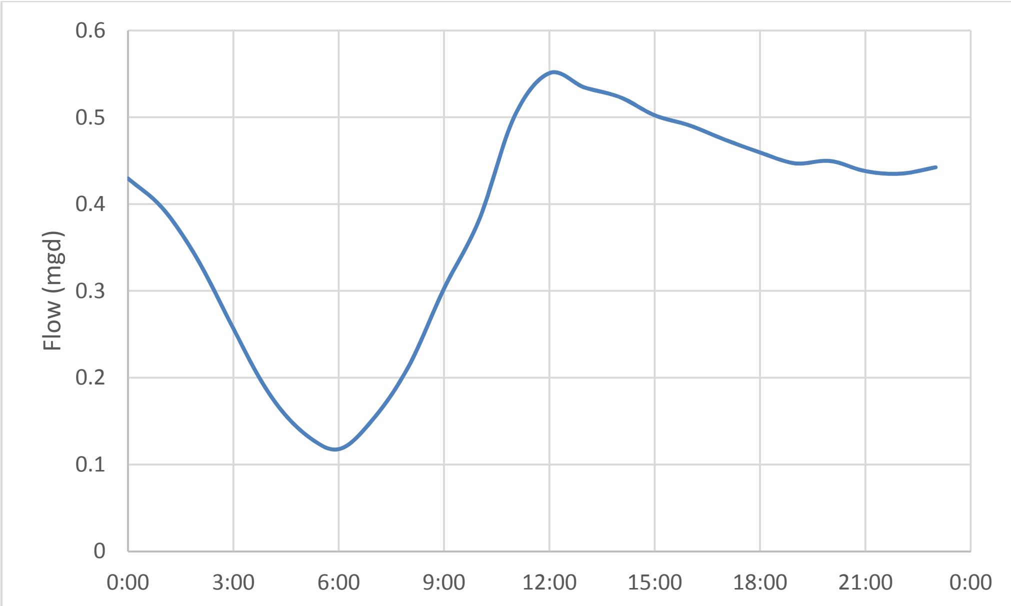
Flow monitoring was conducted by WBSD in June and July 2015 at Manhole 66 in the 36-inch sewer in Oak Avenue. Figure 5-2 shows the Oak Avenue flow monitoring location.

Figure 5-2: Oak Avenue Flow Monitoring Location



Preliminary flow monitoring at Oak Avenue occurred between 6/12/15 and 7/9/15. Figure 5-3 shows the average hourly diurnal curve over the monitoring period. The diurnal curve was created from hourly data between 6/12/15 and 6/28/15 and 15-minute data between 6/29/15 and 7/9/15. Data are included in Appendix C.

Figure 5-3: Wastewater Flow Diurnal Curve at Oak Avenue, Manhole 66 (June-July 2015)



Notes:

1. Curve was created from hourly data between 6/12/15 and 6/28/15 and 15-minute data between 6/29/15 and 7/9/15

Table 5-4 summarizes preliminary data for the average daily flow, average minimum hourly flow and average maximum hourly flow from the June-July 2015 flow monitoring at Oak Avenue. Average daily flow was calculated at less than 0.4 mgd which is approximately 0.1 mgd less than determined in the May 2014 sewer model.

Table 5-4: Oak Ave Wastewater Flow Summary (June-July 2015)

Flow	June-July 2015 Preliminary Flow Monitoring Results
Average Daily Flow (mgd)	0.38
Average Minimum Hourly Flow (mgd)	0.12
Average Maximum Hourly Flow (mgd)	0.55

Figure 5-4 shows flow contribution in each line from sewer modeling conducted in May 2014. These flows are being verified with monitoring currently underway. A small reduction in flow is expected with the increased focus on conservation in California due to the ongoing drought, however, many conservation measures target outdoor water use and therefore do not significantly affect flow available in the sewer.

Figure 5-4: District Collection System in Sharon Heights G&CC Area and Average Flow

Chapter 6 Treatment Requirements for Reuse

6.1 Recycled Water Treatment Requirements

Based on the target uses, the treatment facilities would need to meet Title 22 Disinfected Tertiary Recycled Water requirements. Table 6-1 summarizes the water quality requirements which varies depending on the type of filtration technology used.

The levels of constituents of concern to landscape irrigation and cooling tower customers within WBSD are not high enough to warrant additional treatment (e.g., advanced oxidation, reverse osmosis, etc.) beyond that required by Title 22 for "disinfected tertiary recycled water".

Table 6-1: Water Quality Requirements for Title 22 Disinfected Tertiary Recycled Water

Process	Requirement
Filtration Method	
Coagulated[1] and passed through a bed of filter media	1) Rate does not exceed 5 gallons per minute per square foot of surface area in mono, dual or mixed media gravity, upflow or pressure filtration systems 1) Turbidity of the filtered wastewater does not exceed any of the following: a. An average of 2 NTU within a 24-hour period; b. 5 NTU more than 5 percent of the time within a 24-hour p:eriod; and c. 10 NTU at any time
Microfiltration, Ultrafiltration	Turbidity does not exceed any of the following: 1) 0.2 NTU more than 5 percent of the time within a 24-hour period; and 2) 0.5 NTU at any time
Disinfection	
UV	2) A disinfection process that, when combined with filtration, has been demonstrated to achieve 5-log inactivation of virus 3) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed a most probable number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

Notes:

1. NTU: Nephelometric Turbidity Units

Footnotes:

1. Coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes.

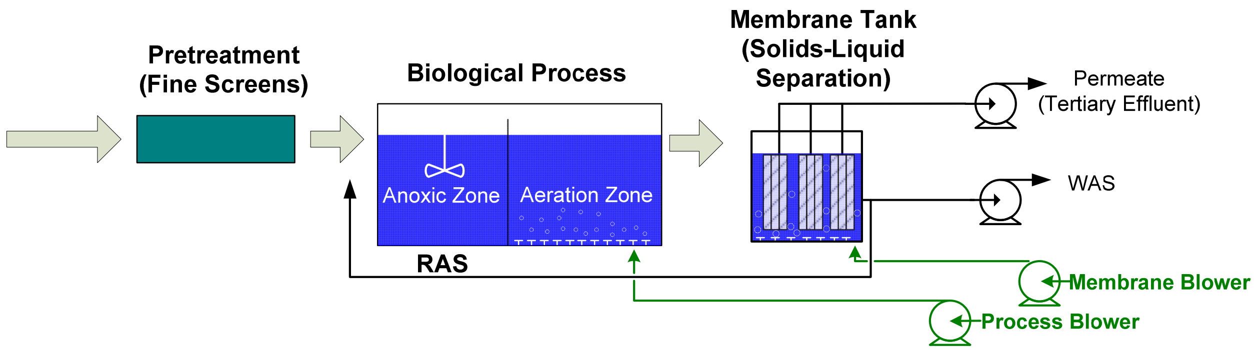
6.2 Treatment Alternatives

The satellite treatment facility will need to include influent grit removal and screening to protect downstream equipment in addition to secondary treatment, filtration and disinfection to meet Title 22 disinfected tertiary recycled water requirements.

6.2.1 Membrane Bioreactor

A membrane bioreactor (MBR) combines secondary treatment with ultrafiltration (UF) or microfiltration (MF) membranes (ranging in size from 0.01 to 0.4 micron) to produce a filtered effluent meeting recycled water requirements. The secondary biological process of an MBR can be designed to meet a wide range to target water quality requirements including various nutrient water quality objectives (e.g., ammonia, total nitrogen, total phosphorous), and the membranes are provided, in lieu of secondary clarification to provide solids liquid separation. Figure 6-1 shows an example flow diagram for an MBR process.

Figure 6-1: MBR Process Flow Diagram



MBR facilities are advantageous when land is limited due to their compact footprint. By using membranes for solids-liquid separation, the MBR combines secondary clarification and tertiary filtration which reduces the facility footprint. Additionally, an MBR has the ability to operate at a higher mixed liquor concentration because solids liquid separation does not depend on gravity settling in a secondary clarifier.

An MBR membrane can either be a hollow fiber or flat plate membrane. Hollow fiber membrane systems typically require fine screening (2 mm screens or less) at the headworks for large and small debris removal (e.g. hair) that can foul and damage the membranes. The flat plate membranes do not typically require as fine of screen (3 mm or less) because the flat plate screens do not foul as easily. The screening requirements in front of the membranes vary by manufacturer.

MBR systems are typically designed with coarse bubble aeration in the membrane tanks. The purpose of the coarse bubble aeration is to provide agitation at the surface of the membrane and carry solids away from the membrane surface to minimize fouling and increase the permeability of the membrane. The coarse bubble aeration represents an additional aeration/energy demand of the MBR system.

Submerged membranes are subject to organic and inorganic fouling and are maintained by chemical cleaning. Typical chemicals include citric acid and sodium hypochlorite for organic and inorganic fouling, respectively. Maintenance cleaning is performed 1-2 times per week and includes the backpulse of chemical solution through the membranes. Recovery cleaning is performed 1-4 times per year and includes soaking the membranes in chemical solution.

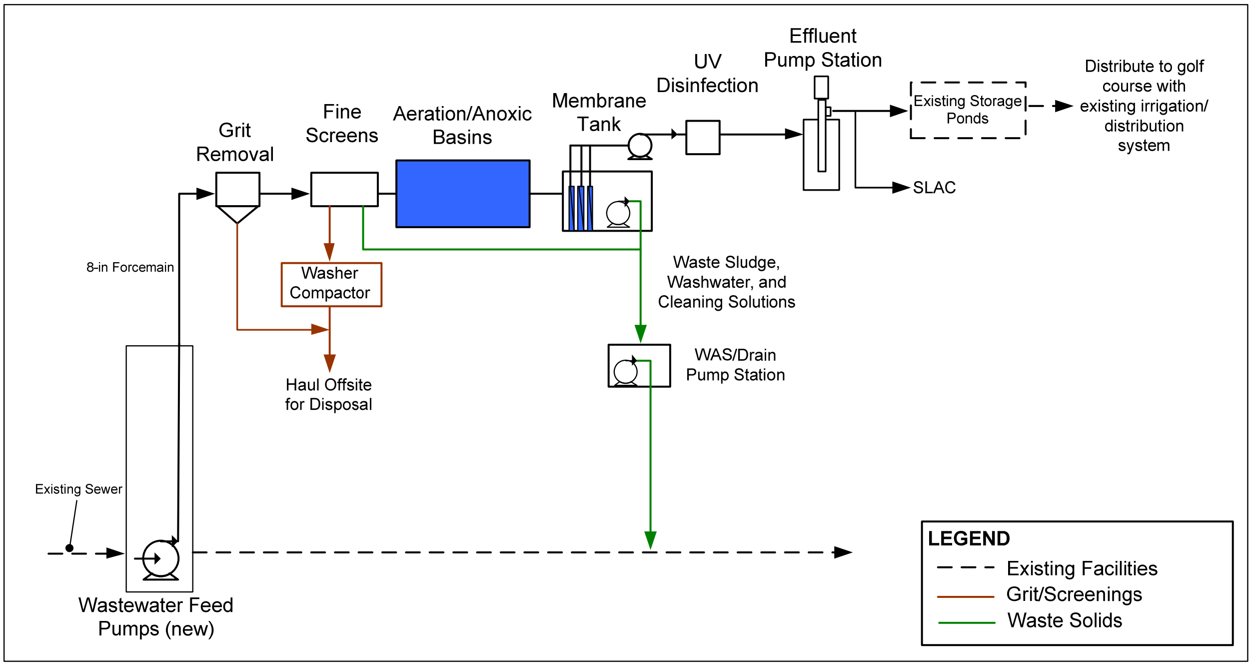
The majority of municipal MBR systems in operation in the United States have the membranes submerged in the mixed liquor and permeate is either pulled through the membranes (vacuum pressure) or permeate is pushed through the membranes by gravity. MBR manufacturers with installations in California include GE/Zenon, Koch Membranes, Ovivo, and Evoqua. The specific sizing and operating details of an MBR system vary by manufacturer. Advantages and disadvantages of the MBR process are provided in Table 6-2.

Table 6-2: Membrane Bioreactor Advantages and Disadvantages compared to a Sequencing Batch Reactor

Advantages	Disadvantages
Compact footprint	High capital and operating costs associated with membrane maintenance and replacement
High quality tertiary effluent for recycled water use allows for lower UV dose for disinfection	Additional maintenance required for automated valve maintenance, compared with a Sequencing Batch Reactor (SBR)
Combines secondary treatment with tertiary treatment which minimizes facilities to operate	Requires fine screening upstream of the MBR, creating a larger solid stream to be disposed of
Eliminates operational issues associated with poor sludge settleability since MBRs do not rely on gravity settlement	

Figure 6-2 shows the process schematic for MBR treatment facilities including headworks, ultraviolet (UV) disinfection and effluent pumping.

Figure 6-2: MBR Process Schematic



6.2.2 Sequencing Batch Reactor with Filtration

Sequencing Batch Reactor

A sequencing batch reactor (SBR) performs equalization, biological treatment, and secondary clarification in one basin versus separate basins for each process. The consolidation of processes allows for complete treatment on a small footprint and provides for potential capital cost savings by eliminating individual process tanks and equipment (clarifiers, etc.). A SBR facility would include two process trains to handle continuous wastewater flow.

A typical SBR process includes multiple operational modes including filling, reaction, settling, and decant. An advantage of SBR is that the reactor acts as an equalization basin as it fills such that peak flows can be absorbed without disrupting the treatment processes. Reactor filling has three variations (static, mixed, aerated) that depend on the operating strategy, particularly the desired food to microorganism ratio and if aerobic or anoxic conditions are desired for nitrogen removal.

During the reaction mode, raw wastewater is mixed with biomass without aeration to achieve denitrification. The basin is then aerated to promote aerobic stabilization. During this aeration period biochemical oxygen demand (BOD) is consumed and ammonia is converted to nitrate.

The reaction process is followed by a settling period where biomass settles to the bottom of the tank. During this period excess biomass will be wasted from the SBR and would be discharged to the sewer.

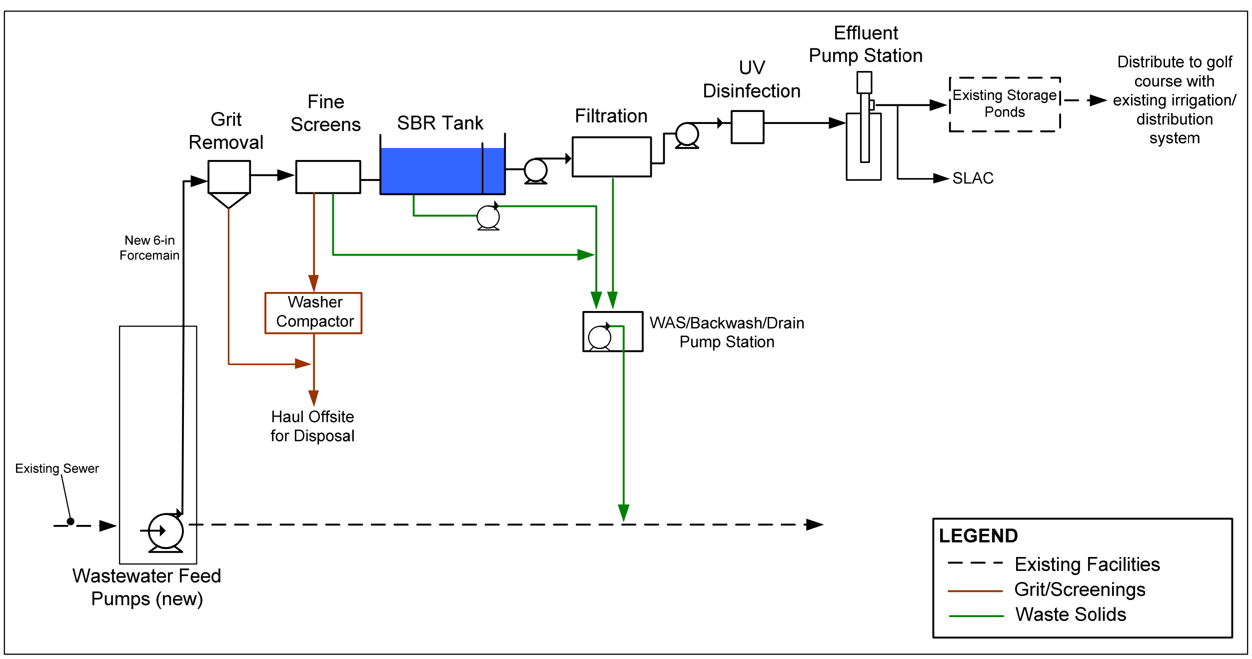
Following the settling period, treated effluent is discharged from the basin through a decanter. Typical decanters include floating types and fixed types which vary by manufacturer. Floating decanters are generally preferred due to their operational flexibility. Manufacturers of SBR equipment include Sanitaire, Aqua Aerobics and Evoqua. Advantages and disadvantages of the SBR process are provided in Table 6-3.

Table 6-3: SBR Advantages and Disadvantages Compared to MBR

Advantages	Disadvantages
Simple process suitable for smaller sized facilities	May require more operational oversight to monitor sludge settleability
Lower capital and O&M costs than MBR facility	Need secondary effluent storage to equalize decant mode
Process is capable of producing tertiary effluent suitable for reuse	
Compact footprint	
Influent equalization built into process basin	

Figure 6-3 shows the process schematic for SBR facilities including headworks, filtration, UV disinfection and effluent pumping.

Figure 6-3: SBR Process Schematic

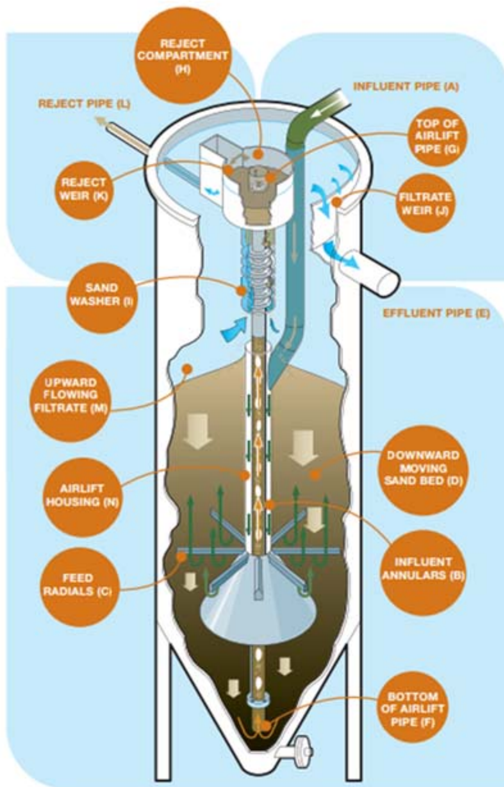


Continuous Backwash Sand Filters

A continuous backwashing filter is an upflow granular media filter that provides continuous filtration while simultaneously backwashing the media and producing a side waste stream. As shown in Figure 6-4, filter influent enters the filter through a supply pipe that distributes the flow in an upward direction through the filter media. Ultimately, the filtered water flows over the effluent weir prior to flowing into the effluent discharge pipeline. While filtration is occurring, granular media is continuously extracted from the bottom of the filter and scoured with air and water. The washwater is captured and the media settles to the top of the filter bed. Key components of a continuous backwash sand filter include:

- Filter internal parts (including cone and central column)
- Sand media
- Air compressor system

Figure 6-4: Continuous Backwash Sand Filter (Parkson Corporation DynaSand®)



Several deep bed continuous backwash sand filters are Title 22-approved. The DynaSand filter is a proprietary upflow deep bed continuous backwash filter manufactured by the Parkson Corporation. The DynaSand is used in multiple Title 22 water reclamation projects across California. Other Title 22-approved continuous backwash filters include the SuperSand™ by WesTech, the Hydrasand by Andritz and the Centra-flo® by Blue Water Technologies. Advantages and disadvantages of continuous backwash sand filtration are summarized in Table 6-4.

Table 6-4: Continuous Backwash Sand Filtration Evaluation

Advantages	Disadvantages
Robust system compared to cloth media which can be subject to tearing	Higher headloss compared to cloth media filter
Continuous operation does not require stoppages for backwashing	Taller facility may create a visual impact
Compact footprint	Higher backwash rate (up to 10% of effluent flow) compared to cloth media filter

Cloth Media Filtration

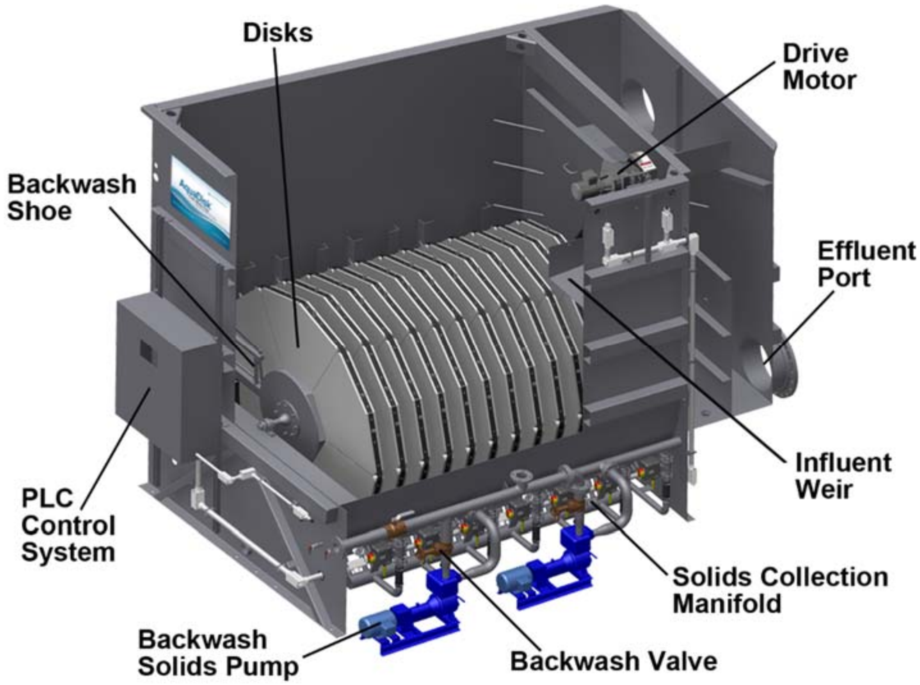
Cloth media filters utilize random weave fabric, nylon mesh or stainless steel mesh with nominal pore sizes ranging from 5 to 10 microns to filter particles from wastewater. There are currently eight cloth media filter manufacturers approved by the Department of Drinking Water (DDW) (formerly the Department of Public Health): Alfa Laval Ashbrook Simon-Hartley, Aqua-Aerobic Systems, Entex Technologies, Five Star Filtration, I. Kruger, Nordic Water, Sanitaire a Xylem Brand and Evoqua Water Technologies.

The configuration of each manufacturer's filter is unique; however the overall concept and treatment process are similar. In general, six pie-shaped sections of the filter media make up one disk, which is mounted vertically, along with other disks, on a tube inside a tank or basin. Tanks may be constructed out of concrete or stainless steel. Wastewater enters the tank or basin and passes by gravity through the cloth membrane. The solids accumulate on the cloth, forming a mat and causing the liquid levels within the basin to increase. Heavier solids settle to the bottom of the tank and are intermittently wasted. The filtered water enters the internal portion of the disk where it is discharged. The filters are designed to backwash automatically based upon a predetermined water level differential and are able to maintain constant filtration during backwash. The disks will only rotate during the backwash process, during which solids are backwashed from the surface of each disk by liquid suction from both sides of the disk. Key components of these filters include:

- Filter parts (including discs and center tube)
- Cloth media
- Drive system
- Backwash system

Figure 6-5 shows a general arrangement drawing for the Aqua Aerobic Systems AquaDisk® Cloth Media Filter. Filtration occurs as wastewater enters the basin or tank and passes through the cloth media. The filtered effluent enters the internal portion of the disk where it is directed to final discharge through the center shaft.

Figure 6-5: Cloth Media Filter (Aqua Aerobic Systems AquaDisk®)



The AquaDisk® filter has been used for water reuse applications in California, with facilities in operation in Chiquita, Fort Irwin, Jackson Rancheria, Manteca, Merced, Moreno Valley, Perris Valley, San Bernardino, and Williams. Advantages and disadvantages of cloth media filtration are summarized in Table 6-5.

Table 6-5: Cloth Media Filtration Advantages and Disadvantages

Advantages	Disadvantages
Lower headloss than sand filters	Susceptible to tears in cloth resulting in filter down time
Continuous operation does not require stoppages for backwashing	Cost of media replacement
Compact footprint	
Modular design allows for additional disks to be added for additional capacity	

6.2.3 Disinfection Alternatives

Ultraviolet disinfection (UV) was selected as the disinfection process to minimize the footprint of the facility and minimize chemical transportation and delivery. A chlorine disinfection process would be the alternative and would require a much larger footprint and would require more chemical use and delivery.

During UV disinfection, filtered wastewater is passed through a closed vessel with lamps that emit UV light. Viruses and bacteria become deactivated upon exposure to high doses of UV energy at wavelengths between 250-270 nanometers (nm). The required UV design dose varies depending on the type of filtration process. For granular filters or cloth filters, the UV dose is 100 millijoules per square centimeter (mJ/cm^2) and a UV transmittance of 55%. For membrane filtration the design dose is 80 mJ/cm^2 and a UV transmittance of 65%.

The most efficient type of UV system is the low-pressure, high intensity system. These systems emit a monochromatic light of 253.7 nm, the most effective wavelength for inactivation of bacteria and viruses. Lamps are typically controlled to generate a UV dose that is paced to the transmittance through the water (UV Transmittance, UVT) and flow rate. Performance of UV systems are usually affected by lamp age, degree of lamp fouling (reduced transmittance of UV light by biofilm, scaling, metal deposits on the lamp sleeve), and UVT. Lamp fouling is typically managed by an automated mechanical or mechanical/chemical cleaning of the UV lamp sleeves. UVT is measured by an on-line monitor, which can be input directly into a control loop and/or SCADA system

Major manufacturers of UV systems are Trojan Technologies Inc (Trojan), Infilco Degremont Inc (IDI), and Wedeco Inc (Wedeco). All three manufacturers supply low pressure, high intensity systems and have installations in California. UV systems typically include power distribution centers, system control centers, lamp ballasts, UV lamps and assemblies, interconnecting wiring, and in some cases a building to house the associated instrumentation and controls.

Chapter 7 Project Alternatives

This Chapter documents the Project recycled water production assumptions, development of project alternatives and the process of determining the Recommended Project.

7.1 Planning and Design Assumptions

Table 7-1 summarizes design criteria used to size infrastructure for the various alternatives.

Table 7-1: Facilities Development Criteria and Hydraulic Criteria

Item	Value	Units/Notes
Wastewater Pump Station		
Pump Efficiency	75	%
Design Flow	Varies by Alternative	Peak Hour Demand (PHD)
Wastewater Conveyance		
Design Flow	Varies by Alternative	Peak Hour Demand (PHD)
Max Velocity for Sizing	5	ft/sec
C Coefficient for Headloss	130	(no units) Assuming PVC pipe
Treatment		
Treatment Capacity	Varies by Alternative	mgd
Solids Handling		Discharge to sewer
Storage		
No new recycled water storage is included in the alternatives. Sharon Heights Golf Course Storage of 2 MG would be used for Golf Course operations and to support delivery of water to the golf course over a 20 hour period.		
Distribution Pump Station		
Pump Efficiency	75	%
Design Flow	Varies by Alternative	Peak hour demand (PHD)
Distribution Conveyance		
Design Flow	Varies by Alternative	Peak hour demand (PHD)
Max Velocity for Sizing	5	ft/sec
C Coefficient for Headloss	130	(no units) Assuming PVC pipe
Delivery Pressure	75	psi

7.1.1 Cost Estimate Basis

Cost estimates were prepared to evaluate and compare project alternatives and to support the alternative selection/decision process. The final costs of the project will depend on a variety factors, including but not limited to, actual labor and material costs, competitive market conditions, actual site conditions, final project scope, and implementation schedule.

The capital cost estimates for the alternatives were developed based other similar recycled water projects, cost quotations from treatment suppliers, industry publications, and typical pipeline installation costs in terms of cost per inch of pipeline length and inch diameter. Depending on the stage of the project and the level of detail understood, different estimating accuracies can be assumed. Since the Recycled Water Facility Plan is a preliminary planning phase project, these estimates are considered Class 5 estimates based on the AACE International Recommended Practice No. 18R-97, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries (2005). Class 5 estimates are based on a level of project definition of 0 to 2 percent and are suitable for alternatives analysis. The typical accuracy ranges for a Class 5 estimate is -20 to -50 percent on the low end, and +30 to +100 on the high end. In addition, the capital costs include the following contingency and markups:

- 30 percent construction contingency to account for unknown or unforeseen construction costs.
- Implementation costs allowances for environmental documentation, permits, design, construction management and financing.
- 5 percent project contingency to account for the current level of alternative detail.

Estimated costs are referenced to the April 2015 Engineering Construction Cost Index (ENR CCI) for San Francisco 11162.57.

O&M costs are the recurring annual expense to operate and maintain the facilities after construction is completed. The O&M cost elements include items such as power, operation and maintenance labor, and replacement of consumables (instruments, pumps, electrical equipment). The O&M cost estimates for the alternatives are developed based on similar recycled water projects, replacement equipment costs, industry publications, and pumping estimates. A contingency is not applied to O&M costs. Table 7-2 summarizes O&M cost assumptions.

Table 7-2: O&M Cost Assumptions

O&M Costs	Unit	Value
Equipment Consumables	-	2% of Equipment Costs
Electrical Consumables	-	2% of Electrical Costs
Instrumentation Consumables	-	2% of Instrumentation Costs
Pipeline Consumables	-	0.5% of Pipeline Costs
Power Costs	$ per kwh	$0.15
Labor Costs	$ per hour	$100

7.1.2 Unit Costs and Assumptions

Table 7-3 summarizes unit costs developed for common infrastructure for recycled water projects. Unit costs were developed based on RMC estimates from recent recycled water projects in California.

Table 7-3: Construction Unit Costs

Item	Unit Cost	Units/Notes
Pipelines		
6-inch diameter PVC	$120	per LF (installed cost)
8-inch diameter PVC	$160	per LF (installed cost)
10-inch diameter PVC	$200	per LF (installed cost)
12-inch diameter PVC	$240	per LF (installed cost)
Pump Stations[1]	$6,500	hp (based on peak flow)

Footnotes:

1. Pump station unit cost includes all equipment (pumps, motors, variable frequency drives (VFDs), and electrical panels), building, and yard piping.

Treatment Facilities Costs

Treatment equipment costs were developed based on the following sources:

- Project specific equipment vendor quotes – For the major treatment processes, MBR, SBR, cloth media filtration and granular media filtration, RMC coordinated with vendors (GE/Zenon for MBR, Sanitaire for SBR and Five Star Filtration for filtration options) to get project-specific budget quotes for the various capacities included in the conceptual projects.

- Previous project experience – RMC has recent project experience planning and designing several aspects of the treatment systems included in the conceptual projects, including MBR, concrete construction, headworks, UV disinfection, pumps, mixers, and blowers, and other items. These previous examples were used to estimate the unit costs included in this planning level estimate.
- Preliminary process sizing and layouts –Process facilities were preliminary sized and a preliminary layout was developed to identify space needed for the treatment plant and to develop quantities for the cost estimate (e.g., concrete, excavation, etc.).

Capital Financing Assumptions

The State Water Resource Control Board (SWRCB) Clean Water State Revolving Fund (SRF) offers low interest financing for recycled water projects. The SRF program offers 30-year financing at an interest rate of ½ the most recent General Obligation (GO) Bond Rate at time of funding approval. The interest rate has ranged from 1.7% to 3.0% over the last 10 years.

SRF financing assumptions used to annualize capital costs are:

- Annual Interest rate - 2.0%
- Term of Financing - 30 years

The rates for SRF financing does change based on the current market conditions, so actually project financing rate will likely differ from the assumption above.

7.2 Recycled Water Project Alternatives

Based on the results from the market assessment and proximity analysis, three Project Alternatives were developed and evaluated:

- **Alternative A, also referred to as Baseline Project,** which would serve Sharon Heights G&CC only whose demand was considered large enough to constitute a project on its own. This Project was developed based on information from the Market Survey, and through consultation with the WBSD and Sharon Heights G&CC. In Alternative A, WBSD would install recycled water treatment facilities at the golf course to serve only the demand from Sharon Heights G&CC.
- **Alternative B, also referred to as Baseline plus SLAC Project,** which would serve Sharon Heights G&CC and the irrigation and cooling tower demands of SLAC.
- **Alternative C, also referred to as Baseline plus Other Users Project,** which would serve Sharon Heights G&CC, Sharon Land Co., Sand Hill Commons and Rosewood Sand Hill.

The three alternatives are discussed in the following sections. MBR treatment and SBR with granular media filtration are compared for each Alternative.

7.2.1 Alternative A – Baseline Project

Alternative A is the Baseline Project and involves the construction of satellite treatment facilities, a wastewater pump station and forcemain to divert flow to the treatment facility and a solids discharge pipeline to convey waste sludge to an existing WBSD sewer. Grit and screenings would be collected in a dumpster and hauled offsite for disposal. Table 7-4 summarizes the customers and demands served by Alternative A. Table 7-5 summarizes the facilities needed for Alternative A.

For this Alternative, Sharon Heights G&CC is the sole targeted user. Sharon Heights G&CC is interested in implementing this project on a short time schedule. Distributing recycled water from the satellite plant would require the City of Menlo Park to allow WBSD to be the recycled water distributor within the City's water service area. Menlo Park has expressed support of this action.

Table 7-4: Alternative A Users

Customer Name	Type of Use	Average Annual Demand (AFY)	Max Day Demand (mgd)	Peak Hour Demand (gpm)
Sharon Heights Golf & Country Club	Irrigation	152	0.4	839

Table 7-5: Alternative A Main Facilities

Component	MBR			SBR + Granular Media Filtration		
	Value	Units	Notes	Value	Units	Notes
Influent Pump Station						
Design Flow	0.8	mgd	Peak hour wastewater flow	0.8	mgd	Peak hour wastewater flow
No. of Pumps	2	-	1 Duty, 1 Standby	2	-	1 Duty, 1 Standby
TDH	300	ft		300	ft	
hp per Pump	45	hp		45	hp	
Influent Pipeline						
8" Pipe	10,560	LF		10,560	LF	
Treatment Facilities						
Grit Removal	0.8	mgd		0.8	mgd	
Fine Screens	2	mm		3	mm	
MBR System – Biological Trains	2	-		N/A		
MBR System Flow	0.4	mgd	Max day wastewater flow			
MBR System – Membrane Tanks	2	-	Two cassettes per tank	N/A		
SBR System Flow				0.4	mgd	Max day wastewater flow
SBR System – Trains	N/A			2	-	
UV Disinfection	0.4	mgd		0.4	mgd	
Solids Discharge Pipeline						
6" Pipe	1,580	LF		1,580	LF	
Distribution Pump Station to Storage Ponds						
Design Flow	1.2	mgd	Peak hour irrigation demand	1.2	mgd	Peak hour irrigation demand
No, of Pumps	2	-		2	-	
TDH	30	ft		30	ft	
hp per Pump	10	hp		10	hp	

Pipeline Critical Crossings

Alternative A requires one major crossing – an east to west crossing of the Hetch-Hetchy right-of-way by the influent forcemain. Utilities crossing SFPUC pipelines must have a minimum clearance of 12-inches for open excavation, 24-inches for directional boring operation. All crossings must be as close to perpendicular as possible. All sewer and recycled water crossings must comply with Division of Drinking Water (DDW) requirements:

- When a sewage forcemain must cross a water main, the crossing should be as close as practical to the perpendicular. The sewage force main should be at least one foot below the water main.
- When a new sewage forcemain crosses under an existing water main, and a one-foot vertical separation cannot be provided, all portions of the sewage force main within eight feet

(horizontally) of the outside walls of the water main should be enclosed in a continuous sleeve. In these cases, a minimum vertical separation distance of 4 inches should be maintained between the outside edge of the bottom of the water main and the top of the continuous sleeve.

Treatment Facilities

Based on discussions with Sharon Heights G&CC, a section of the golf course near Highway 280 is undeveloped and available for the satellite treatment plant. The influent pump station will be sized to pump the peak hour available wastewater flow of 0.8 mgd. The satellite plant would be sized to treat the max day demand flow of 0.4 mgd. Because the facility would operate as a dry weather satellite plant, it is assumed that it would operate at a constant flow rate over 24 hours a day for 8 months of the year and operate at half capacity for 4 months of wet weather to maintain the biological processes.

Irrigation demands were assumed to occur over an 8-hour period. Storage would be provided for recycled water that is produced during the times when there is no demand (e.g. during the 12 to 16-hour window when irrigation demands do not occur) at the existing two million gallon golf course reservoir located near Sharon Park Drive. It was assumed that existing pipeline will be utilized to convey recycled water to the reservoir.

Raw wastewater would be pumped from a new manhole at Oak Avenue and Sand Hill Road which would divert flow from the existing 36-inch sewer to the satellite treatment plant. It was assumed that grit and screenings produced at the facility would be washed, compacted and hauled offsite for disposal and that waste sludge would be discharged by gravity to an existing 8-inch sewer lateral running along the southwest boundary of the golf course to be conveyed to SVCW. Headworks facilities (screening and grit removal) and biological tanks would have an odor control system. Biological tanks would be constructed below grade.

Table 7-6: Alternative A Cost Estimate

Description	MBR	SBR + Granular Media Filtration
Influent Pump Station	$614,000	$614,000
Influent Pipeline	$1,774,000	$1,774,000
Treatment Facilities	$6,768,000	$5,643,000
Distribution Pump Station	$375,000	$375,000
Distribution Pipeline		
Raw Construction Cost	**$9,351,000**	**$8,406,000**
Construction Contingency (30% of Raw Construction Cost)	$2,859,000	$2,522,000
Total Construction Cost	**$12,390,000**	**$10,928,000**
Implementation Cost	$2,600,000	$2,600,000
Project Contingency (5% of Total Construction Cost)	$620,000	$547,000
Total Capital Cost	**$15,610,000**	**$14,075,000**
Annualized Capital Costs[1]	$697,000	$628,000
Annual O&M Costs	$233,000	$198,000
Total Annualized Cost[2]	$930,000	$826,000
Estimated Recycled Water Yield (AFY)	152	152
Unit Cost, Annualized ($/AFY)	**$6,100**	**$5,400**

Footnotes:

1. Planning level estimate; costs are in April 2015 dollars
2. Annualized at 30 years, 2.0%

7.2.2 Alternative B – Baseline Project Plus SLAC

Alternative B involves the same facilities as Alternative A with the addition of a recycled water distribution pipeline and pump station to deliver water to SLAC. Table 7-7 summarizes the demands served by Alternative B. Table 7-8 summarizes the facilities needed for Alternative B.

SLAC was targeted as a user for Alternative B because of its cooling tower and irrigation demands and proximity to Sharon Heights G&CC. The recycled water demand for Sharon Heights G&CC alone is relatively low (152 AFY) for a new satellite treatment plant. Including SLAC as a user would increase the overall recycled water project yield and decrease the unit cost of recycled water. Preliminary wastewater flow monitoring at the proposed influent pump station location has indicated inadequate flows to meet SLAC's irrigation and cooling tower demand year-round in addition to Sharon Heights G&CC's demands. Therefore, it is assumed that SLAC will be served for seven months of the year from approximately October to April.

Table 7-7: Alternative B Users

Customer Name	Type of Use	Average Annual Demand (AFY)	Max Day Demand (mgd)	Peak Hour Demand (gpm)
Sharon Heights Golf & Country Club	Irrigation	152	0.4	839
SLAC	Irrigation	25[1]	0.11	237
SLAC	Cooling Tower	59[1]	0.18	213

Footnotes:

1. Based on assumed seven months of recycled water delivery.

Table 7-8: Alternative B Main Facilities

Component	MBR			SBR + Granular Media Filtration		
	Value	Units	Notes	Value	Units	Notes
Influent Pump Station						
Design Flow	0.8	mgd	Peak hour wastewater flow	0.8	mgd	Peak hour wastewater flow
No. of Pumps	2	-	1 Duty, 1 Standby	2	-	1 Duty, 1 Standby
TDH	300	ft		300	ft	
hp per Pump	45	hp		45	hp	
Influent Pipeline						
8” Pipe	10,560	LF		10,560	LF	
Treatment Facilities						
Grit Removal	0.8	mgd		0.8	mgd	
Fine Screens	2	mm		3	mm	
MBR System – Biological Trains	2	-		N/A		
MBR System Flow	0.5	mgd	Max day wastewater flow			
MBR System – Membrane Tanks	2	-	Two cassettes per tank	N/A		
SBR System Flow				0.5	mgd	Max day wastewater flow
SBR System – Trains	N/A			2	-	
UV Disinfection	0.5	mgd	Max day wastewater flow	0.5	mgd	Max day wastewater flow
Solids Discharge Pipeline						
6” Pipe	1,580	LF		1,580	LF	
Distribution Pump Station to Storage Ponds						
Design Flow	1.2	mgd	Peak hour irrigation demand	1.2	mgd	Peak hour irrigation demand
No, of Pumps	2	-		2	-	
TDH	30	ft		30	ft	
hp per Pump	10	hp		10	hp	
Distribution Pump Station to SLAC						
Design Flow	0.34	mgd	Peak hour irrigation demand	0.34	mgd	Peak hour irrigation demand
No. of Pumps	2	-	1 Duty, 1 Standby	2	-	1 Duty, 1 Standby
TDH	240	ft		240	ft	
hp per Pump	20	hp		20	hp	
Discharge Pressure	70	psi		70	psi	
Distribution Pipeline to SLAC						
6” Pipe	5,300	LF		5,300	LF	

Pipeline Critical Crossings

There are no critical crossings in addition to the crossings for Alternative A discussed in Section 7.2.1.

Treatment Facilities

The influent pump station will be sized to pump the peak hour available wastewater flow of 0.8 mgd. The satellite plant would be sized to treat the max day available wastewater flow of 0.5 mgd.

In addition to the treatment facilities described for Alternative A, Alternative B will include a recycled water distribution pipeline and pump station to convey recycled water to SLAC. It is assumed that SLAC will provide its own on-site storage facilities.

Table 7-9: Alternative B Cost Estimate

Description	MBR	SBR + Granular Media Filtration
Influent Pump Station	$614,000	$614,000
Influent Pipeline	$1,774,000	$1,774,000
Treatment Facilities	$6,768,000	$5,699,000
Distribution Pump Station	$454,000	$454,000
Distribution Pipeline	$665,000	$665,000
Raw Construction Cost	**$10,275,000**	**$9,207,000**
Construction Contingency (30% of Raw Construction Cost)	$3,083,000	$2,762,000
Total Construction Cost	**$13,358,000**	**$11,969,000**
Implementation Cost	$3,100,000	$3,100,000
Project Contingency (5% of Total Construction Cost)	$668,000	$599,000
Total Capital Cost	**$17,126,000**	**$15,668,000**
Annualized Capital Costs[1]	$765,000	$700,000
Annual O&M Costs	$258,000	$219,000
Total Annualized Cost[2]	$1.023,000	$919,000
Estimated Recycled Water Yield (AFY)	236	236
Unit Cost, Annualized ($/AFY)	**$4,300**	**$3,900**

Footnotes:
1. Planning level estimate; costs are in April 2015 dollars
2. Annualized at 30 years, 2.0%

7.2.3 Alternative C – Baseline Project Plus Other Users

Alternative C involves the same facilities as Alternative A with the addition of a recycled water distribution pipeline and pump station to deliver water to Sharon Land Co., Sand Hill Commons and the Rosewood Sand Hill. Table 7-10 summarizes the customers and demands served by Alternative C. Table 7-11 summarizes the facilities needed for Alternative C.

Sharon Land Co., Sand Hill Commons and the Rosewood Sand Hill were targeted as users for Alternative C because of their proximity to Sharon Heights G&CC and combined demand. The recycled water demand for Sharon Heights G&CC alone is relatively low (152 AFY) for a new satellite treatment plant and including the three additional users would increase the overall recycled water project yield and decrease the unit cost of recycled water.

Table 7-10: Alternative C Users

Customer Name	Type of Use	Average Annual Demand (AFY0	Max Day Demand (mgd)	Peak Hour Demand (gpm)
Sharon Heights Golf & Country Club	Irrigation	152	0.4	839
Sharon Land Co.	Irrigation	10	0.03	53
Sand Hill Commons	Irrigation	11	0.03	61
Rosewood Sand Hill	Irrigation	24	0.06	135

Table 7-11: Alternative C Main Facilities

Component	MBR			SBR + Granular Media Filtration		
	Value	Units	Notes	Value	Units	Notes
Influent Pump Station						
Design Flow	0.8	mgd	Peak hour wastewater flow	0.8	mgd	Peak hour wastewater flow
No. of Pumps	2	-	1 Duty, 1 Standby	2	-	1 Duty, 1 Standby
TDH	300	ft		300	ft	
hp per Pump	45	hp		45	hp	
Influent Pipeline						
8" Pipe	10,560	LF		10,560	LF	
Treatment Facilities						
Grit Removal	0.8	mgd		0.8	mgd	
Fine Screens	2	mm		3	mm	
MBR System – Biological Trains	2	-		N/A		
MBR System Flow	0.5	mgd	Max day wastewater flow			
MBR System – Membrane Tanks	2	-	Two cassettes per tank	N/A		
SBR System Flow				0.5	Mgd	Max day wastewater flow
SBR System – Trains	N/A			2	-	
UV Disinfection	0.5	mgd		0.5	mgd	
Solids Discharge Pipeline						
6" Pipe	1,580	LF		1,580	LF	
Distribution Pump Station to Storage Ponds						
Design Flow	1.2	mgd	Peak hour irrigation demand	1.2	mgd	Peak hour irrigation demand
No, of Pumps	2	-		2	-	
TDH	30	ft		30	ft	
hp per Pump	10	hp		10	hp	
Distribution Pump Station to Other Users						
Design Flow	0.3	mgd	Peak hour irrigation demand	0.3	mgd	Peak hour irrigation demand
No. of Pumps	2	-	1 Duty, 1 Standby	2	-	1 Duty, 1 Standby
TDH	210	ft		210	ft	
hp per Pump	15	hp		15	hp	
Discharge Pressure	70	psi		70	psi	

Component	MBR			SBR + Granular Media Filtration		
	Value	Units	Notes	Value	Units	Notes
Distribution Pipeline						
6" Pipe	6,400	LF		6,400	LF	

Pipeline Critical Crossings

There are no critical crossings in addition to the crossings for Alternative A discussed in Section 7.2.1.

Treatment Facilities

The influent pump station will be sized to pump the peak hour available wastewater flow of 0.8 mgd. The satellite plant would be sized to treat the max day available wastewater flow of 0.5 mgd to serve Sharon Heights G&CC, Sharon Land Co., Sand Hill Commons and Rosewood Sand Hill.

In addition to the treatment facilities described for Alternative A, Alternative C will include a recycled water distribution pipelines and pump station.

Table 7-12: Alternative C Cost Estimate

Description	MBR	SBR + Granular Media Filtration
Influent Pump Station	$614,000	$614,000
Influent Pipeline	$1,774,000	$1,774,000
Treatment Facilities	$6,768,000	$5,699,000
Distribution Pump Station	$454,000	$454,000
Distribution Pipeline	$798,000	$798,000
Raw Construction Cost	**$10,408,000**	**$9,340,000**
Construction Contingency (30% of Raw Construction Cost)	$3,122,000	$2,802,000
Total Construction Cost	**$13,530,000**	**$12,142,000**
Implementation Cost	$3,000,000	$3,000,000
Project Contingency (5% of Total Construction Cost)	$677,000	$607,000
Total Capital Cost	**$17,207,00**	**$15,749,000**
Annualized Capital Costs[1]	$768,000	$703,000
Annual O&M Costs	$248,000	$210,000
Total Annualized Cost[2]	$1,016,000	$913,000
Estimated Recycled Water Yield (AFY)	197	197
Unit Cost, Annualized ($/AFY)	**$5,200**	**$4,600**

Footnotes:

1. Planning level estimate; costs are in April 2015 dollars
2. Annualized at 30 years, 2.0%

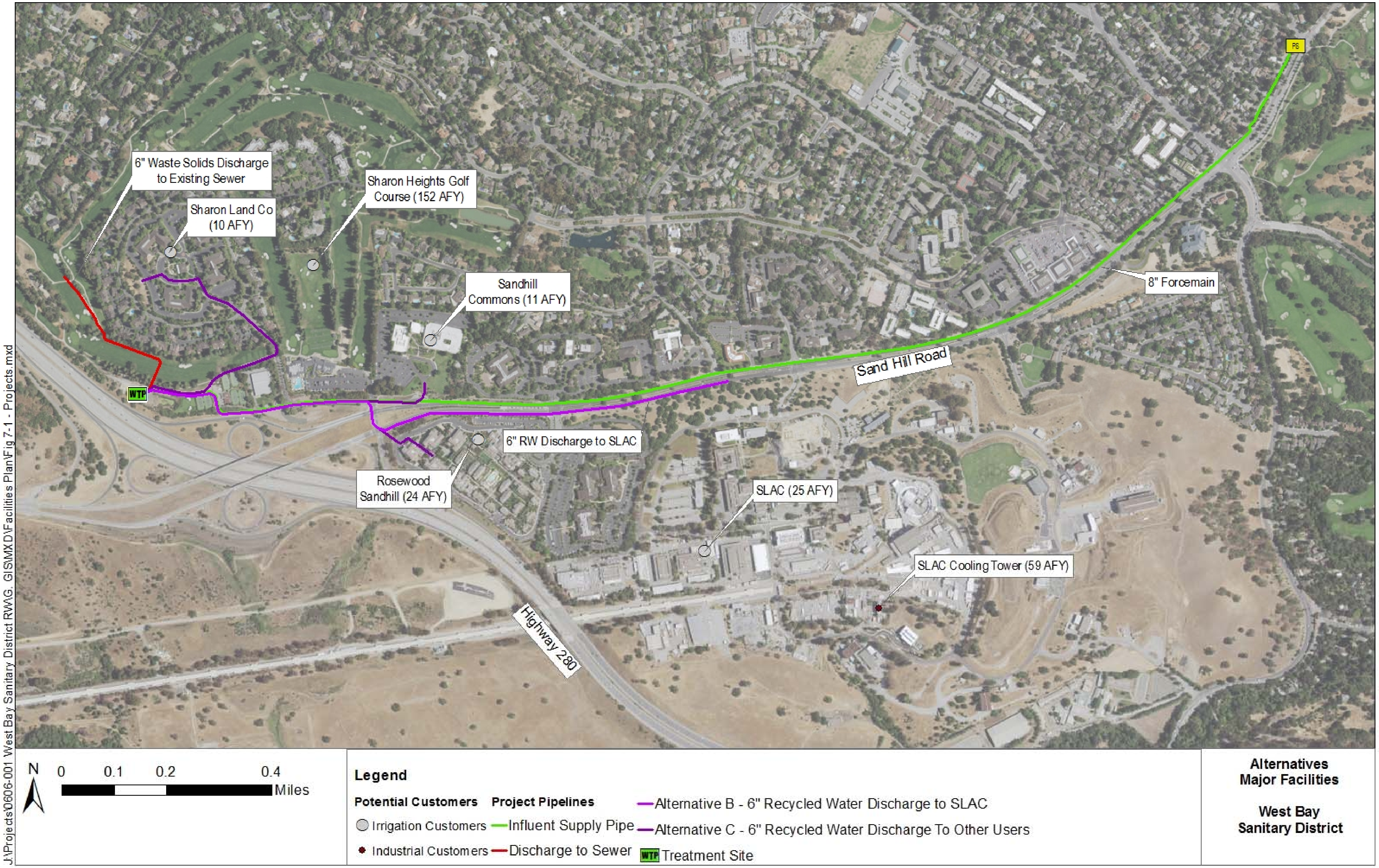
7.2.4 Alternatives Comparison

Table 7-13 summarizes the advantages and disadvantages between MBR and SBR with granular media filtration and the costs between the three Alternatives. Figure 7-1 shows the locations of the major facilities for the three alternatives.

Table 7-13: Alternatives Comparison

Description	MBR	SBR + Granular Media Filtration
Advantages	• Compact footprint • High quality tertiary effluent for recycled water use and discharge during wet weather season • Combines secondary treatment with tertiary treatment which minimizes facilities to operate • Eliminates operational issues associated with poor sludge settleability since MBRs do not rely on gravity sedimentation	• Compact footprint • Process is capable of producing tertiary effluent suitable for reuse • Simple process suitable for smaller sized facilities • Lower capital and O&M costs than MBR facility
Disadvantages	• High capital and operating costs associated with membrane maintenance and replacement • Additional maintenance required for automated valve maintenance, compared with an SBR • Requires fine screening upstream of the MBR, creating a solids stream to be disposed of	• May require more operational oversight to monitor sludge settleability
Alternative A		
Total Capital Cost	**$15,610,000**	**$14,020,000**
Annual O&M Costs	$233,000	$197,000
Total Annualized Cost	$930,000	$823,000
Estimated Recycled Water Yield (AFY)	152	152
Unit Cost, Annualized ($/AFY)	**$6,100**	**$5,400**
Alternative B		
Total Capital Cost	**$17,126,000**	**$15,668,000**
Annual O&M Costs	$258,000	$219,000
Total Annualized Cost	$1,023,000	$919,000
Estimated Recycled Water Yield (AFY)	236	236
Unit Cost, Annualized ($/AFY)	**$4,300**	**$3,900**
Alternative C		
Total Capital Cost	**$17,207,000**	**$15,749,000**
Annual O&M Costs	$248,000	$210,000
Total Annualized Cost	$1,016,000	$913,000
Estimated Recycled Water Yield (AFY)	197	197
Unit Cost, Annualized ($/AFY)	**$5,200**	**$4,600**

Figure 7-1: Alternatives Major Facilities



Conclusions

Based on discussions with WBSD, Alternative B was recommended:

- Incremental construction cost of $1,556,000 compared to the Baseline Project would bring an additional 144 AFY of recycled water use.
- Compared to SBR, MBR provides high quality tertiary effluent for recycled water use
- MBR eliminates operational issues associated with poor sludge settleability since MBRs do not rely on gravity sedimentation
- Includes a year-round demand

Chapter 8 Recommended Project

This chapter describes the Recommended Recycled Water Project (Recommended Project) and includes target customers, project facilities descriptions, cost estimates, project benefits and an implementation plan (including construction financing plan).

8.1 Facilities

The Recommended Project involves the construction of satellite treatment facilities designed to treat a max day flow of 0.5 mgd, a wastewater pump station to divert flow to the treatment facility, 1,580 LF of pipeline to discharge solids to an existing sewer, and 5,300 LF of distribution pipeline to SLAC. The Project would deliver an estimated 236 AFY of recycled water, including 152 AFY to Sharon Heights G&CC through the year and approximately 84 AFY over seven months to SLAC for irrigation and cooling tower uses. Table 8-1 provides the estimated average annual demand for each customer.

Table 8-1: Recommended Project Recycled Water Customers

Customer Name	Primary Type of Use	Average Annual Demand (AFY)	Max Day Demand (mgd)	Peak Hour Demand (gpm)
Sharon Heights Golf Course	Golf Course Irrigation	152	0.4	839
SLAC	Irrigation	25[1]	0.11	237
SLAC	Cooling Tower	59[1]	0.18	213

Footnotes:

1. Based on assumed seven months of recycled water delivery.

The Project begins with diverting wastewater flow from the 36-inch sewer at the intersection of Sand Hill and Oak Avenue. Wastewater would be pumped to Sharon Heights G&CC along Sand Hill Road through an Influent Pump Station where it arrives at the Satellite Treatment Facility. At the treatment facility, the first step is grit removal and fine screening (2 mm fine screen). The screened wastewater will then flow to biological reactor tanks, MBR treatment system, through a UV disinfection unit and to a recycled water clearwell. The recycled water clearwell would be used as the distribution pump station for SLAC and to deliver recycled water to the two million gallon Sharon Heights G&CC storage pond.

Figure 8-1 illustrates the recommended, planning-level layout for the new recycled water treatment facilities at Sharon Heights.

Distribution from the satellite plant to SLAC will be through one 6-inch pipeline. Grit and screenings will be collected in a common dumpster and hauled offsite for disposal. Solids produced from the MBR system will be discharged by gravity through a 6-inch pipeline to an existing 8-inch sewer lateral located near the southwest boundary of the golf course.

Figure 8-2 illustrates the recommended recycled water target customers and major facilities. Figure 8-3 illustrates the influent pump station configuration.

Figure 8-1: Recommended Project Facility-Planning Level Satellite Treatment Layout

Figure 8-2: Recommended Project Recycled Water Customers and Facilities

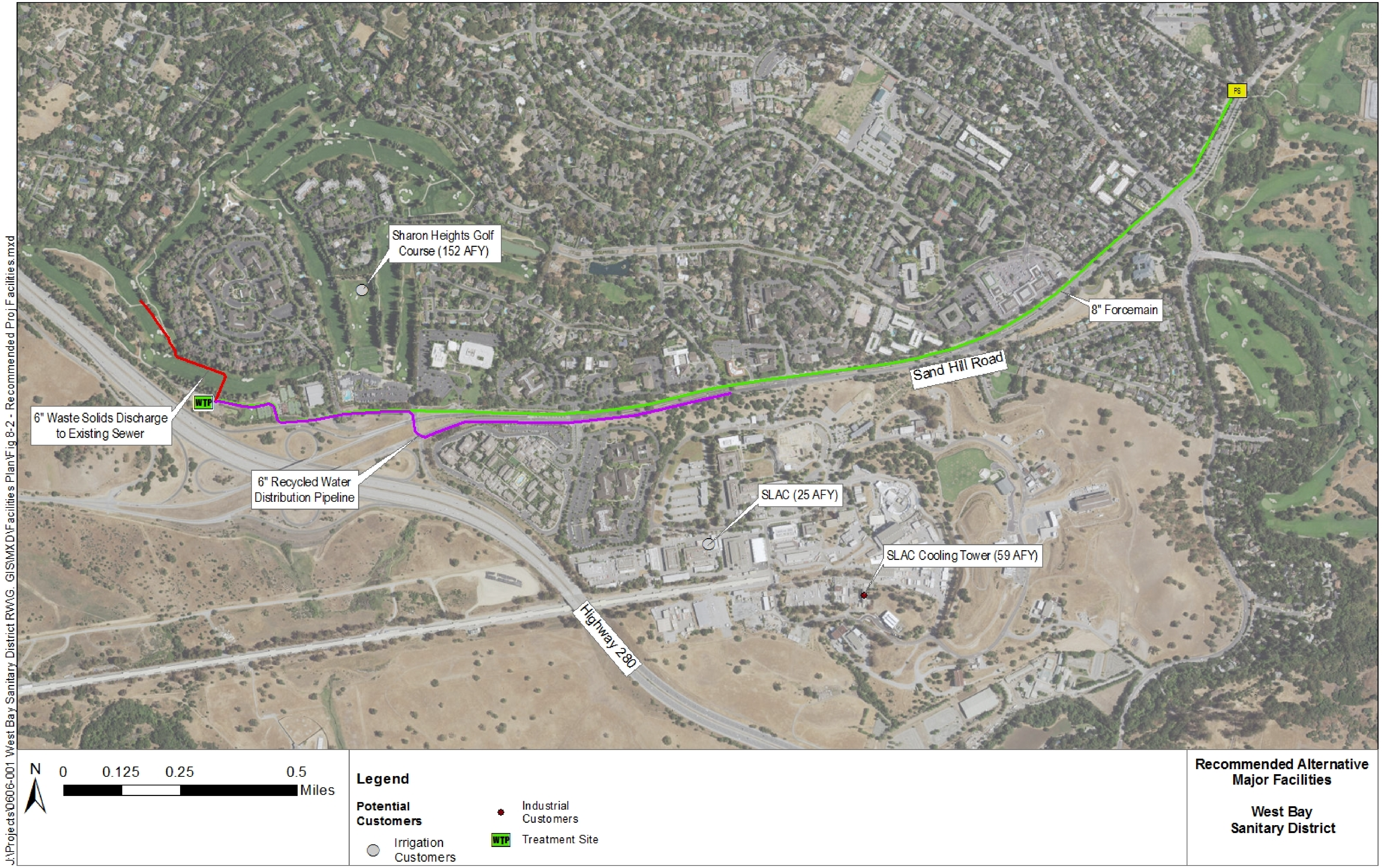


Figure 8-3: Influent Pump Station Configuration

Table 8-2 is a summary of key planning-level design criteria for the recommended facilities.

Table 8-2: Design Criteria for Recommended Project

Component	MBR		
	Value	Units	Notes
Influent Pump Station			
Design Flow	0.8	mgd	Peak hour wastewater flow
No. of Pumps	2	-	1 Duty, 1 Standby
TDH	300	ft	
hp per Pump	45	hp	
Influent Pipeline			
8” Pipe	10,560	LF	
Treatment Facilities			
Grit Removal	0.8	mgd	
Fine Screens	2	mm	
MBR System – Biological Trains	2	-	
MBR System Flow	0.5	mgd	Max day wastewater flow
MBR System – Membrane Tanks	2	-	Two cassettes per tank
SBR System Flow			
SBR System – Trains	N/A		
UV Disinfection	0.5	mgd	Max day wastewater flow
Solids Discharge Pipeline			
6” Pipe	1,580	LF	
Distribution Pump Station to Storage Ponds			
Design Flow	1.2	mgd	Peak hour irrigation demand
No. of Pumps	2	-	
TDH	30	ft	
hp per Pump	10	hp	
Distribution Pump Station to SLAC			
Design Flow	0.34	mgd	Peak hour irrigation demand
No. of Pumps	2	-	1 Duty, 1 Standby
TDH	240	ft	
hp per Pump	20	hp	
Discharge Pressure	70	psi	
Distribution Pipeline			
6” Pipe	5,300	LF	

8.2 Recommended Project Cost Estimate

Table 8-3 summarizes the estimated cost for the Recommended Project. See Appendix D for detailed cost information.

Table 8-3: Recommended Project Costs (April 2015 Dollars)

Description	MBR Treatment Facility Cost
Influent Pump Station	$614,000
Influent Pipeline	$1,774,000
Treatment Facilities	$6,768,000
Distribution Pump Station	$454,000
Distribution Pipeline	$665,000
Raw Construction Cost	**$10,275,000**
Construction Contingency (30% of Raw Construction Cost)	$3,064,000
Total Construction Cost	**$13,358,000**
Implementation Cost	$3,100,000
Project Contingency (5% of Total Construction Cost)	$668,000
Total Capital Cost	**$17,126,000**
Annualized Capital Costs[1]	$765,000
Annual O&M Costs	$258,000
Total Annualized Cost[2]	$1,023,000
Estimated Recycled Water Yield (AFY)	236
Unit Cost, Annualized ($/AFY)	**$4,300**

Footnotes:
1. Planning level estimate; costs are in April 2015 dollars
2. Annualized at 30 years, 2.0%

8.3 Comparison to No Project Alternative (SFPUC Supply)

Without the Project, existing demands would continue to be met using SFPUC supply through the MPMWD. Table 8-4 is a comparison between the Recommended Recycled Water Project and the No Project Alternative (continued use of SFPUC water for irrigation).

Table 8-4: Recommended Recycled Water Project vs. No Project Alternative (SFPUC Supply)

Criteria	Recommended Recycled Water Project	No Project –Continued SFPUC Supply
Summary		
Description	Development of treatment and distribution systems to provide recycled water for irrigation and cooling tower use	Status quo. No additional facilities required.
Water Supply	Recycled water from the Sharon Heights Satellite Treatment Plant, treated to Title 22 standards for "Disinfected Tertiary Recycled Water"	
Benefits		
Diversifying Water Sources	236 AFY of drought-proof locally controlled water supply for non-potable uses	
Sustainability	Conserves potable water for its highest beneficial use	
Costs		
Capital Cost	$17.1 million (April 2015 dollars)	None
Unit Cost ($/AF)	$4,300/AF (delivered)	$2,713/AF in 2014/15 (wholesale – see Chapter 2)
Other Potential Future Costs/Risks	Other users reduced need for irrigation water if turf replaced with zero-water landscaping elements	• Risk of unavailable supplies during periods of drought • Risk of supply interruption following a catastrophic event (e.g. earthquake) • Risk of additional future cost increases

Chapter 9 Implementation Plan

The following sections evaluate various institutional, financing and environmental areas of the recommended project.

9.1 Institutional Needs

Water Use Commitments

WBSD has developed an MOU with Sharon Heights G&CC, to partner in developing and funding the project, and also to be the primary user of the recycled water produced. A market assurance from SLAC could take the form of a letter of intent or user agreement and can be modeled after relevant portions of the SH G&CC MOU. The MOU is included in Appendix F.

Water Rights

No water rights issues were identified. WBSD does not currently have an NPDES permit as its wastewater is diverted to SVCW for treatment and discharge to the Bay at the Redwood City facility. Because SVCW is a bay discharger, they do not need a Petition for Change to be filed with the SWRCB due to the change in wastewater discharge volume associated with effluent diverted to the project.

Permitting and Agreements

Several permits were identified as necessary for the implementation of the recommended project. Foremost, WBSD would need to obtain a water recycled permit to serve recycled water. WBSD currently operates its sewers under the collection system general order, and would need to enroll in the newly adopted General Water Discharge Requirements for Recycled Water Use (General Order, WQ 2014-0900-DWQ). Standard construction permits including encroachment and air quality permits would also be required.

One interagency agreement was identified. A recycled water agreement with the City to serve recycled water to MPMWD customers is required to avoid duplication of service issues within the City's jurisdiction. WBSD has been working with the City and MPMWD on developing an MOU, and the City is supportive of recycled water. No recycled water service will be provided to Cal Water customers as part of the recommended project, so a recycled water agreement with Cal Water is not needed at this time.

Lastly, WBSD will curtail the sewer flow diverted to SVCW by 0.5 mgd however no formal agreement is required to reduce the flow to SVCW. The flow reduction will result in a slightly reduced flow charge to WBSD.

Right of Way Acquisition

No right of way acquisition was identified, however WBSD will need to coordinate ROW crossing with SFPUC for the crossing of the Hetch-Hetchy aqueduct in Sand Hill Road, and also coordinate to use the City's ROW to construct the pipeline along Sand Hill Road.

Unresolved Issues

WBSD is still in discussions regarding recycled water purveyor and conveyance rights with the City and MPMWD. Resolution is expected in the late July 2015 timeframe.

9.2 Financing Plan

This section discusses potential funding sources for the project, the construction financing plan and associated cash flow over the implementation period. Typically, recycled water projects are financed through a combination of grants, partnerships relative to project benefits, and the State Water Resource Control Board (SWRCB) State Revolving Fund (SRF).

9.2.1 Funding Opportunities

A variety of funding opportunities are possible for this project, including the following:

- Integrated Regional Water Management (IRWM) Program Funding
- US Bureau of Reclamation (USBR) Title XVI Funding
- SWRCB Recycled Water Funding
- California Infrastructure and Economic Development Bank (I-Bank) Infrastructure SRF Program

Each of these funding opportunities is described in further detail in the following sections.

Integrated Regional Water Management (IRWM) Program Funding

The Integrated Regional Water Management (IRWM) Program, administered by the California Department of Water Resources (DWR), provides planning and implementation grants to prepare and update IRWM Plans and to implement integrated, regional water resources related projects.

Funding is currently available through Proposition 84 (Prop 84), the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Act of 2006. Additional funding will become available from Proposition 1 in mid to late 2016 with draft guidelines expected in January of 2016.

IRWM program funding is awarded through a competitive grants program, in which approved IRWM Regions submit application packages for funding multiple projects within their regions. In order for a project to be eligible for IRWM funding, it must be included in an IRWM Region's IRWM Plan and preferably be ready to be implemented. This project falls within the San Francisco Bay Area IRWM Region, and therefore must be included within the San Francisco Bay Area IRWM Plan (BAIRWMP) to be eligible for IRWM funding. IRWM funding requires a 25% match for the entire grant proposal, which typically includes multiple projects from different sponsors. It is expected that this same model will be used when Prop 1 funding takes effect.

To prepare for the upcoming application process, the San Francisco Bay Area IRWM Region will issue a call for projects by the subregions. Prior to submitting the projects for consideration by the subregions, they must be submitted for inclusion in the Bay Area IRWM Plan. This can be done at any time through submittal to an online database.

Figure 9-1 illustrates the steps of the IRWM funding process from project submittal into the BAIRWMP to the subregional ranking to the final project proposal package. It is anticipated that Proposition 1 IRWM funding will carry similar requirements to Proposition 84 IRWM funding, and will be distributed through competitive grants in a similar manner following exhaustion of Proposition 84 funding. Additional information about the IRWM grant program can be accessed here: http://www.water.ca.gov/irwm/grants/index.cfm

Figure 9-1: Prop 84 Grant Process

US Bureau of Reclamation (USBR) Title XVI – Grant Funding

Processed through the USBR, the Title XVI grant program is focused on identifying and investigating opportunities for water reclamation and reuse. Funding is made available for the planning, design, and construction of water recycling treatment and conveyance facilities and structured to cover 25% of the total project costs (up to $20 million), with project proponents contributing 75% or more of total project costs. Proposal requirements include technical and budgetary components, as well as a completed Title XVI Feasibility Study, which must be submitted to USBR for review and approval. While compliance with the National Environmental Policy Act (NEPA) is not required during the proposal phase, it is required prior to the receipt and expenditure of Federal funds. Additionally, in order to be eligible to receive Title XVI funding, a project must be congressionally authorized.

Based on communication with USBR staff, USBR may replace the grant program with a low-interest (1 percent), 30-year loan program. Alternatively, it may create a joint-grant and loan program. The timing or certainty of these changes are currently unknown. More information is available from USBR's website here: http://www.usbr.gov/lc/socal/titlexvi.html/

State Water Resources Control Board Recycled Water Funding

The SWRCB administers three types of recycled water funding: recycled water facilities planning grants, construction implementation grants and loans, and clean water state revolving fund loans. Construction grants and loans specific to recycled water programs fall under the Water Recycling Funding Program (WRFP) and follow the clean water state revolving fund policy. With the Facilities Plan in place, WBSD can focus on obtaining grants or low interest loans to cover the construction implementation costs.

Facility Construction Grants

The SWRCB currently administers a grants program to cover construction of recycled water facilities. Funding will come from the Proposition 1 grant passed in November 2014 and makes available $725 million for recycled water and desalination projects. At the writing of this plan, it is estimated that $100 million will go towards desalination projects administered through the Department of Water Resources and $625 million will be available through SWRCB for planning and facilities construction grants and low interest loans.

The State Board's Water Recycling Funding Program Guidelines adopted on June 16, 2015, provide a construction grant that will cover 35% of actual eligible construction costs up to $15 million, including construction allowances. Eligible costs include construction allowances which may include engineering during construction, construction management, and contingencies limited to 15% of the construction grant value. To be eligible to receive grant funds, at least a 50% local cost share match must be provided.

Clean Water State Revolving Fund (CWSRF) Loans

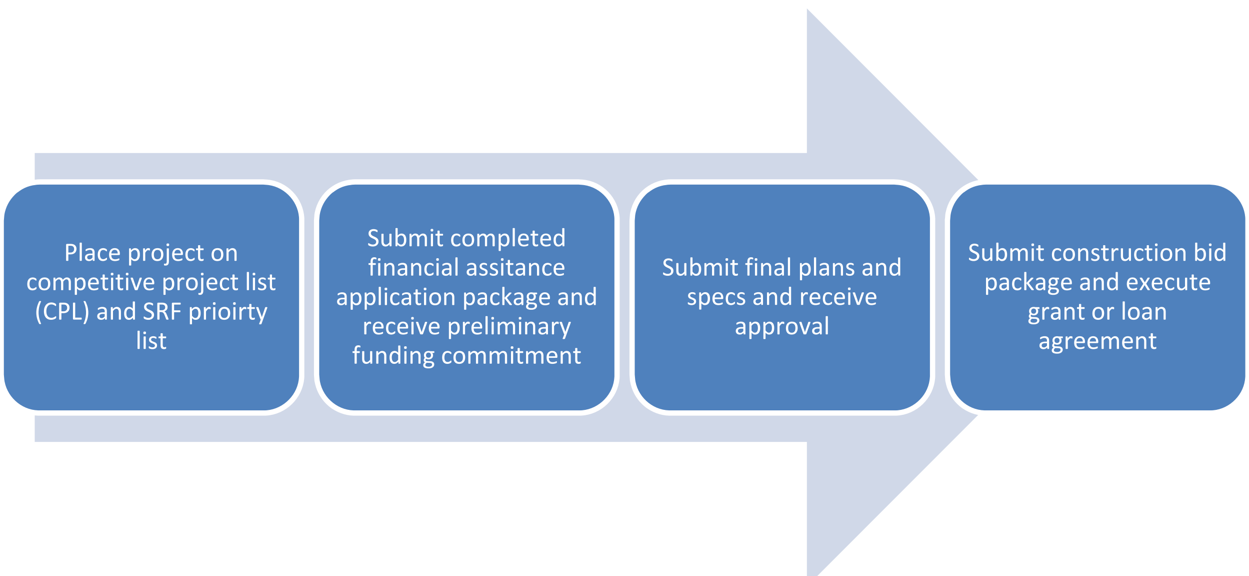
The SWRCB administers the Clean Water State Revolving Fund (CWSRF) Loan Program. This Program offers low-interest loans to eligible applicants for construction of publicly-owned facilities including wastewater treatment, local sewers, sewer interceptors, water reclamation facilities, and stormwater treatment. Funding under this Program is also available for expanded use projects including implementation of nonpoint source projects or programs, and development and implementation of estuary comprehensive conservation and management plans.

The process for securing funds includes submitting a CWSRF application, in addition to additional water recycling project-specific application items. CWSRF loans typically have a lower interest rate than bonds, at half of the General Obligation bond (typically 2.5% to 3%, currently 2.1%) at the time of the Preliminary Funding Commitment. Loans are paid back over 20 or 30 years. Annually, the CWSRF program disburses $200 million to $300 million to agencies in California. There is no award maximum, but a maximum allocation of $50 million per year per agency exists. Repayment begins one year after construction is complete. SWRCB funds projects on a readiness-to-proceed basis. The application process can take up to 6 months; SWRCB recommends collecting required information and applying once the draft California Environmental Quality Act (CEQA) and additional federal requirements (i.e. CEQA+) documents, required resolutions, and financial package are completed. Historically, SWRCB has offered up to $3 million in principal forgiveness (PF) (i.e. grants) to applicants if the project directly benefits a disadvantaged community (DAC). It is anticipated PF/grants will be made available to DACs in the future. Guidelines for the amounts of PF/grants available to DACs are outlined in the annual Intended Use Plan released by SWRCB each year.

In March of 2014, in response to the Drought Emergency issued by Governor Brown, $800 million in 1 percent loans was offered to water recycling projects. The WRFP Loans are available at 1-percent interest until December 2, 2015.

Projects may receive a combination of grant and low interest construction financing. The application process for construction grants and loans is the same and involves completion of an application package consisting of four separate applications to document general project information, financial security, technical project information, and environmental documentation and placement on the competitive funding list. The process is summarized in Figure 9-2.

Figure 9-2: Facilities Construction Grants and Loans Process



More information about the SWRCB CWSRF Program can be found here: http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/srf_forms.shtml .

Infrastructure SRF Program – I-Bank

The Infrastructure SRF (ISRF) Program provides low-interest loan financing to public agencies for a wide variety of infrastructure projects such as water supply, parks and recreation facilities, sewage collection and treatment, and water treatment and distribution projects. Funding is available in amounts up to $25 million with loan terms up to 30 years. The interest rate is set at the time the loan is approved. Eligible applicants include cities, counties, special districts, assessment districts, joint powers authorities, and nonprofit organizations. Applicants must demonstrate project readiness and feasibility to complete construction within two years after I-Bank loan approval. Additionally, eligible projects must promote economic development and attract, create, and sustain long-term employment opportunities. There is no required match; however, there is a one-time origination fee of 1% of the ISRF financing amount or $10,000, whichever is greater. Applications are accepted on continuous basis. The I-Bank recommends applications are submitted upon completion of design, as construction must begin within 6 months of the I-Bank's loan commitment.

More information about the ISRF Program can be found here:
http://www.ibank.ca.gov/infrastructure_loans.htm

9.2.2 Funding Opportunity Summary

There are multiple options to pursue outside funding. Table 9-1 summarizes the funding opportunities deadlines and current grant amounts.

9.2.3 Construction Financing and Cash Flow

Figure 9-3 demonstrates cash flow over the implementation period of the recommended project. Costs were summarized as part of Chapter 8, and the unit cost for water at this feasibility level is $5000/AF. As grants and loans become available to the project, rates and charges will be further refined. Figure 9-3 is an example cash flow chart.

Figure 9-3: Cash Flow Chart

West Bay Sanitary District Recycled Water Project

Design and Construction Cash Flow Analysis[1]

	Year		2015			2016				2017	
	Quarter	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
DESIGN/CONSTRUCTION COSTS[2]											
Eligible Design/Construction Costs											
CEQA Plus	$ 123,000	$ 41,000.00	$ 41,000.00	$ 41,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
State Revolving Fund Activities	$ 100,000	$ 10,000.00	$ 30,000.00	$ 30,000.00	$ 30,000	$ -	$ -	$ -	$ -	$ -	$ -
Preliminary Design/DB Procurement Package	$ 437,500	$ -	$ -	$ 54,688	$ 164,063	$ 164,063	$ 54,688	$ -	$ -	$ -	$ -
Design Build	$ 16,338,500	$ -	$ -	$ -	$ -	$ 1,361,542	$ 4,084,625	$ 4,084,625	$ 4,084,625	$ 1,361,542	$ 1,361,542
Engineers Report and RW Permit	$ 127,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 47,625	$ 47,625	$ 31,750	$ -
TOTAL	$ 17,126,000	$ 51,000	$ 71,000	$ 125,688	$ 194,063	$ 1,525,604	$ 4,139,313	$ 4,132,250	$ 4,132,250	$ 1,393,292	$ 1,361,542
PAYMENTS FROM PROJECT ACCOUNT											
Design/Construction Payment	$ 17,126,000	$ 51,000	$ 71,000	$ 125,688	$ 194,063	$ 1,525,604	$ 4,139,313	$ 4,132,250	$ 4,132,250	$ 1,393,292	$ 1,361,542
TOTAL	$ 17,126,000	$ 51,000	$ 71,000	$ 125,688	$ 194,063	$ 1,525,604	$ 4,139,313	$ 4,132,250	$ 4,132,250	$ 1,393,292	$ 1,361,542

Notes:
1. Cash flow analysis does not consider the financing costs, which would be paid back over a period longer than project implementaion, so the financing mechanism (e.g. bonds, SRF, etc.) is not considered here.
2. Costs based on Facilities Plan cost estimate in April 2015 dollars.

Table 9-1: Summary of Funding Opportunities

Opportunity	Application Dates	Grant Amounts
Title XVI – Construction Grants	Unknown	Up to 25% of construction cost with a maximum of $20M for federal funds
IRWM –Prop 1	Mid-Late 2016	$2.7 M (SF Bay Region), Prop 1: $625M available statewide for water recycling projects
SWRCB Facilities Construction Grants	Anticipated late 2015	$625 M (statewide)
Clean Water SRF Loans	On-going	$50 M/yr. at 1% - 3% interest rates (statewide)
WRFP SRF Loans	Apply prior to Dec 2, 2015	$282 M at 1% interest (statewide)
I-Bank SRF Loans	On-going	$25 M at variable interest rates (statewide)

9.3 Preliminary Environmental Review

An Initial Study/Mitigated Negative Declaration (IS/MND) is being prepared to meet California Environmental Quality Act (CEQA) requirements. The IS/MND is expected to be completed by the end of 2015, and as early as October. Included herein, as Appendix E is a preliminary evaluation of expected environmental impacts from implementation (construction and operation) of the Recommended Project. These topics described will be further explored in the IS/MND being prepared.

9.4 Design

Design-Build

Design-build was selected as the delivery method for the Recommended Project to meet the one-year design and construction schedule discussed in Section 9.5. Following completion and approval of this Plan, WBSD could commence on the pre-design of the satellite treatment plant facilities to finalize the treatment processes, sizing and layout to be used in the final design. Additionally, WBSD will commence on the pre-design of the distribution system to finalize the pipeline alignments, materials, sizing, and customer connections. The pre-design information would be needed to complete the IS/MND.

Upon completion of pre-design and financing package, WBSD could issue a request for proposal to initiate a competitive design-build process. Design-build could allow WBSD and Sharon Heights G&CC to meet the desired one year design and construction schedule

Design-Bid-Build

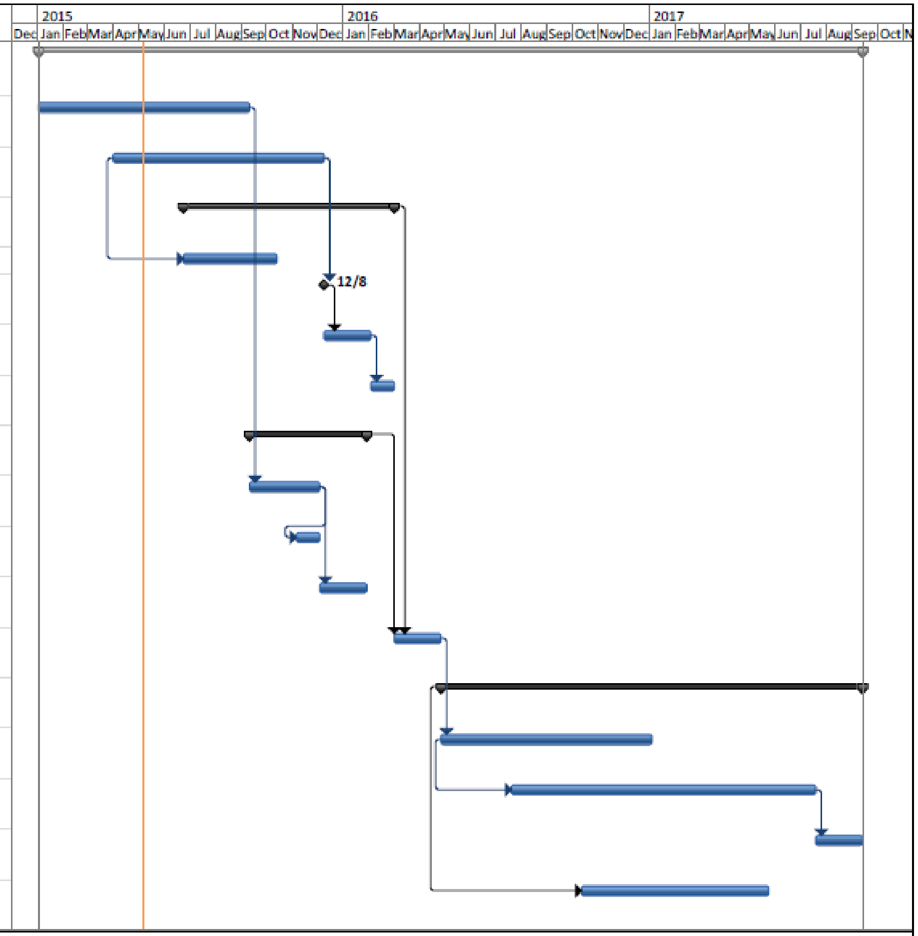
Design-bid-build was considered as a delivery method for the Recommended Project but was not selected because it cannot meet the one-year design and construction schedule.

9.5 Implementation Schedule

Planning on the recycled water project began in June 2014, and is proceeding with the development of this Facilities Plan. Moving forward, CEQA is underway and will be followed by design then construction. An implementation schedules for the design-build approach is included as Figure 9-4.

Figure 9-4: Design-Build Implementation Schedule

ID	Task Mode	Task Name	Duration	Start	Finish
0		**WBSD/Sharon Heights Recycled Water Project**	**703 days**	**Fri 1/2/15**	**Tue 9/12/17**
1		Facility Plan	9 mons	Fri 1/2/15	Thu 9/10/15
2		CEQA Plus	9 mons	Wed 4/1/15	Tue 12/8/15
3		**State Revolving Fund Activities**	**180 days**	**Wed 6/24/15**	**Tue 3/1/16**
4		Application Development	4 mons	Wed 6/24/15	Tue 10/13/15
5		Final Application Submittal (Need CEQA Plus)	0 days	Tue 12/8/15	Tue 12/8/15
6		SWRCB Review	2 mons	Wed 12/9/15	Tue 2/2/16
7		Funding Agreement Development	1 mon	Wed 2/3/16	Tue 3/1/16
8		**Preliminary Design/DB Procurement Package**	**100 days**	**Fri 9/11/15**	**Thu 1/28/16**
9		Preliminary Design	3 mons	Fri 9/11/15	Thu 12/3/15
10		Field Investigations (Survey and Geotech)	1 mon	Fri 11/6/15	Thu 12/3/15
11		DB Procurement Package	2 mons	Fri 12/4/15	Thu 1/28/16
12		DB Contractor Procurement	2 mons	Wed 3/2/16	Tue 4/26/16
13		**Design Build**	**360 days**	**Wed 4/27/16**	**Tue 9/12/17**
14		Design	9 mons	Wed 4/27/16	Tue 1/3/17
15		Construction	13 mons	Wed 7/20/16	Tue 7/18/17
16		Startup and Commissioning	2 mons	Wed 7/19/17	Tue 9/12/17
17		Engineers Report and RW Permit	8 mons	Wed 10/12/16	Tue 5/23/17



Project: WBSD/Sharon Heights Re
Date: Fri 5/8/15

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress

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Chapter 10 Conclusion

Planning on the recycled water project began in June 2014 with the initiation of the Market Survey and is now nearing the design stage with the completion of the Facilities Plan and progress on CEQA. A recommended project has been identified to serve both the Sharon Heights G&CC and SLAC. A strong partnership has been developed by WBSD and Sharon Heights G&CC where the treatment facility will be located. Additionally, SLAC is an enthusiastic recycled water customer and has been very engaged in the last couple months on the project. The City has also expressed support for the recycled water project, and WBSD is in discussions with the City and MPMWD on recycled water purveyorship and conveyance rights. The primary benefit of the recommended project is that SLAC demands are largely outside of the peak irrigation season, allowing recycled water to be produced and served year round. By serving both users the overall cost of the project per unit of water will be less; and more potable water within the SFPUC Hetch Hetchy system will be offset.

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Appendix A - Sand Hill Road Water Quality Data

Constituent	Units	12/10/2014	12/11/2014	12/12/2014	4/16/2015	4/21/2015	4/22/2015	5/6/2015	5/7/2015	5/8/2015	5/9/2015	5/10/2015	5/11/2015	5/14/2015	5/15/2015	5/16/2015	5/17/2015	5/18/2015	5/19/2015
Boron	mg/L	0.28	0.23	0.17	0.32	0.15	0.22	0.12	0.18	0.16	0.18	0.15	0.21	0.2	0.13	0.18	0.31	0.25	0.27
Calcium	mg/L	31	23	54	24	22	17	15	15	15	23	15	31	19	29	21	20	17	24
Magnesium	mg/L	25	6.3	18	14	17	9.3	5.6	6.4	9.7	7.1	6.4	10	5.3	17	8.4	16	12	27
Sodium	mg/L	63	58	220	71	45	58	59	58	41	78	61	110	56	46	54	110	53	46
Ammonia as NH_3	mg/L	63	66	22	58	57	60	56	65	60	63	43	52	48	48	150	58	54	57
BOD	mg/L	260	350	240	320	300	320	280	220	390	280	410	400	440	290	370	460	280	360
TDS	mg/L	510	340	870	450	330	390	330	400	350	460	340	320	430	370	370	540	360	450
TSS	mg/L	420	560	460	400	340	240	160	260	340	330	330	370	530	530	280	380	250	330
Silica	mg/L	17	15	18	16	17	18	13	19	18	17	20	17	20	19	18	22	18	18
TKN	mg/L	73	79	38	76	66	67	79	62	83	69	53	64	60	49	60	81	44	65
TN	mg/L	73	79	39	76	66	67	79	62	83	69	53	65	60	49	60	81	44	65
Phosphorus	mg/L	6.9	7.3	4.1	7.7	9.7	6.4	8.6	7.7	7.9	6.8	6.2	7.3	7.8	6.7	6.3	8.4	5.3	7.1
Chloride	mg/L	70	0.82	310	84	48	62	57	65	42	120	56	61	62	43	61	57	46	59
Nitrate	mg/L	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Appendix B - Alpine Road Water Quality Data

Constituent	Units	12/10/2014	12/11/2014	12/12/2014	4/16/2015	4/21/2015	4/22/2015	5/6/2015	5/7/2015	5/8/2015	5/9/2015	5/10/2015	5/11/2015	5/14/2015	5/15/2015	5/16/2015	5/17/2015	5/18/2015	5/19/2015
Boron	mg/L	0.24	0.14	0.22	0.32	0.26	0.21	0.32	0.29	0.22	0.18	0.27	0.20	0.18	0.22	0.26	0.29	0.23	0.25
Calcium	mg/L	24	26	30	27	37	36	27	20	23	11	27	28	30	51	33	30	30	26
Magnesium	mg/L	5.8	23	11	7.2	12	9.2	7.6	5.8	6.2	5.6	7.5	8.9	7	8.6	7.8	7.9	8.3	7.7
Sodium	mg/L	53	49	54	74	80	80	69	57	67	51	70	93	48	280	83	80	75	64
Ammonia as NH_3	mg/L	66	53	34	38	69	72	48	97	46	43	61	50	22	67	290	160	58	54
BOD	mg/L	370	310	310	310	360	510	520	230	360	360	600	340	580	320	970	440	1500	460
TDS	mg/L	310	430	340	400	540	460	390	410	370	310	410	480	360	1000	460	440	450	410
TSS	mg/L	480	310	230	480	510	680	2100	310	330	240	690	470	840	870	1500	410	3300	720
Silica	mg/L	15	14	17	16	18	16	13	22	17	19	19	20	18	16	21	19	17	19
TKN	mg/L	73	69	46	57	86	77	90	110	64	46	87	58	100	90	82	69	85	74
TN	mg/L	73	69	46	57	86	78	90	110	64	46	87	58	100	90	82	69	86	74
Phosphorus	mg/L	7.0	6.4	5.0	7.0	8.9	11	13	15	7.3	5.9	10	7.2	13	10	10	7.6	12	9.7
Chloride	mg/L	47	53	56	93	88	99	72	59	91	49	83	140	57	380	81	80	67	67
Nitrate as N	mg/L	ND	ND	ND	ND	ND	0.83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite as N	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Appendix C - Oak Avenue Flow Data

Time	06/12/15	06/13/15	06/14/15	06/15/15	06/16/15	06/17/15	06/18/15	06/19/15	06/20/15	06/21/15
0:00		0.462	0.368	0.412	0.422	0.427	0.443	0.435	0.487	0.365
1:00		0.390	0.350	0.408	0.378	0.427	0.428	0.444	0.444	0.365
2:00		0.384	0.317	0.403	0.328	0.384	0.354	0.387	0.406	0.302
3:00		0.287	0.307	0.350	0.297	0.360	0.246	0.290	0.208	0.238
4:00		0.174	0.183	0.182	0.227	0.287	0.219	0.214	0.124	0.178
5:00		0.137	0.135	0.112	0.138	0.174	0.117	0.166	0.087	0.124
6:00		0.107	0.120	0.067	0.114	0.104	0.117	0.129	0.096	0.091
7:00		0.107	0.120	0.092	0.114	0.104	0.117	0.129	0.087	0.091
8:00		0.107	0.120	0.123	0.114	0.104	0.127	0.166	0.087	0.091
9:00		0.199	0.139	0.258	0.188	0.160	0.153	0.226	0.146	0.129
10:00		0.222	0.215	0.308	0.228	0.277	0.258	0.275	0.193	0.143
11:00	0.337	0.265	0.314	0.559	0.438	0.492	0.492	0.532	0.313	0.236
12:00	0.414	0.419	0.429	0.639	0.505	0.505	0.492	0.540	0.355	0.405
13:00	0.363	0.419	0.477	0.657	0.461	0.505	0.492	0.597	0.361	0.466
14:00	0.373	0.360	0.451	0.593	0.456	0.482	0.586	0.532	0.361	0.471
15:00	0.342	0.530	0.451	0.598	0.457	0.388	0.453	0.482	0.364	0.471
16:00	0.442	0.498	0.425	0.524	0.580	0.382	0.453	0.518	0.324	0.511
17:00	0.538	0.459	0.414	0.494	0.525	0.379	0.444	0.486	0.345	0.507
18:00	0.559	0.451	0.438	0.395	0.497	0.389	0.404	0.235	0.354	0.445
19:00	0.496	0.448	0.421	0.323	0.496	0.399	0.343	0.314	0.374	0.404
20:00	0.496	0.436	0.438	0.319	0.463	0.408	0.317	0.458	0.376	0.389
21:00	0.491	0.441	0.236	0.323	0.472	0.451	0.312	0.343	0.384	0.389
22:00	0.491	0.425	0.463	0.399	0.394	0.408	0.314	0.345	0.377	0.407
23:00	0.462	0.383	0.434	0.445	0.472	0.457	0.321	0.489	0.367	0.424

Note:

1. Flow monitored hourly between 6/12/15 and 6/29/15
2. Flow monitored at 15-minute intervals Between 6/29/15 and 7/9/15. Data in table averaged to hourly values.

Time	06/22/15	06/23/15	06/24/15	06/25/15	06/26/15	06/27/15	06/28/15	06/29/15	06/30/15	07/01/15
0:00	0.430	0.453	0.431	0.442	0.434	0.444	0.409	0.532	0.537	0.450
1:00	0.427	0.414	0.419	0.436	0.434	0.423	0.429	0.467	0.489	0.361
2:00	0.407	0.317	0.388	0.434	0.346	0.423	0.429	0.422	0.336	0.221
3:00	0.252	0.341	0.238	0.321	0.321	0.306	0.372	0.260	0.281	0.179
4:00	0.192	0.239	0.166	0.273	0.279	0.230	0.202	0.224	0.227	0.150
5:00	0.185	0.235	0.149	0.132	0.198	0.151	0.189	0.149	0.166	0.123
6:00	0.133	0.117	0.097	0.115	0.139	0.093	0.123	0.149	0.223	0.118
7:00	0.133	0.115	0.097	0.115	0.139	0.093	0.123	0.149	0.287	0.215
8:00	0.133	0.115	0.097	0.132	0.139	0.093	0.123	0.168	0.471	0.411
9:00	0.219	0.136	0.162	0.134	0.219	0.139	0.161	0.266	0.533	0.497
10:00	0.398	0.414	0.423	0.211	0.525	0.183	0.255	0.326	0.533	0.497
11:00	0.574	0.640	0.517	0.490	0.591	0.273	0.260	0.452	0.662	0.576
12:00	0.620	0.640	0.542	0.511	0.662	0.456	0.469	0.631	0.662	0.678
13:00	0.503	0.640	0.387	0.511	0.711	0.593	0.478	0.631	0.619	0.613
14:00	0.545	0.576	0.369	0.604	0.505	0.646	0.633	0.488	0.570	0.528
15:00	0.540	0.461	0.308	0.482	0.471	0.499	0.588	0.581	0.595	0.625
16:00	0.531	0.430	0.307	0.395	0.583	0.524	0.530	0.558	0.620	0.582
17:00	0.516	0.405	0.447	0.468	0.583	0.550	0.528	0.515	0.227	0.422
18:00	0.461	0.411	0.479	0.468	0.481	0.577	0.526	0.469	0.446	0.459
19:00	0.446	0.388	0.451	0.440	0.479	0.550	0.474	0.493	0.472	0.500
20:00	0.446	0.378	0.451	0.440	0.418	0.550	0.474	0.500	0.507	0.472
21:00	0.516	0.378	0.440	0.434	0.409	0.435	0.468	0.519	0.481	0.567
22:00	0.296	0.419	0.436	0.434	0.421	0.435	0.508	0.519	0.406	0.489
23:00	0.296	0.431	0.432	0.434	0.435	0.393	0.600	0.552	0.456	0.405

Note:

1. Flow monitored hourly between 6/12/15 and 6/29/15
2. Flow monitored at 15-minute intervals Between 6/29/15 and 7/9/15. Data in table averaged to hourly values.

Time	07/02/15	07/03/15	07/04/15	07/05/15	07/06/15	07/07/15	07/08/15	07/09/15
0:00	0.394	0.423	0.361	0.317	0.411	0.475	0.404	0.427
1:00	0.340	0.366	0.300	0.309	0.341	0.340	0.338	0.385
2:00	0.324	0.277	0.200	0.248	0.265	0.258	0.223	0.260
3:00	0.194	0.179	0.193	0.167	0.169	0.207	0.168	0.201
4:00	0.100	0.132	0.109	0.153	0.127	0.125	0.104	0.113
5:00	0.115	0.106	0.104	0.111	0.100	0.103	0.098	0.085
6:00	0.115	0.098	0.104	0.111	0.081	0.096	0.129	0.191
7:00	0.333	0.141	0.108	0.126	0.245	0.253	0.303	0.202
8:00	0.434	0.267	0.219	0.175	0.427	0.416	0.442	0.470
9:00	0.520	0.405	0.358	0.339	0.617	0.588	0.585	0.695
10:00	0.557	0.619	0.530	0.386	0.682	0.344	0.770	0.545
11:00	0.594	0.663	0.566	0.582	0.668	0.712	0.720	
12:00	0.582	0.406	0.651	0.603	0.660	0.697	0.704	
13:00	0.594	0.577	0.612	0.576	0.639	0.613	0.337	
14:00	0.548	0.557	0.533	0.518	0.610	0.599	0.638	
15:00	0.572	0.548	0.506	0.465	0.602	0.552	0.634	
16:00	0.496	0.452	0.483	0.532	0.566	0.533	0.465	
17:00	0.481	0.579	0.504	0.482	0.508	0.499	0.499	
18:00	0.503	0.579	0.476	0.437	0.458	0.513	0.494	
19:00	0.510	0.519	0.452	0.443	0.447	0.496	0.492	
20:00	0.452	0.519	0.483	0.442	0.465	0.535	0.510	
21:00	0.471	0.451	0.385	0.435	0.480	0.535	0.578	
22:00	0.501	0.425	0.385	0.459	0.440	0.574	0.575	
23:00	0.472	0.454	0.395	0.461	0.497	0.465	0.510	

Note:

1. Flow monitored hourly between 6/12/15 and 6/29/15
2. Flow monitored at 15-minute intervals Between 6/29/15 and 7/9/15. Data in table averaged to hourly values.

Appendix D - Project Alternative Cost Estimates

Project: West Bay Sanitary District RW Facilities Plan

Aspect: Cost Estimate - Satellite Treatment Plant Options

Estimate Type:

Divisions	1A - Sharon Heights Golf Course ONLY -MBR	2A - Sharon Heights Golf Course + SLAC - MBR	3A - Sharon Heights Golf Course + Other Users - MBR	1B - Sharon Heights Golf Course ONLY - SBR + Cloth Media Filtration	2B - Sharon Heights Golf Course + SLAC - SBR + Cloth Media Filtration	3B - Sharon Heights Golf Course + Other Users - SBR + Cloth Media Filtration	1C - Sharon Heights Golf Course ONLY - SBR + Sand Filtration	2C - Sharon Heights Golf Course + SLAC - SBR + Sand Filtration	3C - Sharon Heights Golf Course + Other Users - SBR + Sand Filtration
Influent Pump Station	$614,000	$614,000	$614,000	$614,000	$614,000	$614,000	$614,000	$614,000	$614,000
Influent Pipeline	$1,774,000	$1,774,000	$1,774,000	$1,774,000	$1,774,000	$1,774,000	$1,774,000	$1,774,000	$1,774,000
Treatment Facilities	$6,768,000	$6,768,000	$6,768,000	$5,469,000	$5,526,000	$5,526,000	$5,643,000	$5,699,000	$5,699,000
Distribution Pump Station	$375,000	$454,000	$454,000	$375,000	$454,000	$391,000	$375,000	$454,000	$454,000
Distribution Pipeline	$0	$665,000	$798,000	$0	$665,000	$798,000	$0	$665,000	$798,000
Subtotal Raw Construction Cost	**$9,531,000**	**$10,275,000**	**$10,408,000**	**$8,232,000**	**$9,033,000**	**$9,144,000**	**$8,406,000**	**$9,207,000**	**$9,340,000**
Construction Contingency	$2,859,000	$3,083,000	$3,122,000	$2,470,000	$2,710,000	$2,743,000	$2,522,000	$2,762,000	$2,802,000
Base Construction Cost	**$12,390,000**	**$13,358,000**	**$13,530,000**	**$10,702,000**	**$11,743,000**	**$11,887,000**	**$10,928,000**	**$11,969,000**	**$12,142,000**
Implementation Costs	$2,600,000	$3,100,000	$3,000,000	$2,600,000	$3,100,000	$3,000,000	$2,600,000	$3,100,000	$3,000,000
Project Contingency	$620,000	$668,000	$677,000	$535,000	$587,000	$595,000	$547,000	$599,000	$607,000
Total Estimated Capital Cost	**$15,610,000**	**$17,126,000**	**$17,207,000**	**$13,837,000**	**$15,430,000**	**$15,482,000**	**$14,075,000**	**$15,668,000**	**$15,749,000**
Annual Costs									
Annual Cost of Consumables	$ 97,000	$ 105,000	$ 106,000	$ 76,000	$ 38,000	$ 83,000	$ 80,000	$ 85,000	$ 86,000
Annual Cost of Power	$ 82,000	$ 99,000	$ 88,000	$ 62,000	$ 78,000	$ 68,000	$ 66,000	$ 82,000	$ 72,000
Annual Cost of Chemicals	$ 2,000	$ 2,000	$ 2,000	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Annual Labor Costs	$ 52,000	$ 52,000	$ 52,000	$ 52,000	$ 52,000	$ 52,000	$ 52,000	$ 52,000	$ 52,000
Total Annual O&M	**$ 233,000**	**$ 258,000**	**$ 248,000**	**$ 190,000**	**$ 168,000**	**$ 203,000**	**$ 198,000**	**$ 219,000**	**$ 210,000**
Annualized Capital Costs									
Annualized Capital Costs	$ 697,000	$ 765,000	$ 768,000	$ 618,000	$ 689,000	$ 691,000	$ 628,000	$ 700,000	$ 703,000
Total Annualized Cost	$ 930,000	$ 1,023,000	$ 1,016,000	$ 808,000	$ 857,000	$ 894,000	$ 826,000	$ 919,000	$ 913,000
Project Unit Costs									
Project Recycled Water Yield (AFY)	152	236	197	152	236	197	152	236	197
Project Unit Cost ($/AFY)	$ 6,100	$ 4,300	$ 5,200	$ 5,300	$ 3,600	$ 4,500	$ 5,400	$ 3,900	$ 4,600
Project Unit Cost without Capital Cost ($/AFY)	$ 1,500	$ 1,100	$ 1,300	$ 1,300	$ 700	$ 1,000	$ 1,300	$ 900	$ 1,100

Notes:

1. Annualized cost are based on a State Revolving Fund Financing of 30 years at 2.0% interest rate.

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**1A - Sharon Heights Golf Course ONLY**		
Treatment:	**MBR**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	152		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 2,606,211	
3 - Concrete	$ 2,469,750	
5 - Metals	$ 30,000	
9 - Finishes	$ 20,000	
11 - Equipment	$ 2,910,000	
15 - Mechanical	$ 40,000	
16 - Electrical	$ 873,000	
17- I&C	$ 582,000	

	RAW CONSTRUCTION COST	**$ 9,531,000**
Construction Contingency	30%	$ 2,859,000
	BASE CONSTRUCTION COST	**$ 12,390,000**
	Environmental	$ 123,000
	Permitting	$ 127,000
	Design for PS, WW FM, Plant	$ 1,500,000
	Design for Distribution Pipeline	$ -
	CM for PS and coveyance FM	$ 250,000
	CM for Treatment Plant	$ 500,000
	CM for Distribution Pipeline	$ -
	Financing	$ 100,000
	IMPLEMENTATION COST	**$ 2,600,000**
	5%	$ 620,000
	PROJECT CONTINGENCY	**$ 620,000**
	TOTAL PROJECT COST	**$ 15,610,000**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 2,606,211**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 6,445,505		5%	$ 322,275	
	Distribution Pump Station Mobilization/Demobilization			$ 357,000		5%	$ 17,850	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 462,755**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for Treatment Structure			9,000	CY	$ 10	$ 90,000	108 ft x 57 ft x 20 ft, 1:1 excavation
	Excavation for Effluent Pump Station			2,200	CY	$ 10	$ 22,000	57 ft x 28 ft x 13 ft, 1:1 excavation
	Backfill			5,300	CY	$ 7	$ 39,436	
	Offhaul			11,200	CY	$ 11	$ 118,759	Assumes all excavation is offhauled
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	6" Pipe, Solids discharge to existing sewer	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
3 - Concrete							**$ 2,469,750**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,172,750**	
	Treatment Strucutre Slab			700	CY	$ 600	$ 420,000	109 ft x 58 ft, 3 ft thick
	Treatment Structure Elevated slab			370	CY	$ 850	$ 314,500	5000 sf, 2 ft thick
	Treatment Structure Walls			540	CY	$ 1,200	$ 648,000	18 ft high, 1.5 ft thick
	Treatment Building			6322	SF	$ 125	$ 790,250	109 ft x 58 ft, Pre-fabricated structure
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline							
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station							
	Distribution Pipeline							
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station							
	Distribution Pipeline							
11 - Equipment							**$ 2,910,000**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,480,000**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 340,000	$ 340,000	Includes allowance for installation
	MBR Package			1	LS	$ 1,280,000	$ 1,280,000	Vendor quote
	MBR Equipment Installation			1	LS	$ 320,000	$ 320,000	25% of equipment cost
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 40,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Distribution Pipeline							
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station							
	Distribution Pipeline							
16 - Electrical							**$ 873,000**	
	Influent Pump Station						**$ 117,000**	
	Electrical Allowance					30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 744,000**	

		Amount	Unit	Value	Cost	
	Electrical Allowance			30%	$ 744,000	30% of Division 11 (Equipment)
	Distribution Pump Station				**$ 12,000**	
	Electrical Allowance			30%	$ 12,000	30% of Division 11 (Equipment)
	Distribution Pipeline					
17 - I&C					**$ 582,000**	
	Influent Pump Station				**$ 78,000**	
	I&C Allowance			20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 496,000**	
	I&C Allowance			20%	$ 496,000	20% of Division 11 (Equipment)
	Distribution Pump Station				**$ 8,000**	
	I&C Allowance			20%	$ 8,000	20% of Division 11 (Equipment)
	Distribution Pipeline					
ANNUAL O&M COSTS		**Amount**	**Unit**	**Value**	**Cost**	
Consumables				Total Consumables	**$ 97,000**	
	Equipment Consumables	$ 2,910,000		2%	$ 58,200	2% of Equipment
	Electrical Consumables	$ 873,000		2%	$ 17,460	2% of Electrical
	Instrumentation Consumables	$ 582,000		2%	$ 11,640	2% of Instrumentation
	Pipeline Consumables	$ 1,874,928		0.5%	$ 9,375	0.5% of Pipeline
Power Costs				Total Power	**$ 82,000**	
	WW Pump Station	75,848	kwh	$ 0.15	$ 11,377	
	Headworks Screen					
	Grit Screw	2722	kwh	$ 0.15	$ 408	
	Grit Conveyor	227	kwh	$ 0.15	$ 34	
	Headworks Screen	490	kwh	$ 0.15	$ 73	
	MBR					
	Permeate Pumps	13335	kwh	$ 0.15	$ 2,000	
	Recirculation Pumps	73189	kwh	$ 0.15	$ 10,978	
	Denitrification Pumps	16079	kwh	$ 0.15	$ 2,412	
	Membrane Blowers	27218	kwh	$ 0.15	$ 4,083	
	Process Blowers	81654	kwh	$ 0.15	$ 12,248	
	Anoxic Mixers	68045	kwh	$ 0.15	$ 10,207	
	UV	27218	kwh	$ 0.15	$ 4,083	
	Effluent Pumping					
	To Storage Pond	7290	kwh	$ 0.15	$ 1,094	
	Chemicals					
	Hypochlorite Dosing	5444	kwh	$ 0.15	$ 817	
	Citric Acid Dosing	227	kwh	$ 0.15	$ 34	
	Odor Control					
	Odor Control Fans	108872	kwh	$ 0.15	$ 16,331	
	Site Electrical	36500	kwh	$ 0.15	$ 5,475	
Chemicals				Total Chemicals	**$ 2,000**	
	Hypochlorite	255	gal	$ 1	$ 255	
	Citric Acid	165	gal	$ 4	$ 660	
	Caustic	3	dry ton	$ 450	$ 1,350	
Labor Costs				Total Labor	$ 52,000	
	Total # Operators	1	number			
						Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Average Annual Hours per operator	520	hrs/yr			
	Total Operators per year	520	Total hrs	$ 100	**$ 52,000**	
			TOTAL ANNUAL O&M COSTS		**$ 233,000**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**2A - Sharon Heights Golf Course + SLAC**		
Treatment:	**MBR**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	236		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework		$ 3,275,241	
3 - Concrete		$ 2,469,750	
5 - Metals		$ 30,000	
9 - Finishes		$ 20,000	
11 - Equipment		$ 2,960,000	
15 - Mechanical		$ 40,000	
16 - Electrical		$ 888,000	
17- I&C		$ 592,000	
	RAW CONSTRUCTION COST	**$ 10,275,000**	
Construction Contingency	30%	$ 3,083,000	
	BASE CONSTRUCTION COST	**$ 13,360,000**	
	Environmental	$ 123,000	
	Permitting	$ 127,000	
	Design for PS, WW FM, Plant	$ 1,500,000	
	Design for Distribution Pipeline	$ 250,000	
	CM for PS and coveyance FM	$ 250,000	
	CM for Treatment Plant	$ 500,000	
	CM for Distribution Pipeline	$ 250,000	
	Financing	$ 100,000	
	IMPLEMENTATION COST	**$ 3,100,000**	
	5%	$ 668,000	
	PROJECT CONTINGENCY	**$ 668,000**	
	TOTAL PROJECT COST	**$ 17,126,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 3,275,241**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 6,445,505		5%	$ 322,275	
	Distribution Pump Station Mobilization/Demobilization			$ 432,000		5%	$ 21,600	
	Distribution Pipeline Mobilization/Demobilization			$ 633,600		5%	$ 31,680	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 462,755**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for Treatment Structure			9,000	CY	$ 10	$ 90,000	108 ft x 57 ft x 20 ft, 1:1 excavation
	Excavation for Effluent Pump Station			2,200	CY	$ 10	$ 22,000	57 ft x 28 ft x 13 ft, 1:1 excavation
	Backfill			5,300	CY	$ 7	$ 39,436	
	Offhaul			11,200	CY	$ 11	$ 118,759	Assumes all excavation is offhauled
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	6" Pipe, Solids discharge to existing sewer	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ 633,600**	
	Recycled water to SLAC	6	in	5,280	LF	$ 120	$ 633,600	
3 - Concrete							**$ 2,469,750**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,172,750**	
	Treatment Strucutre Slab			700	CY	$ 600	$ 420,000	109 ft x 58 ft, 3 ft thick
	Treatment Structure Elevated slab			370	CY	$ 850	$ 314,500	5000 sf, 2 ft thick
	Treatment Structure Walls			540	CY	$ 1,200	$ 648,000	18 ft high, 1.5 ft thick
	Treatment Building			6322	SF	$ 125	$ 790,250	109 ft x 58 ft, Pre-fabricated structure
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline						**$ -**	
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
11 - Equipment							**$ 2,960,000**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,480,000**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 340,000	$ 340,000	Includes allowance for installation
	MBR Package			1	LS	$ 1,280,000	$ 1,280,000	Vendor quote
	MBR Equipment Installation			1	LS	$ 320,000	$ 320,000	25% of equipment cost
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 90,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Vertical Turbine Pumps (RW to Other Users)			2	EA	$ 25,000	$ 50,000	
	Distribution Pipeline						**$ -**	
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
16 - Electrical							**$ 888,000**	
	Influent Pump Station						**$ 117,000**	
	Electrical Allowance					30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 744,000**	

	Electrical Allowance	30%	$	744,000	30% of Division 11 (Equipment)
	Distribution Pump Station		**$**	**27,000**	
	Electrical Allowance	30%	$	27,000	30% of Division 11 (Equipment)
	Distribution Pipeline		**$**	**-**	
17 - I&C			**$**	**592,000**	
	Influent Pump Station		**$**	**78,000**	
	I&C Allowance	20%	$	78,000	20% of Division 11 (Equipment)
	Influent Pipeline		**$**	**-**	
	Treatment Facilities		**$**	**496,000**	
	I&C Allowance	20%	$	496,000	20% of Division 11 (Equipment)
	Distribution Pump Station		**$**	**18,000**	
	Electrical Allowance	20%	$	18,000	20% of Division 11 (Equipment)
	Distribution Pipeline		**$**	**-**	

ANNUAL O&M COSTS			**Amount**	**Unit**		**Value**		**Cost**	
Consumables						Total Consumables	**$**	**105,000**	
	Equipment Consumables	$	2,960,000			2%	$	59,200	2% of Equipment
	Electrical Consumables	$	888,000			2%	$	17,760	2% of Electrical
	Instrumentation Consumables	$	592,000			2%	$	11,840	2% of Instrumentation
	Pipeline Consumables	$	3,205,488			0.5%	$	16,027	0.5% of Pipeline
Power Costs						Total Power	**$**	**99,000**	
	WW Pump Station		147,704	kwh	$	0.15	$	22,156	
	Headworks Screen								
	Grit Screw		2722	kwh	$	0.15	$	408	
	Grit Conveyor		227	kwh	$	0.15	$	34	
	Headworks Screen		490	kwh	$	0.15	$	73	
	MBR								
	Permeate Pumps		24799	kwh	$	0.15	$	3,720	
	Recirculation Pumps		73189	kwh	$	0.15	$	10,978	
	Denitrification Pumps		16079	kwh	$	0.15	$	2,412	
	Membrane Blowers		27218	kwh	$	0.15	$	4,083	
	Process Blowers		81654	kwh	$	0.15	$	12,248	
	Anoxic Mixers		68045	kwh	$	0.15	$	10,207	
	UV		27218	kwh	$	0.15	$	4,083	
	Effluent Pumping								
	To Storage Pond		7290	kwh	$	0.15	$	1,094	
	To SLAC		34,474	kwh	$	0.15	$	5,171	
	Chemicals								
	Hypochlorite Dosing		5444	kwh	$	0.15	$	817	
	Citric Acid Dosing		227	kwh	$	0.15	$	34	
	Odor Control								
	Odor Control Fans		108872	kwh	$	0.15	$	16,331	
	Site Electrical		36500	kwh	$	0.15	$	5,475	
Chemicals						Total Chemicals	**$**	**2,000**	
	Hypochlorite		255	gal		$1	$	255	
	Citric Acid		165	gal		$4	$	660	
	Caustic		3	dry ton		$450	$	1,350	
Labor Costs						Total Labor	$	52,000	
	Total # Operators		1	number					
	Average Annual Hours per operator		520	hrs/yr					Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year		520	Total hrs	$	100	**$**	**52,000**	
				TOTAL ANNUAL O&M COSTS			**$**	**258,000**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**3A - Sharon Heights Golf Course + Other Users**		
Treatment:	**MBR**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	197		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework		$ 3,408,297	
3 - Concrete		$ 2,469,750	
5 - Metals		$ 30,000	
9 - Finishes		$ 20,000	
11 - Equipment		$ 2,960,000	
15 - Mechanical		$ 40,000	
16 - Electrical		$ 888,000	
17- I&C		$ 592,000	
	RAW CONSTRUCTION COST	**$ 10,408,000**	
Construction Contingency	30%	$ 3,122,000	
	BASE CONSTRUCTION COST	**$ 13,530,000**	
	Environmental	$ 123,000	
	Permitting	$ 127,000	
	Design for PS, WW FM, Plant	$ 1,500,000	
	Design for Distribution Pipeline	$ 200,000	
	CM for PS and coveyance FM	$ 250,000	
	CM for Treatment Plant	$ 500,000	
	CM for Distribution Pipeline	$ 200,000	
	Financing	$ 100,000	
	IMPLEMENTATION COST	**$ 3,000,000**	
	5%	$ 677,000	
	PROJECT CONTINGENCY	**$ 677,000**	
	TOTAL PROJECT COST	**$ 17,207,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 3,408,297**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 6,445,505		5%	$ 322,275	
	Distribution Pump Station Mobilization/Demobilization			$ 432,000		5%	$ 21,600	
	Distribution Pipeline Mobilization/Demobilization			$ 760,320		5%	$ 38,016	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 462,755**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for Treatment Structure			9,000	CY	$ 10	$ 90,000	108 ft x 57 ft x 20 ft, 1:1 excavation
	Excavation for Effluent Pump Station			2,200	CY	$ 10	$ 22,000	57 ft x 28 ft x 13 ft, 1:1 excavation
	Backfill			5,300	CY	$ 7	$ 39,436	
	Offhaul			11,200	CY	$ 11	$ 118,759	Assumes all excavation is offhauled
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	Waste flows to sewer system, within Golf Course property	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ 760,320**	
	Recycled water to other users	6	in	6,336	LF	$ 120	$ 760,320	
3 - Concrete							**$ 2,469,750**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,172,750**	
	Treatment Strucutre Slab			700	CY	$ 600	$ 420,000	109 ft x 58 ft, 3 ft thick
	Treatment Structure Elevated slab			370	CY	$ 850	$ 314,500	5000 sf, 2 ft thick
	Treatment Structure Walls			540	CY	$ 1,200	$ 648,000	18 ft high, 1.5 ft thick
	Treatment Building			6322	SF	$ 125	$ 790,250	109 ft x 58 ft, Pre-fabricated structure
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline						**$ -**	
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
11 - Equipment							**$ 2,960,000**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,480,000**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 340,000	$ 340,000	Includes allowance for installation
	MBR Package			1	LS	$ 1,280,000	$ 1,280,000	Vendor quote
	MBR Equipment Installation			1	LS	$ 320,000	$ 320,000	25% of equipment cost
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 90,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Vertical Turbine Pumps (RW to Other Users)			2	EA	$ 25,000	$ 50,000	
	Distribution Pipeline						**$ -**	
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	

		Amount	Unit		Value	Cost	
16 - Electrical						**$ 888,000**	
	Influent Pump Station					**$ 117,000**	
	Electrical Allowance				30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline					**$ -**	
	Treatment Facilities					**$ 744,000**	
	Electrical Allowance				30%	$ 744,000	30% of Division 11 (Equipment)
	Distribution Pump Station					**$ 27,000**	
	Electrical Allowance				30%	$ 27,000	30% of Division 11 (Equipment)
	Distribution Pipeline					**$ -**	
17 - I&C						**$ 592,000**	
	Influent Pump Station					**$ 78,000**	
	I&C Allowance				20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline					**$ -**	
	Treatment Facilities					**$ 496,000**	
	I&C Allowance				20%	$ 496,000	20% of Division 11 (Equipment)
	Distribution Pump Station					**$ 18,000**	
	Electrical Allowance				20%	$ 18,000	20% of Division 11 (Equipment)
	Distribution Pipeline					**$ -**	
ANNUAL O&M COSTS		**Amount**	**Unit**		**Value**	**Cost**	
Consumables					Total Consumables	**$ 106,000**	
	Equipment Consumables	$ 2,960,000			2%	$ 59,200	2% of Equipment
	Electrical Consumables	$ 888,000			2%	$ 17,760	2% of Electrical
	Instrumentation Consumables	$ 592,000			2%	$ 11,840	2% of Instrumentation
	Pipeline Consumables	$ 3,370,224			0.5%	$ 16,851	0.5% of Pipeline
Power Costs					Total Power	**$ 88,000**	
	WW Pump Station	98,263	kwh	$	0.15	$ 14,739	
	Headworks Screen						
	Grit Screw	2722	kwh	$	0.15	$ 408	
	Grit Conveyor	227	kwh	$	0.15	$ 34	
	Headworks Screen	490	kwh	$	0.15	$ 73	
	MBR						
	Permeate Pumps	17716	kwh	$	0.15	$ 2,657	
	Recirculation Pumps	73189	kwh	$	0.15	$ 10,978	
	Denitrification Pumps	16079	kwh	$	0.15	$ 2,412	
	Membrane Blowers	27218	kwh	$	0.15	$ 4,083	
	Process Blowers	81654	kwh	$	0.15	$ 12,248	
	Anoxic Mixers	68045	kwh	$	0.15	$ 10,207	
	UV	27218	kwh	$	0.15	$ 4,083	
	Effluent Pumping						
	To Storage Pond	7290	kwh	$	0.15	$ 1,094	
	To Sharon Land Co	2,961	kwh	$	0.15	$ 444	
	To Rosewood Sandhill and Sandhill Commons	12,856	kwh	$	0.15	$ 1,928	
	Chemicals						
	Hypochlorite Dosing	5444	kwh	$	0.15	$ 817	
	Citric Acid Dosing	227	kwh	$	0.15	$ 34	
	Odor Control						
	Odor Control Fans	108872	kwh	$	0.15	$ 16,331	
	Site Electrical	36500	kwh	$	0.15	$ 5,475	
Chemicals					Total Chemicals	**$ 2,000**	
	Hypochlorite	255	gal		$1	$ 255	
	Citric Acid	165	gal		$4	$ 660	
	Caustic	3	dry ton		$450	$ 1,350	
Labor Costs					Total Labor	$ 52,000	
	Total # Operators	1	number				
	Average Annual Hours per operator	520	hrs/yr				Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year	520	Total hrs	$	100	**$ 52,000**	
			TOTAL ANNUAL O&M COSTS			**$ 248,000**	

Project: West Bay Sanitary District RW Facilities Plan

Alternative: 1B - Sharon Heights Golf Course ONLY
Treatment: SBR + Cloth Media Filtration

Date: June 12, 2015
Project Number: 606-001

Prepared by: SAM
Checked by:

Avg Annnual Demand (AFY) 152

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 2,483,195	
3 - Concrete	$ 2,430,500	
5 - Metals	$ 30,000	
9 - Finishes	$ 20,000	
11 - Equipment	$ 2,152,500	
15 - Mechanical	$ 40,000	
16 - Electrical	$ 645,750	
17- I&C	$ 430,500	

	RAW CONSTRUCTION COST	**$ 8,232,000**
Construction Contingency	30%	$ 2,470,000
	BASE CONSTRUCTION COST	**$ 10,700,000**
	Environmental	$ 123,000
	Permitting	$ 127,000
	Design for PS, WW FM, Plant	$ 1,500,000
	Design for Distribution Pipeline	$ -
	CM for PS and coveyance FM	$ 250,000
	CM for Treatment Plant	$ 500,000
	CM for Distribution Pipeline	$ -
	Financing	$ 100,000
	IMPLEMENTATION COST	**$ 2,600,000**
	5%	$ 535,000
	PROJECT CONTINGENCY	**$ 535,000**
	TOTAL PROJECT COST	**$ 13,837,000**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 2,483,195**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 5,208,824		5%	$ 260,441	
	Distribution Pump Station Mobilization/Demobilization			$ 357,000		5%	$ 17,850	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 401,574**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for SBR tanks			8,700	CY	$ 10	$ 87,000	89 ft x 62 ft x 10 ft, assume using existing pon
	Backfill			4,000	CY	$ 7	$ 29,763	
	Offhaul			8,700	CY	$ 11	$ 92,250	
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	6" Pipe, Solids discharge to existing sewer	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
3 - Concrete							**$ 2,430,500**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,133,500**	
	SBR Tanks Slab			680	CY	$ 600	$ 408,000	92 ft x 67 ft, 3 ft thick
	SBR Tanks Elevated slab			460	CY	$ 850	$ 391,000	6200 sf, 2 ft thick
	SBR Tanks Walls			470	CY	$ 1,200	$ 564,000	18 ft high, 1.5 ft thick
	Treatment Building			6,164	SF	$ 125	$ 770,500	92 ft x 67 ft
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline							
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station							
	Distribution Pipeline							
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station							
	Distribution Pipeline							
11 - Equipment							**$ 2,152,500**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 1,722,500**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	SBR Equipment Package			1	LS	$ 540,000	$ 540,000	Vendor quote
	Equipment Installation			1	LS	$ 135,000	$ 135,000	25% of equipment cost
	Sodium Hypochlorite Pump			1	EA	$ 7,500	$ 7,500	
	Cloth Media Filter Package			1	LS	$ 200,000	$ 200,000	Vendor quote
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 40,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Distribution Pipeline							
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station							
	Distribution Pipeline							
16 - Electrical							**$ 645,750**	
	Influent Pump Station						**$ 117,000**	
	Electrical Allowance					30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline						**$ -**	

	Treatment Facilities						**$ 516,750**	
	Electrical Allowance					30%	$ 516,750	30% of Division 11 (Equipment)
	Distribution Pump Station						**$ 12,000**	
	Electrical Allowance					30%	$ 12,000	30% of Division 11 (Equipment)
	Distribution Pipeline							
17 - I&C							**$ 430,500**	
	Influent Pump Station						**$ 78,000**	
	I&C Allowance					20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 344,500**	
	I&C Allowance					20%	$ 344,500	20% of Division 11 (Equipment)
	Distribution Pump Station						**$ 8,000**	
	I&C Allowance					20%	$ 8,000	20% of Division 11 (Equipment)
	Distribution Pipeline							
ANNUAL O&M COSTS			**Amount**	**Unit**		**Value**	**Cost**	
Consumables						Total Consumables	**$ 76,000**	
	Equipment Consumables		$ 2,152,500			2%	$ 43,050	2% of Equipment
	Electrical Consumables		$ 645,750			2%	$ 12,915	2% of Electrical
	Instrumentation Consumables		$ 430,500			2%	$ 8,610	2% of Instrumentation
	Pipeline Consumables		$ 2,381,808			0.5%	$ 11,909	0.5% of Pipeline
Power Costs						Total Power	**$ 62,000**	
	WW Pump Station		75,848	kwh	$	0.15	$ 11,377	
	Headworks Screen							
	Grit Screw		2722	kwh	$	0.15	$ 408	
	Grit Conveyor		227	kwh	$	0.15	$ 34	
	Headworks Screen		490	kwh	$	0.15	$ 73	
	SBR							
	Mixers		25,517	kwh	$	0.15	$ 3,828	
	Blowers		90,727	kwh	$	0.15	$ 13,609	
	Transfer Pumps		3,442	kwh	$	0.15	$ 516	
	Cloth Media Filtration							
	Filter Drive		150	kwh	$	0.15	$ 22	
	Filter Backwash Pumps		1,578	kwh	$	0.15	$ 237	
	UV		27,218	kwh	$	0.15	$ 4,083	
	Effluent Pumping							
	To Storage Pond		7290	kwh	$	0.15	$ 1,094	
	Chemicals							
	Hypochlorite Dosing		5,444	kwh	$	0.15	$ 817	
	Odor Control							
	Odor Control Fans		136090	kwh	$	0.15	$ 20,414	
	Site Electrical		36500	kwh	$	0.15	$ 5,475	
Chemicals						Total Chemicals	**$ 300**	
	Hypochlorite		255	gal		$1	$ 255	
Labor Costs						Total Labor	$ 52,000	
		Total # Operators	1	number				
		Average Annual Hours per operator	520	hrs/yr				Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
		Total Operators per year	520	Total hrs	$	100	**$ 52,000**	
				TOTAL ANNUAL O&M COSTS			**$ 190,300**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**2B - Sharon Heights Golf Course + SLAC**		
Treatment:	**SBR + Cloth Media Filtration**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	236		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division			Subtotal	Notes
2 - Sitework			$ 3,209,194	
3 - Concrete			$ 2,430,500	
5 - Metals			$ 30,000	
9 - Finishes			$ 20,000	
11 - Equipment			$ 2,202,500	
15 - Mechanical			$ 40,000	
16 - Electrical			$ 660,750	
17- I&C			$ 440,500	
		RAW CONSTRUCTION COST	**$ 9,033,000**	
	Construction Contingency	30%	$ 2,710,000	
		BASE CONSTRUCTION COST	**$ 11,740,000**	
		Environmental	$ 123,000	
		Permitting	$ 127,000	
		Design for PS, WW FM, Plant	$ 1,500,000	
		Design for Distribution Pipeline	$ 250,000	
		CM for PS and coveyance FM	$ 250,000	
		CM for Treatment Plant	$ 500,000	
		CM for Distribution Pipeline	$ 250,000	
		Financing	$ 100,000	
		IMPLEMENTATION COST	**$ 3,100,000**	
		5%	$ 587,000	
		PROJECT CONTINGENCY	**$ 587,000**	
		TOTAL PROJECT COST	**$ 15,430,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 3,209,194**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 5,263,080		5%	$ 263,154	
	Distribution Pump Station Mobilization/Demobilization			$ 432,000		5%	$ 21,600	
	Distribution Pipeline Mobilization/Demobilization			$ 633,600		5%	$ 31,680	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 455,830**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for SBR tanks			8,700	CY	$ 10	$ 87,000	89 ft x 62 ft x 10 ft, assume using existing pond.
	Excavation for effluent pump station wet well			2,200	CY	$ 10	$ 22,000	10 ft x 11 ft x 14 ft, assume 1:1 excavation
	Backfill			5,200	CY	$ 7	$ 38,692	
	Offhaul			10,900	CY	$ 11	$ 115,578	
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	Waste flows to sewer system, within Golf Course property	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ 633,600**	
	Recycled water to SLAC	6	in	5,280	LF	$ 120	$ 633,600	
3 - Concrete							**$ 2,430,500**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,133,500**	
	SBR Tanks Slab			680	CY	$ 600	$ 408,000	92 ft x 67 ft, 3 ft thick
	SBR Tanks Elevated slab			460	CY	$ 850	$ 391,000	6200 sf, 2 ft thick
	SBR Tanks Walls			470	CY	$ 1,200	$ 564,000	18 ft high, 1.5 ft thick
	Treatment Building			6,164	SF	$ 125	$ 770,500	92 ft x 67 ft
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline						**$ -**	
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
11 - Equipment							**$ 2,202,500**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 1,722,500**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	SBR Equipment Package			1	LS	$ 540,000	$ 540,000	Vendor quote
	Equipment Installation			1	LS	$ 135,000	$ 135,000	25% of equipment cost
	Sodium Hypochlorite Pump			1	EA	$ 7,500	$ 7,500	
	Cloth Media Filter			1	LS	$ 200,000	$ 200,000	Vendor quote
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 90,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Vertical Turbine Pumps (RW to SLAC)			2	EA	$ 25,000	$ 50,000	
	Distribution Pipeline						**$ -**	
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
16 - Electrical							**$ 660,750**	
	Influent Pump Station						**$ 117,000**	
	Electrical Allowance					30%	$ 117,000	30% of Division 11 (Equipment)

		Amount	Unit	Value	Cost	
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 516,750**	
	Electrical Allowance			30%	$ 516,750	30% of Division 11 (Equipment)
	Distribution Pump Station				**$ 27,000**	
	Electrical Allowance			30%	$ 27,000	30% of Division 11 (Equipment)
	Distribution Pipeline				**$ -**	
17 - I&C					**$ 440,500**	
	Influent Pump Station				**$ 78,000**	
	I&C Allowance			20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 344,500**	
	I&C Allowance			20%	$ 344,500	20% of Division 11 (Equipment)
	Distribution Pump Station				**$ 18,000**	
	Electrical Allowance			20%	$ 18,000	20% of Division 11 (Equipment)
	Distribution Pipeline				**$ -**	
ANNUAL O&M COSTS		**Amount**	**Unit**	**Value**	**Cost**	
Consumables				Total Consumables	**$ 38,000**	
	Equipment Consumables	$ 2,202,500		2%	`	2% of Equipment
	Electrical Consumables	$ 660,750		2%	$ 13,215	2% of Electrical
	Instrumentation Consumables	$ 440,500		2%	$ 8,810	2% of Instrumentation
	Pipeline Consumables	$ 3,205,488		0.5%	$ 16,027	0.5% of Pipeline
Power Costs				Total Power	**$ 78,000**	
	WW Pump Station	147,704	kwh	$ 0.15	$ 22,156	
	Headworks Screen					
	Grit Screw	2722	kwh	$ 0.15	$ 408	
	Grit Conveyor	227	kwh	$ 0.15	$ 34	
	Headworks Screen	490	kwh	$ 0.15	$ 73	
	SBR					
	Mixers	25,517	kwh	$ 0.15	$ 3,828	
	Blowers	90,727	kwh	$ 0.15	$ 13,609	
	Transfer Pumps	3,442	kwh	$ 0.15	$ 516	
	Cloth Media Filtration					
	Filter Drive	150	kwh	$ 0.15	$ 22	
	Filter Backwash Pumps	1,578	kwh	$ 0.15	$ 237	
	UV	27,218	kwh	$ 0.15	$ 4,083	
	Effluent Pumping					
	To Storage Pond	7290	kwh	$ 0.15	$ 1,094	
	To SLAC	34,474	kwh	$ 0.15	$ 5,171	
	Chemicals					
	Hypochlorite Dosing	5,444	kwh	$ 0.15	$ 817	
	Odor Control					
	Odor Control Fans	136090	kwh	$ 0.15	$ 20,414	
	Site Electrical	36500	kwh	$ 0.15	$ 5,475	
Chemicals				Total Chemicals	**$ 300**	
	Hypochlorite	255	gal	$1	$ 255	
Labor Costs				Total Labor	$ 52,000	
	Total # Operators	1	number			
	Average Annual Hours per operator	520	hrs/yr			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year	520	Total hrs	$ 100	**$ 52,000**	
	TOTAL ANNUAL O&M COSTS				**$ 168,300**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**3B - Sharon Heights Golf Course + Other Users**		
Treatment:	**SBR + Cloth Media Filtration**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	197		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework		$ 3,339,250	
3 - Concrete		$ 2,430,500	
5 - Metals		$ 30,000	
9 - Finishes		$ 20,000	
11 - Equipment		$ 2,202,500	
15 - Mechanical		$ 40,000	
16 - Electrical		$ 648,750	
17- I&C		$ 432,500	
	RAW CONSTRUCTION COST	**$ 9,144,000**	
Construction Contingency	30%	$ 2,743,000	
	BASE CONSTRUCTION COST	**$ 11,890,000**	
	Environmental	$ 123,000	
	Permitting	$ 127,000	
	Design for PS, WW FM, Plant	$ 1,500,000	
	Design for Distribution Pipeline	$ 200,000	
	CM for PS and coveyance FM	$ 250,000	
	CM for Treatment Plant	$ 500,000	
	CM for Distribution Pipeline	$ 200,000	
	Financing	$ 100,000	
	IMPLEMENTATION COST	**$ 3,000,000**	
	5%	$ 595,000	
	PROJECT CONTINGENCY	**$ 595,000**	
	TOTAL PROJECT COST	**$ 15,482,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 3,339,250**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 5,263,080		5%	$ 263,154	
	Distribution Pump Station Mobilization/Demobilization			$ 372,000		5%	$ 18,600	
	Distribution Pipeline Mobilization/Demobilization			$ 760,320		5%	$ 38,016	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 455,830**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for SBR tanks			8,700	CY	$ 10	$ 87,000	89 ft x 62 ft x 10 ft, assume using existing pond
	Excavation for effluent pump station wet well			2,200	CY	$ 10	$ 22,000	10 ft x 11 ft x 14 ft, assume 1:1 excavation
	Backfill			5,200	CY	$ 7	$ 38,692	
	Offhaul			10,900	CY	$ 11	$ 115,578	
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	Waste flows to sewer system, within Golf Course property	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ 760,320**	
	Recycled water to other users	6	in	6,336	LF	$ 120	$ 760,320	
3 - Concrete							**$ 2,430,500**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,133,500**	
	SBR Tanks Slab			680	CY	$ 600	$ 408,000	92 ft x 67 ft, 3 ft thick
	SBR Tanks Elevated slab			460	CY	$ 850	$ 391,000	6200 sf, 2 ft thick
	SBR Tanks Walls			470	CY	$ 1,200	$ 564,000	18 ft high, 1.5 ft thick
	Treatment Building			6,164	SF	$ 125	$ 770,500	92 ft x 67 ft
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline						**$ -**	
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
11 - Equipment							**$ 2,202,500**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 1,722,500**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	SBR Equipment Package			1	LS	$ 540,000	$ 540,000	Vendor quote
	Equipment Installation			1	LS	$ 135,000	$ 135,000	25% of equipment cost
	Sodium Hypochlorite Pump			1	EA	$ 7,500	$ 7,500	
	Cloth Media Filter			1	LS	$ 200,000	$ 200,000	Vendor quote
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 50,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Vertical Turbine Pumps (RW to Other Users)			2	EA	$ 25,000	$ 50,000	
	Distribution Pipeline						**$ -**	
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station						**$ -**	

		Amount	Unit		Value		Cost	
	Distribution Pipeline					**$**	**-**	
16 - Electrical						**$**	**648,750**	
	Influent Pump Station					**$**	**117,000**	
	Electrical Allowance				30%	$	117,000	30% of Division 11 (Equipment)
	Influent Pipeline					**$**	**-**	
	Treatment Facilities					**$**	**516,750**	
	Electrical Allowance				30%	$	516,750	30% of Division 11 (Equipment)
	Distribution Pump Station					**$**	**15,000**	
	Electrical Allowance				30%	$	15,000	30% of Division 11 (Equipment)
	Distribution Pipeline					**$**	**-**	
17 - I&C						**$**	**432,500**	
	Influent Pump Station					**$**	**78,000**	
	I&C Allowance				20%	$	78,000	20% of Division 11 (Equipment)
	Influent Pipeline					**$**	**-**	
	Treatment Facilities					**$**	**344,500**	
	I&C Allowance				20%	$	344,500	20% of Division 11 (Equipment)
	Distribution Pump Station					**$**	**10,000**	
	Electrical Allowance				20%	$	10,000	20% of Division 11 (Equipment)
	Distribution Pipeline					**$**	**-**	
ANNUAL O&M COSTS		**Amount**	**Unit**		**Value**		**Cost**	
Consumables					Total Consumables	**$**	**83,000**	
	Equipment Consumables	$ 2,202,500			2%	$	44,050	2% of Equipment
	Electrical Consumables	$ 648,750			2%	$	12,975	2% of Electrical
	Instrumentation Consumables	$ 432,500			2%	$	8,650	2% of Instrumentation
	Pipeline Consumables	$ 3,370,224			0.5%	$	16,851	0.5% of Pipeline
Power Costs					Total Power	**$**	**68,000**	
	WW Pump Station	98,263	kwh	$	0.15	$	14,739	
	Headworks Screen							
	Grit Screw	2722	kwh	$	0.15	$	408	
	Grit Conveyor	227	kwh	$	0.15	$	34	
	Headworks Screen	490	kwh	$	0.15	$	73	
	SBR							
	Mixers	25,517	kwh	$	0.15	$	3,828	
	Blowers	90,727	kwh	$	0.15	$	13,609	
	Transfer Pumps	3,442	kwh	$	0.15	$	516	
	Cloth Media Filtration							
	Filter Drive	150	kwh	$	0.15	$	22	
	Filter Backwash Pumps	1,578	kwh	$	0.15	$	237	
	UV	27,218	kwh	$	0.15	$	4,083	
	Effluent Pumping							
	To Storage Pond	7290	kwh	$	0.15	$	1,094	
	To Sharon Land Co	2,961	kwh	$	0.15	$	444	
	To Rosewood Sandhill and Sandhill Commons	12,856	kwh	$	0.15	$	1,928	
	Chemicals							
	Hypochlorite Dosing	5,444	kwh	$	0.15	$	817	
	Odor Control							
	Odor Control Fans	136090	kwh	$	0.15	$	20,414	
	Site Electrical	36500	kwh	$	0.15	$	5,475	
Chemicals					Total Chemicals	**$**	**300**	
	Hypochlorite	255	gal		$1	$	255	
Labor Costs					Total Labor	$	52,000	
	Total # Operators	1	number					
	Average Annual Hours per operator	520	hrs/yr					Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year	520	Total hrs	$	100	**$**	**52,000**	
			TOTAL ANNUAL O&M COSTS			**$**	**203,300**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**1C - Sharon Heights Golf Course ONLY**		
Treatment:	**SBR + Sand Filtration**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	152		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework		$ 2,491,445	
3 - Concrete		$ 2,430,500	
5 - Metals		$ 30,000	
9 - Finishes		$ 20,000	
11 - Equipment		$ 2,262,500	
15 - Mechanical		$ 40,000	
16 - Electrical		$ 678,750	
17- I&C		$ 452,500	
	RAW CONSTRUCTION COST	**$ 8,406,000**	
Construction Contingency	30%	$ 2,522,000	
	BASE CONSTRUCTION COST	**$ 10,930,000**	
	Environmental	$ 123,000	
	Permitting	$ 127,000	
	Design for PS, WW FM, Plant	$ 1,500,000	
	Design for Distribution Pipeline	$ -	
	CM for PS and coveyance FM	$ 250,000	
	CM for Treatment Plant	$ 500,000	
	CM for Distribution Pipeline	$ -	
	Financing	$ 100,000	
	IMPLEMENTATION COST	**$ 2,600,000**	
	5%	$ 547,000	
	PROJECT CONTINGENCY	**$ 547,000**	
	TOTAL PROJECT COST	**$ 14,075,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 2,491,445**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 5,373,824		5%	$ 268,691	
	Distribution Pump Station Mobilization/Demobilization			$ 357,000		5%	$ 17,850	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 401,574**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for SBR tanks			8,700	CY	$ 10	$ 87,000	89 ft x 62 ft x 10 ft, assume using existing pon
	Backfill			4,000	CY	$ 7	$ 29,763	
	Offhaul			8,700	CY	$ 11	$ 92,250	
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	6" Pipe, Solids discharge to existing sewer	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
3 - Concrete							**$ 2,430,500**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,133,500**	
	SBR Tanks Slab			680	CY	$ 600	$ 408,000	92 ft x 67 ft, 3 ft thick
	SBR Tanks Elevated slab			460	CY	$ 850	$ 391,000	6200 sf, 2 ft thick
	SBR Tanks Walls			470	CY	$ 1,200	$ 564,000	18 ft high, 1.5 ft thick
	Treatment Building			6,164	SF	$ 125	$ 770,500	92 ft x 67 ft
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline							
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station							
	Distribution Pipeline							
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station							
	Distribution Pipeline							
11 - Equipment							**$ 2,262,500**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 1,832,500**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	SBR Equipment Package			1	LS	$ 540,000	$ 540,000	Vendor quote
	Equipment Installation			1	LS	$ 135,000	$ 135,000	25% of equipment cost
	Sodium Hypochlorite Pump			1	EA	$ 7,500	$ 7,500	
	Sand Filtration			1	LS	$ 310,000	$ 310,000	Vendor quote
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 40,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Distribution Pipeline							
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station							
	Distribution Pipeline							
16 - Electrical							**$ 678,750**	
	Influent Pump Station						**$ 117,000**	
	Electrical Allowance					30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline						**$ -**	

	Treatment Facilities				**$ 549,750**	
	Electrical Allowance			30%	$ 549,750	30% of Division 11 (Equipment)
	Distribution Pump Station				**$ 12,000**	
	Electrical Allowance			30%	$ 12,000	30% of Division 11 (Equipment)
	Distribution Pipeline					
17 - I&C					**$ 452,500**	
	Influent Pump Station				**$ 78,000**	
	I&C Allowance			20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 366,500**	
	I&C Allowance			20%	$ 366,500	20% of Division 11 (Equipment)
	Distribution Pump Station				**$ 8,000**	
	I&C Allowance			20%	$ 8,000	20% of Division 11 (Equipment)
	Distribution Pipeline					
ANNUAL O&M COSTS		**Amount**	**Unit**	**Value**	**Cost**	
Consumables				Total Consumables	**$ 80,000**	
	Equipment Consumables	$ 2,262,500		2%	$ 45,250	2% of Equipment
	Electrical Consumables	$ 678,750		2%	$ 13,575	2% of Electrical
	Instrumentation Consumables	$ 452,500		2%	$ 9,050	2% of Instrumentation
	Pipeline Consumables	$ 2,381,808		0.5%	$ 11,909	0.5% of Pipeline
Power Costs				Total Power	**$ 66,000**	
	WW Pump Station	75,848	kwh	$ 0.15	$ 11,377	
	Headworks Screen					
	Grit Screw	2722	kwh	$ 0.15	$ 408	
	Grit Conveyor	227	kwh	$ 0.15	$ 34	
	Headworks Screen	490	kwh	$ 0.15	$ 73	
	SBR					
	Mixers	25,517	kwh	$ 0.15	$ 3,828	
	Blowers	90,727	kwh	$ 0.15	$ 13,609	
	Transfer Pumps	3,442	kwh	$ 0.15	$ 516	
	Sand Filters Air compressor	27,218	kwh	$ 0.15	$ 4,083	
	UV	27,218	kwh	$ 0.15	$ 4,083	
	Effluent Pumping					
	To Storage Pond	7290	kwh	$ 0.15	$ 1,094	
	Chemicals					
	Hypochlorite Dosing	5,444	kwh	$ 0.15	$ 817	
	Odor Control					
	Odor Control Fans	136090	kwh	$ 0.15	$ 20,414	
	Site Electrical	36500	kwh	$ 0.15	$ 5,475	
Chemicals				Total Chemicals	**$ 300**	
	Hypochlorite	255	gal	$1	$ 255	
Labor Costs				Total Labor	$ 52,000	
	Total # Operators	1	number			
	Average Annual Hours per operator	520	hrs/yr			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year	520	Total hrs	$ 100	**$ 52,000**	
			TOTAL ANNUAL O&M COSTS		**$ 198,300**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**2C - Sharon Heights Golf Course + SLAC**		
Treatment:	**SBR + Sand Filtration**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	236		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework		$ 3,217,444	
3 - Concrete		$ 2,430,500	
5 - Metals		$ 30,000	
9 - Finishes		$ 20,000	
11 - Equipment		$ 2,312,500	
15 - Mechanical		$ 40,000	
16 - Electrical		$ 693,750	
17- I&C		$ 462,500	
	RAW CONSTRUCTION COST	**$ 9,207,000**	
Construction Contingency	30%	$ 2,762,000	
	BASE CONSTRUCTION COST	**$ 11,970,000**	
	Environmental	$ 123,000	
	Permitting	$ 127,000	
	Design for PS, WW FM, Plant	$ 1,500,000	
	Design for Distribution Pipeline	$ 250,000	
	CM for PS and coveyance FM	$ 250,000	
	CM for Treatment Plant	$ 500,000	
	CM for Distribution Pipeline	$ 250,000	
	Financing	$ 100,000	
	IMPLEMENTATION COST	**$ 3,100,000**	
	5%	$ 599,000	
	PROJECT CONTINGENCY	**$ 599,000**	
	TOTAL PROJECT COST	**$ 15,668,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 3,217,444**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 5,428,080		5%	$ 271,404	
	Distribution Pump Station Mobilization/Demobilization			$ 432,000		5%	$ 21,600	
	Distribution Pipeline Mobilization/Demobilization			$ 633,600		5%	$ 31,680	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 455,830**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for SBR tanks			8,700	CY	$ 10	$ 87,000	89 ft x 62 ft x 10 ft, assume using existing pon
	Excavation for effluent pump station wet well			2,200	CY	$ 10	$ 22,000	10 ft x 11 ft x 14 ft, assume 1:1 excavation
	Backfill			5,200	CY	$ 7	$ 38,692	
	Offhaul			10,900	CY	$ 11	$ 115,578	
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	Waste flows to sewer system, within Golf Course property	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ 633,600**	
	Recycled water to SLAC	6	in	5,280	LF	$ 120	$ 633,600	
3 - Concrete							**$ 2,430,500**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,133,500**	
	SBR Tanks Slab			680	CY	$ 600	$ 408,000	92 ft x 67 ft, 3 ft thick
	SBR Tanks Elevated slab			460	CY	$ 850	$ 391,000	6200 sf, 2 ft thick
	SBR Tanks Walls			470	CY	$ 1,200	$ 564,000	18 ft high, 1.5 ft thick
	Treatment Building			6,164	SF	$ 125	$ 770,500	92 ft x 67 ft
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline						**$ -**	
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
11 - Equipment							**$ 2,312,500**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 1,832,500**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	SBR Equipment Package			1	LS	$ 540,000	$ 540,000	Vendor quote
	Equipment Installation			1	LS	$ 135,000	$ 135,000	25% of equipment cost
	Sodium Hypochlorite Pump			1	EA	$ 7,500	$ 7,500	
	Sand Filtration			1	LS	$ 310,000	$ 310,000	Vendor quote
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 90,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Vertical Turbine Pumps (RW to Other Users)			2	EA	$ 25,000	$ 50,000	
	Distribution Pipeline						**$ -**	
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station						**$ -**	

		Amount	Unit	Value	Cost	
	Distribution Pipeline				**$ -**	
16 - Electrical					**$ 693,750**	
	Influent Pump Station				**$ 117,000**	
	Electrical Allowance			30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 549,750**	
	Electrical Allowance			30%	$ 549,750	30% of Division 11 (Equipment)
	Distribution Pump Station				**$ 27,000**	
	Electrical Allowance			30%	$ 27,000	30% of Division 11 (Equipment)
	Distribution Pipeline				**$ -**	
17 - I&C					**$ 462,500**	
	Influent Pump Station				**$ 78,000**	
	I&C Allowance			20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 366,500**	
	I&C Allowance			20%	$ 366,500	20% of Division 11 (Equipment)
	Distribution Pump Station				**$ 18,000**	
	Electrical Allowance			20%	$ 18,000	20% of Division 11 (Equipment)
	Distribution Pipeline				**$ -**	
ANNUAL O&M COSTS		**Amount**	**Unit**	**Value**	**Cost**	
Consumables				Total Consumables	**$ 85,000**	
	Equipment Consumables	$ 2,312,500		2%	$ 46,250	2% of Equipment
	Electrical Consumables	$ 693,750		2%	$ 13,875	2% of Electrical
	Instrumentation Consumables	$ 462,500		2%	$ 9,250	2% of Instrumentation
	Pipeline Consumables	$ 3,205,488		0.5%	$ 16,027	0.5% of Pipeline
Power Costs				Total Power	**$ 82,000**	
	WW Pump Station	147,704	kwh	$ 0.15	$ 22,156	
	Headworks Screen					
	Grit Screw	2722	kwh	$ 0.15	$ 408	
	Grit Conveyor	227	kwh	$ 0.15	$ 34	
	Headworks Screen	490	kwh	$ 0.15	$ 73	
	SBR					
	Mixers	25,517	kwh	$ 0.15	$ 3,828	
	Blowers	90,727	kwh	$ 0.15	$ 13,609	
	Transfer Pumps	3,442	kwh	$ 0.15	$ 516	
	Sand Filters Air compressor	27,218	kwh	$ 0.15	$ 4,083	
	UV	27,218	kwh	$ 0.15	$ 4,083	
	Effluent Pumping					
	To Storage Pond	7290	kwh	$ 0.15	$ 1,094	
	To SLAC	34,474	kwh	$ 0.15	$ 5,171	
	Chemicals					
	Hypochlorite Dosing	5,444	kwh	$ 0.15	$ 817	
	Odor Control					
	Odor Control Fans	136090	kwh	$ 0.15	$ 20,414	
	Site Electrical	36500	kwh	$ 0.15	$ 5,475	
Chemicals				Total Chemicals	**$ 300**	
	Hypochlorite	255	gal	$1	$ 255	
Labor Costs				Total Labor	$ 52,000	
	Total # Operators	1	number			
	Average Annual Hours per operator	520	hrs/yr			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year	520	Total hrs	$ 100	**$ 52,000**	
		TOTAL ANNUAL O&M COSTS			**$ 219,300**	

Project:	**West Bay Sanitary District RW Facilities Plan**	Date:	June 12, 2015
		Project Number:	606-001
Alternative:	**3C - Sharon Heights Golf Course + Other Users**		
Treatment:	**SBR + Sand Filtration**	Prepared by:	SAM
		Checked by:	
Avg Annnual Demand (AFY)	197		
Estimate Type:	Conceptual Design		

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework		$ 3,350,500	
3 - Concrete		$ 2,430,500	
5 - Metals		$ 30,000	
9 - Finishes		$ 20,000	
11 - Equipment		$ 2,312,500	
15 - Mechanical		$ 40,000	
16 - Electrical		$ 693,750	
17- I&C		$ 462,500	
	RAW CONSTRUCTION COST	**$ 9,340,000**	
Construction Contingency	30%	$ 2,802,000	
	BASE CONSTRUCTION COST	**$ 12,140,000**	
	Environmental	$ 123,000	
	Permitting	$ 127,000	
	Design for PS, WW FM, Plant	$ 1,500,000	
	Design for Distribution Pipeline	$ 200,000	
	CM for PS and coveyance FM	$ 250,000	
	CM for Treatment Plant	$ 500,000	
	CM for Distribution Pipeline	$ 200,000	
	Financing	$ 100,000	
	IMPLEMENTATION COST	**$ 3,000,000**	
	5%	$ 607,000	
	PROJECT CONTINGENCY	**$ 607,000**	
	TOTAL PROJECT COST	**$ 15,749,000**	

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 3,350,500**	
	Influent Pump Station Mobilization/Demobilization			$ 585,000		5%	$ 29,250	
	Influent Pipeline Mobilization/Demobilization			$ 1,689,600		5%	$ 84,480	
	Treatment Facilities Mobilization/Demobilization			$ 5,428,080		5%	$ 271,404	
	Distribution Pump Station Mobilization/Demobilization			$ 432,000		5%	$ 21,600	
	Distribution Pipeline Mobilization/Demobilization			$ 760,320		5%	$ 38,016	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ 1,689,600**	
	8" Pipe, Forcemain from collection system	8	in	10,560	LF	$ 160	$ 1,689,600	Conveys raw wastewater to site
	Treatment Facilities						**$ 455,830**	
	Site Clearing			1	Days	$ 5,000	$ 5,000	
	Excavation for SBR tanks			8,700	CY	$ 10	$ 87,000	89 ft x 62 ft x 10 ft, assume using existing pond,
	Excavation for effluent pump station wet well			2,200	CY	$ 10	$ 22,000	10 ft x 11 ft x 14 ft, assume 1:1 excavation
	Backfill			5,200	CY	$ 7	$ 38,692	
	Offhaul			10,900	CY	$ 11	$ 115,578	
	Dewatering			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 10,000	$ 10,000	
	Misc site work			1	LS	$ 15,000	$ 15,000	
	Waste flows to sewer system, within Golf Course property	6	in	1,584	LF	$ 90	$ 142,560	Connects to existing sewer
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ 760,320**	
	Recycled water to other users	6	in	6,336	LF	$ 120	$ 760,320	
3 - Concrete							**$ 2,430,500**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 2,133,500**	
	SBR Tanks Slab			680	CY	$ 600	$ 408,000	92 ft x 67 ft, 3 ft thick
	SBR Tanks Elevated slab			460	CY	$ 850	$ 391,000	6200 sf, 2 ft thick
	SBR Tanks Walls			470	CY	$ 1,200	$ 564,000	18 ft high, 1.5 ft thick
	Treatment Building			6,164	SF	$ 125	$ 770,500	92 ft x 67 ft
	Distribution Pump Station						**$ 297,000**	
	Slab			190	CY	$ 600	$ 114,000	58 ft x 29 ft, 3 ft thick
	Elevated slab			60	CY	$ 850	$ 51,000	57 ft x 28 ft, 1 ft thick
	Walls			110	CY	$ 1,200	$ 132,000	12 ft high, 1.5 ft thick
	Distribution Pipeline						**$ -**	
5 - Metals							**$ 30,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 30,000**	
	Misc Metals			1	LS	$ 30,000	$ 30,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
9 - Finishes							**$ 20,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 20,000**	
	Finishes Allowance			1	LS	$ 20,000	$ 20,000	
	Distribution Pump Station						**$ -**	
	Distribution Pipeline						**$ -**	
11 - Equipment							**$ 2,312,500**	
	Influent Pump Station						**$ 390,000**	
	Submersible Pumps	30	hp	2	EA	$ 6,500	$ 390,000	Estimate for complete pump station
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 1,832,500**	
	Grit Removal			1	LS	$ 150,000	$ 150,000	Includes allowance for installation
	Screens and Washer Compactor			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	SBR Equipment Package			1	LS	$ 540,000	$ 540,000	Vendor quote
	Equipment Installation			1	LS	$ 135,000	$ 135,000	25% of equipment cost
	Sodium Hypochlorite Pump			1	EA	$ 7,500	$ 7,500	
	Sand Filtration			1	LS	$ 310,000	$ 310,000	Vendor quote
	UV Disinfection			1	LS	$ 300,000	$ 300,000	Includes allowance for installation
	Odor Control			1	LS	$ 90,000	$ 90,000	Includes allowance for installation
	Distribution Pump Station						**$ 90,000**	
	Vertical Turbine Pumps (RW to Storage Ponds)			2	EA	$ 20,000	$ 40,000	
	Vertical Turbine Pumps (RW to Other Users)			2	EA	$ 25,000	$ 50,000	
	Distribution Pipeline						**$ -**	
15 - Mechanical							**$ 40,000**	
	Influent Pump Station						**$ -**	
	Influent Pipeline						**$ -**	
	Treatment Facilities						**$ 40,000**	
	Misc. Mechanical			1	LS	$ 40,000	$ 40,000	
	Distribution Pump Station						**$ -**	

	Distribution Pipeline				**$ -**	
16 - Electrical					**$ 693,750**	
	Influent Pump Station				**$ 117,000**	
	Electrical Allowance			30%	$ 117,000	30% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 549,750**	
	Electrical Allowance			30%	$ 549,750	30% of Division 11 (Equipment)
	Distribution Pump Station				**$ 27,000**	
	Electrical Allowance			30%	$ 27,000	30% of Division 11 (Equipment)
	Distribution Pipeline				**$ -**	
17 - I&C					**$ 462,500**	
	Influent Pump Station				**$ 78,000**	
	I&C Allowance			20%	$ 78,000	20% of Division 11 (Equipment)
	Influent Pipeline				**$ -**	
	Treatment Facilities				**$ 366,500**	
	I&C Allowance			20%	$ 366,500	20% of Division 11 (Equipment)
	Distribution Pump Station				**$ 18,000**	
	Electrical Allowance			20%	$ 18,000	20% of Division 11 (Equipment)
	Distribution Pipeline				**$ -**	
ANNUAL O&M COSTS		**Amount**	**Unit**	**Value**	**Cost**	
Consumables				Total Consumables	**$ 86,000**	
	Equipment Consumables	$ 2,312,500		2%	$ 46,250	2% of Equipment
	Electrical Consumables	$ 693,750		2%	$ 13,875	2% of Electrical
	Instrumentation Consumables	$ 462,500		2%	$ 9,250	2% of Instrumentation
	Pipeline Consumables	$ 3,370,224		0.5%	$ 16,851	0.5% of Pipeline
Power Costs				Total Power	**$ 72,000**	
	WW Pump Station	98,263	kwh	$ 0.15	$ 14,739	
	Headworks Screen					
	Grit Screw	2722	kwh	$ 0.15	$ 408	
	Grit Conveyor	227	kwh	$ 0.15	$ 34	
	Headworks Screen	490	kwh	$ 0.15	$ 73	
	SBR					
	Mixers	25,517	kwh	$ 0.15	$ 3,828	
	Blowers	90,727	kwh	$ 0.15	$ 13,609	
	Transfer Pumps	3,442	kwh	$ 0.15	$ 516	
	Sand Filters Air compressor	27,218	kwh	$ 0.15	$ 4,083	
	UV	27,218	kwh	$ 0.15	$ 4,083	
	Effluent Pumping					
	To Storage Pond	7290	kwh	$ 0.15	$ 1,094	
	To Sharon Land Co	2,961	kwh	$ 0.15	$ 444	
	To Rosewood Sandhill and Sandhill Commons	12,856	kwh	$ 0.15	$ 1,928	
	Chemicals					
	Hypochlorite Dosing	5,444	kwh	$ 0.15	$ 817	
	Odor Control					
	Odor Control Fans	136090	kwh	$ 0.15	$ 20,414	
	Site Electrical	36500	kwh	$ 0.15	$ 5,475	
Chemicals				Total Chemicals	**$ 300**	
	Hypochlorite	255	gal	$1	$ 255	
Labor Costs				Total Labor	$ 52,000	
	Total # Operators	1	number			
	Average Annual Hours per operator	520	hrs/yr			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
	Total Operators per year	520	Total hrs	$ 100	**$ 52,000**	
			TOTAL ANNUAL O&M COSTS		**$ 210,300**	

Appendix E - Environmental Checklist

Introduction

The purpose of this preliminary evaluation is to identify expected environmental impacts from implementation (construction and operation) of the West Bay Sanitary District's Recycled Water Recommended Project. In addition, this analysis is intended to help the City determine the level of environmental documentation that will be needed at the next stage of CEQA environmental review. The environmental topics discussed in this document are based on Appendix G of the CEQA Guidelines. The anticipated environmental impacts are identified for each resource area. The level of significance for each resource area uses CEQA terminology as specified below:

- No Impact;
- Less than Significant;
- Less than Significant Impact with Mitigation Incorporation; and
- Potentially Significant Impact.

Project Description

Chapter 8 of the Recycled Water Facility Plan provides a discussion of the Recycled Water Recommended Project. The figures in that section identify the locations of the proposed facilities within the Sharon Heights Golf & Country Club property and the proposed pipeline alignments within the City of Menlo Park's boundaries. For the purposes of this preliminary analysis, it is assumed that construction activities would involve grading, excavation, erection of facilities, installation of pipelines using open-trench construction, and backfilling. Typical construction equipment would be used, including but not limited bulldozers, backhoes, water trucks, dump trucks, excavators, and concrete trucks. Construction activities would likely last for one year overall but would be less for each component (e.g., treatment facilities and the proposed pipeline segments). Details of the construction scenarios will be developed as the project progresses into design, and will be evaluated in more depth in the upcoming environmental analysis. The following preliminary analysis is based on the current understanding of the project construction and operation as described Chapter 8 of the Recycled Water Facility Plan. This analysis shows that the majority of the impacts would be less than significant. Where potential significant impacts are anticipated, they would be reduced to less than significant with implementation of mitigation measures that will be further developed during the CEQA process. No significant, unavoidable impacts have been identified.

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
Aesthetics		
Adverse effect on a scenic vista	LTS	• The City of Menlo Park has identified stretch of Sand Hill Road from Santa Cruz Avenue to Highway 280 as a View Corridor. Impacts to the View Corridor are minimized to less than significant by the low profile of planned project facilities, screening structures and coverage provided by trees between the project and Sand Hill Road. • Construction of all proposed facilities would temporarily alter the visual quality of the affected area due to the presence of construction equipment, but would not result in any permanent visual changes. • Proposed pipelines would ultimately be buried underground and out of sight. No visual impacts would occur. • Within the Project area, there is one officially designated State Scenic Highway (I-280) located immediately adjacent (to the west) to the Project. Impacts to the scenic resources are minimized to less than significant by the low profile of the Project, the size of the treatment plant, the speed of traffic on I-280, screening structures and coverage provided by trees between the Project and I-280.
Substantial damage to scenic resources, including trees, rock outcroppings or historic buildings within a state scenic highway	LTSM	
Substantial degradation of the existing visual character or quality of the site and its surroundings	LTSM	
Creation of a new source of substantial light or glare which would adversely affect day or nighttime views in the area	LTS	
Agricultural and Forestry Resources		
Conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Important (Farmland) or conflict with existing zoning for agricultural use of a Williamson Act contract	NI	• The Study Area falls entirely within Urban/Built and Other land designations. There are no Farmlands or forestry resources within the Study Area.
Loss of forest land or conversion of forest land to non-forest land or change in the existing environment which could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use	NI	
Air Quality		
Conflict with or obstruction of implementation of the applicable air quality plan or cumulative considerable net increase of any criteria pollutant for	LTSM	• Construction activities would generate dust and criteria pollutant emissions that could, but are not expected to, exceed Bay Area Air Quality Management District (BAAQMD) standards. These emissions have not yet been quantified.

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
which the project region is nonattainment		• Excavation and hauling trips could generate criteria pollutant emissions that exceed BAAQMD thresholds and result in a potentially significant impact. Mitigation measures could include implementation of dust control measures, sequencing (phasing) work to reduce daily emissions (including preconstruction grading to prepare the site), and/or requiring contractors to implement best available control technology for construction equipment. Air quality modeling would be conducted during the next stage of CEQA review to confirm this conclusion. • Operation of the Proposed Project is expected to generate minimal emissions from chemical delivery truck trips and operation of the satellite treatment facility. Based on the number of truck trips and existing assumptions, operational-related air quality impacts are anticipated to be less than significant. • Trinity School, Stanford Hills Park and some residential units are located along the alignment of the Proposed Project influent supply pipe. Given the short duration of construction, and mitigation measures that would be implemented as described above to reduce dust, sensitive receptors at the school and at nearby residences are not expected to be exposed to substantial pollutant concentrations. • Potential objectionable odors may occur treatment facility during operation. However, biological basins would be constructed below grade, with covers at grade level for odor control. With this mitigation measure in place, and the relatively small size of the treatment facility, impacts from operation are expected to be less than significant. • There is also potential for some objectionable odors during construction (e.g., diesel fuel), but these would be temporary in nature and considered less than significant.
Violation of any air quality standard or substantial contribution to an existing or projected air quality violation	LTSM	
Exposure of sensitive receptors to substantial pollutant concentrations	LTS	
Creation of objectionable odors affecting a substantial number of people	LTSM	
Biological Resources		
Effects on candidate, sensitive, or special status species or sensitive habitat	LTSM	• A California Natural Diversity Database (CNDDB) search for sensitive resources was conducted for information regarding the locations of known observations of Federal and State-listed sensitive species and habitats in the vicinity of the Project area. Information on wetlands, creeks, and/or other water bodies was derived from the U.S. Fish and Wildlife Service's Wetland Digital Database. Biological resources surveys have not been completed for this preliminary analysis. • Impacts to terrestrial biological resources from the Proposed Project are expected to be minimal. No critical habitat occurs in and around the Proposed Project (USFWS, 2015a); although nearby trees and shrubs may provide habitat for birds and other species. A field reconnaissance survey is still needed. Mitigation measures (such as restriction on the
Substantial interference with the movement of fish or wildlife species, their or native wildlife nursery sites	LTS	
Substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California	LTS	

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
Department of Fish and Game or U.S. Fish and Wildlife Service		timing of construction) are expected to be available to reduce any impacts to terrestrial biological resources to less than significant.
Substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act	LTS	• Operation of the Proposed Project is not expected to result in any significant impacts on special-status aquatic resources. Potential impacts to aquatic biological resources from the Proposed Project would be less than significant, and no additional mitigation would be required.
Conflict with any local plans, policies or ordinances protecting biological resources	LTSM	• There are no creeks in or near the project area.
Conflict with provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional or state habitat conservation plan	NI	• The disposal pipeline would be constructed within roadway ROWs, and is not expected to interfere with wildlife movement. Menlo Park does not have any Priority Conservation Areas and construction of the treatment facility is not anticipated to affect wildlife movement. • Some trees would be removed for construction of the treatment facility. All such trees are located within the property line of the Sharon Heights Golf Course. To the extent possible, trees that currently provide screening between residences, Highway 280 and the treatment facility would remain in place. It is anticipated that only non-heritage trees and shrubs would be removed. If heritage trees must be removed, then appropriate mitigation measures, consistent with the City of Menlo Park's tree removal policy, shall be implemented to reduce impacts to less than significant. • The Proposed Project would not be sited in any of the areas designated by the Midpeninsula Regional Open Space District as Priority Conservation Areas.
Cultural Resources		
Alteration of or damage to cultural resources (i.e., historical and archaeological resources, including human remains, and paleontological resources)	LTSM	• No cultural resources study or records search through the Northwest Information Center for the California Historical Research Information System, or reconnaissance survey were conducted as part of this preliminary analysis. • The Cultural Resources Inventory Report has not yet been conducted but would be completed as part of future CEQA review. Because of the potential for unrecorded cultural resources sites to be found during excavation activities, impacts to cultural resources would be considered significant. However, mitigation measures are available to reduce potential impacts to less than significant levels.

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
Geology, Soils and Seismicity		
Exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic risks or landslides	LTSM	• Proposed facilities are not habitable structures. • The City of Menlo Park is located adjacent to the San Andreas Fault. The Alquist-Priolo map for the region indicates that the proposed project site is within fault zones, landslide and liquefaction zones. None of the Proposed Project components would cross a known fault line or otherwise expose people or structures to ruptures of a known fault. However, there is potential for exposure to ground shaking. • Shaking hazard maps show the Study Area is at risk for very strong shaking. Due to the Proposed Project's location, it would be subject to design and construction regulations
Substantial soil erosion or the loss of topsoil	LTSM	
Exposure of people or structures to unstable or expansive soils	LTSM	

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
Soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposals systems where sewers are not available	LTS	compliant with the 2013 California Building Code. This compliance would reduce the risks associated with seismic activities to less than significant levels. • Liquefaction mapping from U.S. Geological Survey (USGS) shows that the Study Area is primarily within no or low liquefaction susceptibility areas. Additional compliance with applicable codes, regulations, and standards would reduce risks to the Proposed Project from liquefaction to less than significant. • Soil erosion is possible during construction, particularly due to grading activities at the treatment facility site. Implementation of typical Best Management Practices (BMPs) and the required SWPPP would reduce the potential risk for soil erosion or loss. Additional mitigation measures may be required to reduce the risk of soil loss during grading or other construction activities. • The waste disposal pipeline component of the Proposed Project would not affect the stability of the geologic unit or soil, or result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. The grading and excavation required for the treatment facility could create the potential for collapse or on-site landslide, but with the installation of the retaining wall, geotechnical investigation for the retaining wall and treatment facilities, and proper engineering and compliance with all applicable codes and regulations, potential impacts is expected to be reduced to less than significant. • Portions of the Study Area are located in clay loam soils, which have some potential for expansion. Mitigation measures, including preparation of a geotechnical study and implementation of its recommended measures, would reduce the potential for unstable soils to adversely affect the Proposed Project. • The Proposed Project includes wastewater treatment for non-potable reuse, but does not include septic-related waste. Sewers are available in the project vicinity for waste, including waste from the treatment processes.
Greenhouse Gas Emissions		
Generation of greenhouse gas emissions that may have a significant impact on the environment	LTSM	• Air quality modeling has not been conducted for the proposed Project. Operation of the treatment facility (including chemical trip deliveries) is expected to generate greenhouse gas emissions, but is not anticipated to exceed BAAQMD thresholds. Air quality modeling would be conducted in the next stage of CEQA review to confirm the results.
Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases	LTSM	
Hazards and Hazardous Materials		

<table>
<tr><th>Environmental Topics</th><th>Expected Impact</th><th>Discussion of Major, Potential Environmental Effects</th></tr>
<tr><td>Creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; or accident involving the release of hazardous materials into the environment</td><td>LTSM</td><td rowspan="6">
Construction would not require the long-term routine transport, use, or disposal of hazardous materials. However, hazardous materials and substances such as diesel fuel would be transported to, handled and used at the construction sites and could present a hazard to the public or the environment through their accidental release. One school is located within one-quarter mile of the proposed work sites. With mitigation, such as the preparation and implementation of a Health and Safety Plan and a Hazardous Materials Management and Spill Prevention Plan and Control Plan, potential impacts would be reduced to less than significant.
Operation of the treatment facility would require the long-term routine transport and use of hazardous materials and substances for treatment, cleaning, and other operation and maintenance purposes. Chemicals that would be transported to and/or from, and used at, the proposed treatment facility may include anionic or nonionic emulsion polymer, lubrication oils, grease, sodium hypochlorite, aqueous ammonia, ferric chloride, sodium bisulfite, antiscalent, carbon dioxide, carbonic acid, caustic soda, citric acid, fluorosilicic acid, and lime. All of the chemical facilities would be stored in double containment to ensure protection in the event of an accidental spill, and the depth of the tanks relative to the surrounding terrain would afford extra protection in the event of an accidental spill. Because Trinity School and some residences are within one-quarter mile of the treatment facility, impacts associated with the accidental release of hazardous materials are considered potentially significant. However, with the mitigation measures described above and compliance with the City's Emergency Operation Plan, the risk of hazardous materials release is low, and potential impacts would be reduced to less than significant.
Based on a review of the California Department of Toxic Substances Control's (DTSC's) EnviroStor database, the Proposed Project's components would not be located on or near a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (Cortese List).
The Study Area does not include any airports. The nearest airport to the Study Area is in the City of Palo Alto, six miles northeast of the Proposed Project. As such, the Proposed Project would not expose people residing or working in the area to safety hazards.
Construction activities for the proposed influent and waste disposal pipelines may require temporary lane or road closures that could impede emergency responses. Mitigation Measures, such as a Traffic Management Plan would be required, and would address any potential interference with emergency response and/or evacuation plans, and would reduce these impacts to less than significant.
</td></tr>
<tr><td>Emission or handling of hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.</td><td>LTSM</td></tr>
<tr><td>Located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5</td><td>LTSM</td></tr>
<tr><td>Located within two miles of a public airport or private airstrip and result in a safety hazard for people residing or working in the project area.</td><td>NI</td></tr>
<tr><td>Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan</td><td>LTSM</td></tr>
<tr><td>Exposure of people or structures to significant risk of loss, injury or death involving wildland fires</td><td>NI</td></tr>
</table>

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
		• The Study Area is not at risk of wildland fires; therefore there would be no impact for risks associated with wildland fires and fires in urban-wildland interface areas.
Hydrology and Water Quality		
Violation of water quality standards or waste discharge requirements or degrade water quality	LTSM	• Excavation, grading, and construction activities associated with construction of the Proposed Project could result in water quality violations from soil disturbance and potential sedimentation and erosion. It could also cause water quality violations in the event of an accidental fuel or hazardous materials leak or spill. The Construction General Permit requires the preparation and implementation of a formal SWPPP which must be prepared before construction begins. The SWPPP includes specifications for BMPs implemented during construction to control sedimentation or pollution concentration in stormwater runoff. • The Proposed Project would be designed and operated in accordance with the applicable requirements of California Code of Regulations (CCR) Title 22 and any other local legislation that is currently effective or may become effective as it pertains to recycled water. • Salts and nutrients are a potential concern because recycled water could conceivably add measurable quantities of salts and/or nutrients and cause a drinking water quality objective to be exceeded if assimilative capacity did not otherwise exist. The Proposed Project site does not overly a regional aquifer or groundwater basin, but localized aquifers may be present. Runoff or subsurface flows could also run into the San Mateo Plain Subbasin, located to the east of the project. Adherence of the Proposed Project to all appropriate Title 22 requirements would ensure that potential impacts to public health or groundwater quality would be less than significant. Thus, No mitigation measures are required. • The Proposed Project does not include groundwater pumping or recharge, and would have no impact to aquifer volumes or groundwater table levels. • The Proposed Project would not alter the course of a stream or river. • The Proposed Project could temporarily alter the drainage of the Study Area during construction and excavation activities, which could result in additional sedimentation and erosion if mitigation measures are not incorporated to reduce these potential impacts. Additionally, installation of facilities at the treatment facility site could create additional runoff, sedimentation, and erosion during operation due to the grading needed at the site and the increased impermeable surface area. Installation of appropriate drainage (stormwater) facilities and erosion control at the site may be necessary to accommodate additional stormwater flows and reduce the potential for localized siltation/erosion and
Substantial depletion of groundwater supplies or interference with groundwater recharge	LTSM	
Substantial alteration of the existing drainage pattern of the site or area	LTSM	
Creation of contribution of runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff	LTS	
Substantially degrade water quality	LTSM	
Placement of housing within a 100-year flood hazard area, or structures within a 100-year flood hazard area which would impede or redirect flood flows	NI	
Exposure of people or structures to a significant risk or loss, injury or death involving flooding.	NI	
Inundation by seiche, tsunami or mudflow	NI	

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
		flooding, respectively. The inclusion of design elements to address runoff would ensure that impacts during operation of the Proposed Project would be less than significant. • The Proposed Project would not construct housing; therefore it would have no impact related to placing housing within a 100-year flood zone. • The Proposed Project is not located in and would not cross any flood zones. • The Proposed Project would not expose people to risks of flooding, dam, or levee failure. The treatment facility is the only component of the Proposed Project that would require staffing long-term, and is not located in a flood zone or downstream of an existing dam or levee. • There are no large enclosed water bodies in the project area that would be subject to seiche. Coastal low-lying areas in the City of Menlo Park may be affected by tsunamis, but the project area is over five miles away from the coast and at an elevation of over 200 feet above sea level. The impacts from seiche, tsunamis, and mudflows are expected to be less than significant.
Land Use and Planning		
Physically divide an established community	NI	• The Proposed Project is located within roadway ROWs and within the property line of the Sharon Heights Golf Course. As the treatment facility site is landlocked by other land uses and is under private ownership, development on this land would not divide the existing community. • The Proposed Project would be constructed in Open Space (for the treatment facility) and roadway ROWs (pipelines). Utility Substations can be located in Open Space with approval of a Use Permit. Acquisition of the permit and compliance with its conditions would ensure that the Project would not conflict with any application land use plan, policy or regulation and impacts would be less than significant.
Conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect	LTSM	
Conflict with any applicable HCP or NCCP	NI	
Mineral Resources		
Loss of availability of a known mineral source	NI	• There are no active mining or mineral resource extraction occurring within the Study Area.
Noise		
Exposure of persons to or generation of noise levels in excess of standards or excessive groundbourne vibration	LTSM	• Construction of the Proposed Project would involve the use of heavy equipment that could create noise substantially above existing ambient noise levels. It also has the potential to generate noise in excess of relevant local noise regulations. Mitigation measures, such as limiting vibration to under appropriate thresholds for structures and people, would be needed to reduce potential construction-related impacts to less than significant.
Substantial permanent or periodic increase in ambient noise levels in the project vicinity	LTSM	

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
Exposure of persons residing or working within the vicinity of a private airstrip or public use airport to excessive noise levels	NI	• Once constructed, the influent and disposal pipelines would not produce any excess noise. • The treatment facility would produce permanent noise, primarily from the pump station and the additional truck trips required for delivery of materials necessary for operation. The noise-generating components of the treatment facility would be enclosed in buildings, which would dampen the noise. Furthermore, the treatment facility would also be located near an existing freeway, which would drown out much of the noise created by the treatment facility. • There are no airports or airstrips within the vicinity of the Proposed Project.
Population and Housing		
Induction of substantial population growth in an area either directly or indirectly	LTS	• The Proposed Project would not directly induce population growth because it would not produce additional water supply, but instead replaces imported supply (purchased water) with a more desirable (locally-produced) water. • The Proposed Project would not displace existing housing or people
Displacement of substantial numbers of existing people or housing	NI	
Public Services		
Substantial adverse physical impacts to public services including but not limited to fire and police protection, schools and parks	NI	• The Proposed Project would involve the production and delivery of recycled water to meet existing demand, and disposal of wastewater produced by the treatment process. It would not increase the use of or demand for public services (e.g., schools, parks, police, fire, or other public facilities).
Recreation		
Substantial physical deterioration of park facilities	NI	• The Proposed Project would create recycled water to offset potable water use on an existing golf course, but not cause an increase in the use of existing parks or other recreational facilities.
Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment	NI	

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
Transportation/Traffic		
Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system	LTSM	• The Proposed Project would be constructed within roadway ROWs and within the Sharon Heights Golf Course property. For the waste disposal pipeline, open trench construction would be employed except at sensitive crossings, if any, where trenchless methods would be used. The assumed 30-foot construction footprint may require closure of some traffic lanes, thus reducing roadway capacities. • Construction traffic could result in increased traffic volumes. Mitigation measures, such as development and implementation of a Traffic Control Plan, would be required to reduce traffic-related impacts of potential temporary lane closures during construction of the influent and disposal pipelines. There may be traffic impacts related to increased truck traffic during construction of the treatment facility, but no road closures are anticipated for this component of the Proposed Project. • The Proposed Project would not affect air traffic patterns, and would be located sufficiently far from an airport or airstrip to avoid creating a substantial air traffic safety risk. • The Proposed Project would not create or substantially increase a traffic hazard due to a design feature. The roadway ROWs excavated for pipelines may be temporary reconfigured to accommodate construction activities, but would be restored to preconstruction conditions upon project completion. • Lane closures and other potential traffic impacts caused by construction activities associated with the Proposed Project would have potential to impede emergency response to those areas, or to areas accessed via those routes. Mitigation Measures, such as the development and implementation of a Traffic Control Plan, would reduce these impediments to less than significant. • Upon completion, the Proposed Project would not conflict with adopted policies, plans, or programs regarding alternate transportation, nor would it decrease the safety of these facilities. Mitigation measures, such as development and implementation of a Traffic Control Plan, would reduce potential impacts to less than significant.
Conflict with applicable congestion management program	LTSM	
Changes in air traffic patterns, resulting in substantial safety risks	NI	
Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses	LTS	
Inadequate emergency access or parking capacity	LTSM	
Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities	LTSM	
Utilities and Service Systems		
Exceedence of wastewater requirements of the applicable Regional Water Quality Control Board	LTSM	• The Proposed Project would not increase the concentration of wastewater produced in the Study Area, but decrease the quantity of wastewater produced. It would convey waste produced at the treatment facility to the WBSD system for disposal. Based on the project size and relative contribution to the collection system, it is not anticipated to require SVCW to amend its NPDES permit to accommodate the flow.
Expansions of, or construction of new water, wastewater, or stormwater facilities cause significant environmental effects or physical	LTS	

Environmental Topics	Expected Impact	Discussion of Major, Potential Environmental Effects
deterioration of a public facility due to increased use as a result of the project		• The Proposed Project would not cause SVCW to exceed the wastewater treatment requirements of the RWQCB and the SVCW NPDES would not need to be amended prior to the Proposed Project. • The Project proposes the construction of a treatment facility and influent and disposal pipelines. It does not include expansion of existing facilities (beyond those evaluated in this document). • The Proposed Project would require additional on-site drainage facilities at the treatment facility site. The Proposed Project would increase the amount of impervious surface at the site, increasing total stormwater runoff to some degree. Mitigation measures to reduce potential effects could include improvements to the existing stormwater system, as needed. • The Proposed Project would augment the District's capacity to serve the region's demand. • The main contributor to solid waste (soil) generated by the Proposed Project would be the excavation and disposal of soil from the treatment facility site. Solid waste (soil) generated by the Proposed Project would likely be hauled to ??. Mitigation measures, such as maximizing reuse of excavated soil to the extent possible, including use as backfill for the pipelines, or identifying an alternate disposal site and/or construction timing should the identified landfill not be able to accommodate all of the waste, would reduce this potential impact to less than significant. Solid waste would be disposed of in accordance with all applicable federal, state, and local statutes and regulations.
Sufficient water supplies or capacity to serve the project	NI	
Adequate wastewater treatment capacity to serve the project	NI	
Have sufficient capacity at a landfill to accommodate the project's solid waste disposal needs and compliance with statues and regulations related to solid waste	LTSM	
Comply with federal, state and local statues and regulations related to solid waste	NI	
Mandatory Findings of Significance		
Substantial environmental degradation (e.g., reduction of sensitive habitat, endangered plant or animal species, or cultural resources,	LTSM	• Mitigation measures are anticipated to reduce potential biological and cultural impacts to less than significant. • Most of the potential impacts from the Proposed Project would occur during construction. While all potential impacts of the Proposed Project could be mitigated to less than significant, there is potential for cumulatively considerable impacts in combination with other past, present, and probable future projects. This is most likely to occur in relation to air quality emissions, and the potential to contribute to global climate change. Further analysis of the potential cumulatively considerable impacts would be required to determine if additional mitigation measures would be necessary to reduce these potential impacts to less than significant. • The potential impacts with the greatest potential adverse effects on humans and human health include air quality and traffic and transportation. Mitigation measures that address potential impacts would reduce impacts to humans to less than significant.
Contribution to cumulative impacts	LTSM	
Substantial adverse effects on human beings.	LTSM	

Note: PS = Potentially significant; LTSM = Less than Significant with Mitigation Incorporation; LTS = Less than Significant; NI = No Impact.

Appendix E - WBSD and Sharon Heights MOU

MEMORANDUM OF UNDERSTANDING
ESTABLISHING PRINCIPLES OF AGREEMENT FOR DESIGN,
CONSTRUCTION AND OPERATION OF RECYCLED WATER TREATMENT FACILITY

This Memorandum of Understanding is made this 20 day of April, 2015, by and between the West Bay Sanitary District ("West Bay") and the Sharon Heights Golf & Country Club ("Club") and provides as follows:

RECITAL

WHEREAS, West Bay is a Sanitary District organized and existing under the Sanitary District Act of 1924 (Cal. Health & Safety Code § 6400, et seq.), and provides wastewater collection and conveyance services to the Cities of Menlo Park, Atherton and Portola Valley, and portions of East Palo Alto, Woodside and unincorporated San Mateo and Santa Clara counties; and

WHEREAS, Club is a corporation duly organized and existing under the laws of the State of California that owns and operates a golf course and related facilities located within West Bay's service area at 2900 Sand Hill Road, Menlo Park, that is irrigated solely with potable water from the San Francisco Public Utilities Commission ("SFPUC") delivered by the Menlo Park Municipal Water District ("Menlo Park"), and its current use of water for irrigation purposes is approximately 200 AFY, with a peak daily demand during the summer irrigation season of approximately 0.400 mgd; and

WHEREAS numerous golf courses throughout California now use recycled water for irrigation purposes and such use has been shown to be beneficial and is consistent with State law and water policy; and

WHEREAS, the parties have preliminarily concluded that recycled water may be suitable for use as a substitute for the potable water currently used to irrigate the golf course, and are mutually interested in determining the feasibility of substituting recycled water for same or all of the potable water now used to irrigate the golf course; and

WHEREAS, on November 19, 2014, West Bay entered into that certain AGREEMENT FOR RECYCLED WATER FACILITIES PLAN BETWEEN WESTBAY SANTIARY DISTRICT AND RMC WATER AND ENVIRONMENT (the "RMC Study"), in an amount not to exceed $150,000, up to fifty percent of the cost of which West Bay expects to be reimbursed by a grant from the California State Water Resources Control Board ("SWRCB"); and

WHEREAS, the Club has agreed to contribute toward the cost of the RMC Study in an amount equal to the amount paid by West Bay, not to exceed Thirty Seven Thousand Five Hundred Dollars ($37,500) and to reimburse West Bay for the full cost incurred thereafter for the planning, design, environmental review, permitting, construction and operation of a recycled water treatment facility on Club property, ; and

WHEREAS, this Memorandum of Understanding is intended to establish the basic principles of a long-term agreement (the "Agreement") to determine the feasibility of, design, construction and operation of a recycled water treatment facility on the Club's property.

TERMS

1. The parties agree that the principles of the California State Constitution and California Statutory Law and State Regulations (Water Code Sections 13550-13551 and Water Code Section 106) shall apply to their efforts to develop a recycled water treatment facility on property owned by Club using wastewater from West Bay as a substitute for all or a portion of the potable water currently and historically used for irrigating the golf course (the "Project").

2. The parties agree to negotiate in good faith and on a regular basis to resolve issues.

3. The Agreement shall provide for the following:

    a. Cost of planning, design and construction of recycled water facilities as well as initial ownership of the facility during the designing/build phase;

    b. A grant of easement in perpetuity from Club to West Bay for location of the recycled water treatment facility, subject to termination in event use of property for operation of a recycled water facility or sufficient delivery to the Club of treated water are permanently discontinued;

    c. West Bay to have Ownership of treatment facility and all recycled water produced therefrom, subject to 1) Club's contractual right to receive recycled water in agreed upon quantity and quality, and 2) Club's recovery of a portion of any capital and operational costs invested in the Project from future users, pursuant to the contractual rights as stated in the Agreement ;

    d. Club to own all water distribution facilities located on Club property outside of West Bay Easement Area;

    e. Design criteria for recycled water facilities including:

        i. Annual production capacity (afy)
        ii. Daily production capacity (mgd)
        iii. Building footprint
        iv. Point of delivery
        v. Method of delivery
        vi. Water quality requirements

    f. Responsibility for costs for design, permitting and construction and potential funding strategies

g. Target date for completion

h. Terms for operation and maintenance

    i. Quantity and rate of delivery
    ii. Minimum and maximum amount to be delivered
    iii. Water quality requirements

i. Club's use of recycled water exclusively on-site;

j. West Bay's right to sell recycled water in excess of amount delivered to Club to third parties;

k. Method for calculating recycled water service charge rates and adjusting rates

l. Relationship and influence of Menlo Park Water District on the Agreement

m. Additional terms

    i. Liability/indemnification provisions
    ii. Force majeure
    iii. Dispute resolution
    iv. Mediation
    v. Arbitration/litigation
    vi. Attorneys' fees and costs
    vii. Remedies for non-performance
    viii. Termination
    ix. Miscellaneous
    x. Conditions precedent
    xi. Assignment
    xii. Notice
    xiii. Governing law/venue
    xiv. Amendments
    xv. Cessation during declared emergency
    xvi. Relationship of parties
    xvii. Severability
    xviii. Waiver
    xix. Counterparts
    xx. Representations, warranties and covenants

4. Pending the final approval of the Agreement by West Bay and the Club, the Parties agree that Club shall reimburse West Bay for fifty percent of the cost incurred by

West Bay (less grant funded portion) for the RMC Study, upon completion of the study, and the full cost incurred by West Bay in connection with the environmental review, planning, design, permitting and construction of the Project, within thirty (30) days advance written notice by West Bay provided, however, that West Bay shall notify the Club and obtain approval prior to incurring such costs.

EXECUTED and effective on the date shown above by duly authorized representatives of the parties.

SHARON HEIGHTS GOLF COURSE AND COUNTRY CLUB

By:________________________
PAUL SCOTT
President

WEST BAY SANITARY DISTRICT

By:________________________
PHIL SCOTT
District Manager

APPROVED AS TO FORM:

____

Club Attorney

APPROVED AS TO FORM:

____
ANTHONY P. CONDOTTI
District Counsel

Appendix B - General Conformity Report and Air Quality Analysis

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Technical Memorandum

Subject: General Conformity Air Quality Analysis

Prepared for: West Bay Sanitary District

Prepared by: Enrique Lopezcalva and Simon Kobayashi

Date: September 14, 2015

Reference: Recycled Water Facility at Sharon Heights Golf Course and Country Club

A. Overview of the General Conformity Rule

The United States (U.S.) Congress adopted general conformity requirements as part of the Clean Air Act (CAA) Amendments in 1990 and the U.S. Environmental Protection Agency (USEPA) implemented those requirements in 1993 (Sec. 176 of the CAA (42 U.S.C. § 7506) and 40 CFR Part 93, Subpart B). The general conformity requirements are formally referred to as the General Conformity Rule, which requires that all federal actions "conform" with the State Implementation Plan (SIP) as approved or promulgated by USEPA. The purpose of the General Conformity Rule is to ensure that actions taken by the federal government do not undermine state or local efforts to achieve and maintain the National Ambient Air Quality Standards (NAAQS). Before a federal action is taken, the action must be evaluated for conformity with the SIP. All "reasonably foreseeable" emissions predicted to result from the action are taken into consideration; reasonably foreseeable emissions include direct and indirect emissions, and must be evaluated for their location and quantity. If it is found that the action would create emissions above de minimis threshold levels specified in USEPA regulations (40 CFR § 93.153(b)), or if the action is considered "regionally significant" because its emissions exceed 10% of an area's total emissions, the action cannot proceed unless mitigation measures are specified that would bring the project into conformance.

General conformity applies in both federal nonattainment and federal air quality maintenance areas, including the Study Area for the West Bay Sanitary District's (WBSD) Recycled Water Facility (Proposed Project). Within these federally designated areas, the General Conformity Rule applies to any "federal action" not specifically exempted by the CAA or USEPA regulations, i.e., any non-exempt activity by a federal governmental department, agency or instrumentality, or any activity that such an entity supports in any way, provides financial assistance for, or licenses, permits, or approves. This definition is broad enough to capture local agency approvals involving the receipt of federal funding, which may be pursued for the Project from the United States Army Corps of Engineers, and potentially other federal sources.

Methods Used for Determining Conformity

An action cannot be in compliance with the General Conformity Rule unless the total direct and indirect emissions from the action for criteria pollutants are in compliance with all relevant requirements contained in the applicable SIP. The USEPA provides several methods to determine if an action conforms to a SIP including a statewide emission budget, emission offsets, and/or air quality modeling. This Technical Memorandum (TM) uses a modeling approach to determine if the Proposed Project would cause or contribute to new air quality violations, or increase the frequency or severity of existing violations.

In addition to the use of modeling, USEPA has identified other methods of determining conformance with a SIP. One of these methods includes actions involving regional water and/or wastewater projects, as long as the projects are sized to meet only the needs of population projections that are in the applicable SIP.

All SIPs are based on local build-out projections from general planning documents; for the Study Area, the relevant SIP includes projections from local General Plans of applicable jurisdictions (City of Menlo Park and County of San Mateo). Based on this factor, in conjunction with the low number of vehicle trips generated by the Proposed Project (e.g. less than 70 per day) over its long-term operational life, this assessment focuses on construction-related air quality effects that could result from the Proposed Project.

B. Project Description

The Study Area is located in Menlo Park, California, along the San Francisco Bay. The Study Area is within the service area of West Bay Sanitary District (WBSD) with most construction occurring at the Sharon Heights Golf Course and Country Club (GC&CC) and nearby roadways. Recycled water will be served to Sharon Heights GC&CC and Stanford Linear Accelerator Center (SLAC) National Accelerator Laboratory.

The Proposed Project will be the first recycled water treatment plant within WBSD. Phase I will involve constructing and operating an membrane bioreactor (MBR) treatment plant, and constructing and operating recycled water pipelines, wastewater pipeline, salt disposal pipeline, pump stations, storage tanks, pressure reducing facilities, and all other facilities necessary to supply an anticipated demand of 236 acre-feet per year (AFY) recycled water within the Study Area. Phase II is an additional set of recycled water delivery pipelines that will be completed in 2019 and will increase demand by 45 AFY. The Proposed Project is exclusively recycled water and Phase I will be operational in 2018, with Phase II following in 2019.

This TM evaluates the Proposed Project at the project-level, complying with the California Environmental Quality Act (CEQA) and addressing National Environmental Policy Act (NEPA) components that would allow applicable federal agencies to make NEPA-related findings. For the purposes of this analysis, recycled water supplies would be utilized as non-potable water for irrigation and industrial use within the Study Area. The Proposed Project would connect Sharon Height GC&CC and SLAC National Accelerator Laboratory to recycled water through 2 planned groups of distribution pipelines and laterals, storage tanks, and additional pumping capacity. Phase II would add an additional set non-potable pipelines to supply recycled water to two business parks and a homeowners' association for irrigation and industrial use.

Pipelines

The Proposed Project's Phase I proposes construction of approximately 17,500 linear feet (LF) of pipelines to convey wastewater to the new WWTP, to distribute recycled water to end users, and to convey solids to an existing sewer main. Phase II proposes construction of approximately 6,400 linear feet (LF) of pipeline to distribute recycled water to end users. Proposed pipelines are listed below in **Table 1**.

Table 1: Proposed Project Pipelines

Section	Pipe Length (Linear Feet)	Pipe Diameter (inches)
Phase I		
Wastewater Conveyance Pipeline	10,600	8
Recycled Water Distribution Pipeline	5,300	6
Solids Disposal Line	1,600	6
Phase II		
Recycled Water Distribution Pipeline	6,400	6

Section	Pipe Length (Linear Feet)	Pipe Diameter (inches)
TOTALS	**23,900**	6 or 8

Treatment Plant

The Proposed Project includes the construction of one new wastewater treatment plant (WWTP) on the Sharon Heights GC&CC. The WWTP would involve grit removal, fine screening, MBR filtration, and UV disinfection. The new WWTP will have a capacity of 0.5 MGD.

Pump Stations

The Proposed Project includes the addition of two new pump stations, which are listed below in **Table 2**. The air emissions resulting from the construction of these pump stations were estimated using a disturbed area of 0.05 and 0.08 acres. The Storage Pond Pumps and SLAC Pumps will pull from the same clear well and fall under the same construction footprint. This is a conservative approximation given the overlap of pipe construction and treatment plant construction. The pumps would be electrically driven, and no emergency standby power is currently planned for the sites.

Table 2: Proposed Project Pump Station Installations

Component	Size (HP)	Number[1]
PS1 - Influent Wastewater Pumps	45	2
PS2 - Storage Pond Pumps	10	2
PS2 - SLAC Pumps	20	2
TOTALS	**75**	6

[1]All pump stations have one duty pump and one standby pump.

Proposed Construction

Construction of the pipelines would generally be located within publically-owned lands and roadway rights-of-way (ROWs) within County of San Mateo, specifically in the city of Menlo Park. Pipeline installation for all portions of the Proposed Project would use standard open-cut trenching techniques or trenchless technology such as jack-and-bore to go under the Hetch-Hetchy right-of-way and other features as applicable.

Construction Equipment and Staging. Standard installation of the pipelines would proceed at the rate of approximately 150 feet per day. The disturbed area for each pipeline segment was calculated assuming a total of 30-feet of disturbed land perpendicular to the pipeline, generally within the roadway right-of-way. Excavated trench materials would be redistributed over the completed pipeline area and/or transported off-site. Construction of the WWTP and pump stations with adjacent chlorination/storage components would also require grading, site preparation, and facility installation, within an estimated construction timeframe of 15 months, with the Phase I completed over 13 months and Phase II completed over approximately 2 months.

Installation of facilities for the Proposed Project would require, but are not limited to, the following equipment:

- backhoe
- bulldozer
- dump truck crane
- compactor
- flat-bed delivery truck
- pavement saw
- compressor/jack hammer
- asphalt

- front-end loader
- excavator

When feasible, equipment and vehicle staging would be accommodated either at each construction site (pipeline, WWTP, and pump station sites), or at a centralized staging area, such as the lot at the proposed tank and pump station site.

Surface Restoration. Damage to roadways and non-paved areas would be repaired in accordance with the requirements of jurisdictional agencies, including the impacted City of Menlo Park and/or Caltrans. Where the pipelines are installed in a paved roadway, new asphalt or concrete pavement would be placed to match the surrounding road type. Temporary asphalt material may be installed to allow traffic to use the roadway immediately after construction. Final repaving would be done after pipeline installations and testing are complete. For unpaved surfaces, restoration would generally involve replanting with annual grasses or native vegetation.

Construction Schedule

Construction of the Proposed Project's pump station and WWTP are estimated to begin in 2017. Pump stations will be completed early 2018, at which point pipeline installation will begin. Construction of the pipelines and WWTP will be completed in 2018. Construction of Phase II pipelines will begin and end in 2019 over the course of approximately 2 months.

C. Existing Air Quality Conditions

The Study Area is located in the County of San Mateo, California. This area lies within the San Francisco Bay Area Air Basin (SFBAAB), a 5,340-square-mile area bounded including the 400-square-mile San Francisco Bay. It sits with the Pacific Ocean on the west, the Coast Range Mountains from the northwest to the southeast. The SFBAAB includes all of San Mateo County. The climate of the SFBAAB is determined primarily by the temperature interactions between the bay and the surrounding land, where temperature gradients between coastal and inland locations arise during the days in the summer and the nights in the winter. Due to the heavy industry, shipping, two large airports and a large population in the Basin, ozone (O_3) and $PM_{2.5}$ levels are expected to continue to violate federal and State ambient air quality standards in spite of vigorous control measures. High levels of respirable particulate matter 10 microns or smaller (PM_{10}) also continue to violate State standards.

Criteria Air Pollutants

Criteria air pollutants of concern in the Study Area include ozone and particulate matter (PM). As required by the federal CAA, the USEPA has established National Ambient Air Quality Standards (NAAQS or national standards) to protect public health and welfare from these criteria pollutants. USEPA established standards for ozone[1], carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead, and particulate matter equal to or less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$). PM_{10} is also commonly referred to as respirable particulate and $PM_{2.5}$ is also known as fine particulate.

Local Air Attainment Status

The USEPA designates all areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. A nonattainment designation generally means that a primary NAAQS has been exceeded more than once per year in a given area. The SFBAAB is presently in "marginal"

1 Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NOx). ROG and NOx are known as precursor compounds for ozone.

nonattainment for the 1997 and 2008 eight-hour ozone standards and "moderate" nonattainment for the 2006 $PM_{2.5}$ standard.

Generally, concentrations of photochemical smog, or ozone, are highest during the summer months and coincide with the season of maximum solar radiation. Inert pollutant concentrations tend to be the greatest during the winter months and are a product of light wind conditions and surface-based temperature inversions that are more frequent during that time of year. These conditions limit atmospheric dispersion, trapping pollutants close to the ground. However, in the case of PM_{10} impacts from fugitive dust sources, maximum dust impacts may occur during high wind events and/or in proximity to man-made ground-disturbing activities, such as vehicular activities on roads and earth moving during construction activities.

The Bay Area Air Quality Management District (BAAQMD) maintains 32 monitoring stations within the SFBAAB that monitor air quality compliance with ambient standards (BAAQMD 2015). Many of the stations are around the urban centers. Pollutants monitored include nitrogen oxides, carbon monoxide, sulfur dioxide, lead, black carbon, hydrogen sulfide, ultrafine particulate less than or equal to 0.1 microns and most importantly: O_3, PM_{10}, $PM_{2.5}$, and a number of toxic compounds.

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are pollutants that are associated with acute, chronic, or carcinogenic effects but for which no ambient air quality standard has been established or, in the case of carcinogens, is appropriate. TAC impacts are evaluated by determining if a particular chemical poses a significant risk to human health and, if so, under what circumstances. The ambient background of TACs is the combined result of many diverse human activities, including gasoline stations, refineries, automobiles, industrial operations, and painting operations. In general, mobile sources contribute more significantly to health risks than stationary sources. Diesel PM is responsible for approximately 70 percent of the total toxic risk to Californians from air pollution.

In addition to diesel PM, emissions from diesel-fueled engines include over 40 other cancer-causing substances. Because diesel PM consists of more than one compound, monitoring is more difficult than for single TACs. However, based on a limited amount of data, the California Air Resources Board (CARB) has estimated the statewide, ambient, "population-weighted," cancer risk due to essentially all TACs, based on year 2000 emissions, at 758 in 1 million; of this, CARB estimates that 540 in 1 million, or approximately 70 percent, is due to diesel particulate (CARB 2000).

Certain serpentine formations contain asbestos fibers, which are considered a TAC when released into the atmosphere. Based on available geologic mapping, there is currently no documented evidence of serpentine rock in the Study Area (California Geological Survey 2000). Based on this circumstance, the potential for encountering asbestos-containing geologic formations is considered unlikely.

D. Regulatory Setting

Federal Policies and Regulations

As previously indicated, the federal CAA requires the USEPA to identify criteria pollutants and establish NAAQS to protect public health and welfare. National standards have been established for ozone, CO, NO_2, SO_2, lead (Pb), PM_{10}, and $PM_{2.5}$. USEPA is responsible for implementing the myriad of programs established under the federal CAA, such as establishing and reviewing the NAAQS and judging the adequacy of SIPs, but has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

Emission Standards for Nonroad Diesel Engines

The USEPA has established a series of cleaner emission standards for new off-road diesel engines culminating in the Tier 4 Final Rule of June 2004. The Tier 1, Tier 2, Tier 3, and Tier 4 standards require compliance with progressively stringent emission standards. Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category. Tier 2 standards were phased in from 2001 to 2006 and the Tier 3 standards were phased in from 2006 to 2008. The Tier 4 standards complement the latest 2007 on-road heavy-duty engine standards by requiring 90 percent reduction in PM and NO_x when compared against current emission levels. To meet these standards, engine manufacturers will produce new engines with advanced emissions control technologies similar to those already expected for on road heavy-duty diesel vehicles. Phasing in of Tier 4 standards started with smaller engines in 2008 until all but the very largest diesel engines meet NO_x and PM standards in 2015.

Emission Standards for On-Road Trucks

To reduce emissions from on-road, heavy-duty diesel trucks, USEPA established a series of cleaner emission standards for new engines starting in 1988. The final and cleanest Tier 4 standards apply to engines manufactured in year 2007.

Local Regulations

Through the attainment planning process, the BAAQMD has developed BAAQMD Rules and Regulations to regulate sources of air pollution in the SFBAAB. The most pertinent BAAQMD rules to the Proposed Project are listed below. The emission sources associated with the Proposed Project are considered mobile sources. Therefore, they are not subject to the BAAQMD rules that apply to stationary sources, namely Regulation 10 (Standards of Performance for New Stationary Sources). There will be an emergency generator on-site; however, it will operate very infrequently and will not produce significant emissions.

BAAQMD Rule 1-301 – Public Nuisance

Rule 1-301 prohibits discharge of air contaminants or other material that cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property

BAAQMD Rule 6-1-301, 305 – Ringelmann No. 1 Limitation and Visible Particles

The purpose of Rules 6-1-301 and 305 are to control the amount of PM entrained in the atmosphere from man-made sources of fugitive dust. The 301 rule prohibits emissions of visible emissions lasting a cumulative 3 minutes in any 60 minutes as dark as or darker than Ringelmann No. 1 or with an opacity to obscure sight in an equivalent or greater manner. The 305 rule prohibits emissions of visible particles from any operation resulting in annoyance to any other person, visible on the individual particle level. During project construction, best available control measures identified in the rule would be required to minimize fugitive dust emissions from proposed earth-moving and grading activities. These measures would include site watering as necessary to maintain sufficient soil moisture content.

E. Impact Assessment

Methodology

As indicated in Section A, this analysis of the General Conformity Rule uses a modeling approach to determine if the Proposed Project would cause or contribute to new air quality violations, or increase the frequency or severity of existing violations. As part of this evaluation, emphasis is placed on the criteria air pollutants regulated by USEPA. In addition to criteria air pollutants, this analysis also addresses potential cumulative air quality impacts, potential sources of odor, impacts to sensitive receptors, and sources of greenhouse gases (GHGs) that would result from the Proposed Project.

This analysis involves the calculation of emission estimates using models widely used throughout BAAQMD and California and compares the model estimates to the General Conformity's thresholds for NOx, ROG, CO, and PM10. The CalEEMod Model, Version 2013.2.2, was used to quantify construction and operational emissions associated with proposed storage tank and pump station facilities. Construction emissions from pipeline installation activities were estimated using the Road Construction Emissions Model, Version 7.1.5.1. Construction emissions for the treatment facilities were estimated using an analysis of published emissions from similar projects.

Given that the San Mateo County is either in federal attainment or unclassified with respect to PM10, CO, SO_2, sulfates, lead, and hydrogen sulfide, and the Proposed Project improvements would generate minimal to no emissions of these pollutants, these pollutants require no further evaluation.

Threshold Exceedances

The BAAQMD has air quality screening-level thresholds (BAAQMD, 2009), which were published as updates to the CEQA Air Quality Handbook. While these thresholds are not enforced due to the ruling of the Alameda County Supreme Court in 2012, the merits of the threshold were not put into question and have been used as thresholds in other BAAQMD EIRs. The thresholds for criteria pollutants are presented in **Table 3**.

Table 3: BAAQMD Air Quality Screening-Level Thresholds

Pollutant	Emissions Rate[1]
Volatile Organic Carbon (VOC)	54 lbs/day
Nitrogen Oxides (NOx)	54 lbs/day
Particulate Matter <10 micron (PM10)	84 lbs/day
Particulate Matter <2.5 micron (PM2.5)	54 lbs/day

[1] Source: Revised Draft Options and Justification Report California Environmental Quality Act Thresholds of Significance (BAAQMD 2009).

Proposed Project-related air quality impacts fall into two categories: 1) short-term impacts during construction and 2) long-term impacts during project operation. During project construction, construction activities would affect local particulate concentrations primarily because of fugitive dust emissions. Proposed Project construction would also result in increased ROG and NO_x emissions from construction equipment. During the Project operations phase, project-related motor vehicle trips would also increase emissions of ozone precursors and particulates.

Table 4 provides a summary of the maximum daily air emissions generated for the Proposed Project components and evaluation of compliance with BAAQMD air quality significance thresholds, which are based on BAAQMD CEQA Significance Thresholds (2009). These maximum emissions take into consideration the Proposed Project construction schedule.

Table 4: Maximum Daily Air Emissions Generated for Proposed Project

Pollutant	Construction lbs/day				Significant Construction Emissions[3]	Operation lbs/day	Significant Operation Emissions[3]
	Phase I		Phase II	Total			
	Pump Stations and WWTP (2017)[1]	Pipelines and WWTP (2018)[2]	Pipelines (2019)				
Volatile Organic Carbon (VOC)	4	11	4	18	*No*	0.4	*No*
Nitrogen Oxides (NOx)	34	50	35	119	*No*	2.0	*No*
Carbon Monoxide (CO)	30	35	27	92	*No*	2.5	*No*
Particulate Matter <10 micron (PM10)	4	5	4	13	*No*	0.3	*No*
Particulate Matter <2.5 micron (PM2.5)	3	3	2	8	*No*	0.1	*No*

1. The WWTP and pump station emissions were calculated using CalEEMOD
2. Pipeline emissions were calculated using the Roadway Construction Emissions Model (SMAQMD 2013).
3. Thresholds from BAAQMD CEQA Significance Thresholds (BAAQMD 2009).

Based on maximum daily emissions for the Proposed Project, the air quality significance thresholds for emissions would be exceeded during construction if construction of components were not phased. For this reason, construction will be phased as shown in the paired components in the table above.

Construction Emissions

Implementation of Proposed Project-related construction activities would occur in two distinct phases for the non-pipeline components: phase one involves site preparation, trenching, earthmoving, and stockpiling activities, while the second phase involves installing equipment, facility construction, on-site pipeline, concrete, and above ground improvements. Earthmoving activities include cut and fill operations, trenching, soil compaction, and grading. Installation of pipelines, associated grading and roadway surface work will occur separately temporally from the treatment facilities construction. The emissions generated from these common construction activities include:

- Dust (including PM_{10} and $PM_{2.5}$) primarily from fugitive sources such as soil disturbance and vehicle travel over unpaved surfaces;
- Combustion emissions of criteria air pollutants (including ROG, NO_X, PM_{10}) primarily from operation of heavy equipment construction machinery (primarily diesel operated), portable auxiliary equipment and construction worker automobile trips (primarily gasoline operated); and,
- Evaporative emissions (ROG) from asphalt paving and architectural coating applications.

Construction-related fugitive dust emissions would vary from day to day, depending on the level and type of activity and the weather. However, construction-related fugitive dust emissions would not exceed established thresholds.

Construction activities would also result in the emission of pollutants of concern, including ROG, NO_X, and PM10, from construction equipment exhaust and construction worker automobile trips. Emission levels for construction activities would vary depending on the number and type of equipment, duration of use, operating schedules, and the number of construction workers. Construction-related ROG, NOx and PM10 emissions would not exceed established thresholds when a phased construction schedule is followed.

Construction emissions for pipeline installation were estimated using the Sacramento Metropolitan Air Quality Management District's Roadway Construction Model (SMAQMD 2013). Vehicle trips would be dispersed along the roadway network based on the location of construction activities. Estimated annual construction-related fugitive dust emissions, as well as exhaust emissions from construction equipment and worker trips are shown in **Table 5**. A summary of the model outputs is provided as part of **Appendix A**.

As shown in **Table 5**, General Conformity significance thresholds would *not* be exceeded during construction of the Proposed Project.

Table 5: Proposed Project Estimated Pollutant Emissions during Construction

Pollutant	Carbon Monoxide (CO) (Tons/Yr)	Nitrogen Oxides (NOx) (Tons/Yr)	Reactive Organic Gases (ROG) (Tons/Yr)	Particulate (PM10) (Tons/Yr)
Federal General Conformity Rule Threshold[1]	100	100	100	100
Construction Emissions[2]	3.3	4.6	0.5	0.4
Significant Emissions[1]	*No*	*No*	*No*	*No*
Operational Emissions[3]	0.3	0.3	0.1	0.0
Significant Emissions[1]	*No*	*No*	*No*	*No*

1. Thresholds applied by Federal General Conformity Rule.
2. Calculations for construction were completed using Roadway Construction Emissions Model (Version 7.1.5.1, 2013) and CalEEMod model (Version 2013.2) and are included in Appendix A.
3. Calculations for operations were completed using CalEEMod (Version 2013.2) and are included in Appendix A. The emissions listed above are for a worst-case day.

Operational Emissions

The main operational components of the project include two new pumping facilities, the WWTP, and maintenance-related vehicle trips. The CalEEMod Model, Version 2013.2, was used to quantify operational area and mobile source emissions associated with proposed storage and pump station facilities. A summary of the CalEEMod outputs are included in **Appendix A.**

Pump and WWTP operation would be driven by electricity and would not generate local emissions directly, but would result in emissions at a power plant within or outside of the BAAQMD. Power plant emissions, if located in California, are subject to the rules and regulations of the air district in which they are located and have been subject to their own regulatory review. Emissions from power generation to supply pumps and treatment train would occur anywhere in the western U.S. power grid and emissions from motors to service the pumps would be regional. Energy would be supplied by permitted power sources, such as sources permitted by the California Energy Commission's Application for Certification (CEQA equivalent) process.

Following installation, the Proposed Project improvements would require maintenance activities that would be fairly minor, involving the treatment facilities and adjacent pump stations. Traffic generation during the long-term operation of the project improvements would average less than 8 one-way passenger vehicle trips per day; comparable to existing conditions given existing traffic to the Sharon Height GC&CC, other destinations nearby, as well as use of the Sand Hill Road as a transport corridor. Operational emissions were estimated for the pump station or treatment plant facilities using the CalEEMod 2013 Model. As provided in **Table 5** above, the CalEEMod outputs indicate that operational emissions for these facilities would be minor and would not exceed General Conformity thresholds or the BAAQMD thresholds meant to conform to the SIP.

Based on **Table 5** above, operational air quality emissions associated with Proposed Project implementation are anticipated to be less than significant from a federal de minimis threshold perspective.

Cumulatively Considerable Net Increase of Criteria Pollutants

The Proposed Project is located within the BAAQMD, which does *not* meet state PM_{10} standards, the national $PM_{2.5}$, state $PM_{2.5}$ standard, and the state 1-hour, state 8-hour and the national 8-hour ozone standards. The BAAQMD is active in establishing and enforcing air pollution control rules and regulations in order to attain all state and federal ambient air quality standards and to minimize public exposure to airborne toxins and nuisance odors. As identified earlier, air emissions would be generated during construction of the Proposed Project. These construction-related emissions would not exceed significance thresholds established by the BAAQMD in CEQA Significance Thresholds (2009). With mitigation applied to further reduce emissions (see below), the Proposed Project would not contribute considerably to cumulative air quality impacts.

Upon completion of construction activities, emission sources resulting from project operations would be associated with WWTP operation, regular maintenance, and inspection work. Given the limited number of trips that would be required, **Table 5** shows that system operational emissions would be expected to be below BAAQMD guidelines and do not require further quantification. With mitigation applied to further reduce emissions (see below), the Proposed Project would not result in a cumulatively considerable net increase of criteria air pollutants as a result of operations. Potential air quality impacts would be de minimis.

Expose Sensitive Receptors to Substantial Pollutant Concentrations

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Land uses such as schools, children's day care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses are more susceptible to respiratory distress and other air quality-related health problems.

Within the Study Area, one sensitive receptor has been identified, a nearby school. Construction of the Proposed Project would not emit hazardous air pollutants in significant quantity other than from large, heavy-duty, diesel-powered equipment exhaust. The California Office of Environmental Health Hazard Assessment (OEHHA) currently describes the health risk from diesel exhaust entirely in terms of the amount of particulate, or PM_{10}, that is emitted. Currently, the health risk associated with diesel exhaust PM_{10} or diesel particulate matter is characterized as a carcinogenic and chronic effect; whereas no short-term acute effect is currently recognized. Construction of the Proposed Project improvements would be limited in duration and, therefore, no long-term chronic impact would be expected.

There is currently no documented evidence of serpentine rock in the Study Area, which could contain asbestos fibers, which are considered a TAC when released into the atmosphere (California Geological Survey 2000). Based on this circumstance, the potential for encountering asbestos-containing geologic formations during excavation is considered unlikely and no additional air contaminants would be released.

Based on the above discussion, the generation of significant emissions of TACs during construction activities is unlikely. However, based on the potential for close proximity of construction to sensitive receptors, the impact of construction-related dust and PM_{10} and $PM_{2.5}$ could potentially affect those sensitive receptors. WBSD is committed to implementing dust control measures per its standard construction specifications to reduce release of fugitive dust and associated impacts to sensitive receptors. With implementation of the standard construction specifications, the impact will be less significant.

Over the longer term, operational emissions associated with the proposed pumps would operate by electricity. The pumping facilities would operate year-round (24-hours a day, seven days a week). One backup generator is anticipated for this Proposed Project, but is not anticipated to contribute significant emissions due to infrequent and limited duration of operation.

Creation of Objectionable Odors

Objectionable odors may be associated with a variety of pollutants. Common sources of odors include wastewater treatment plants, landfills, composting facilities, refineries, and chemical plants. Odors rarely directly affect health, but they can be very unpleasant and lead to distress and concern over possible health effects among the public, generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors. Sources of odors within the Study Area include a horse park and adjacent freeway.

The Proposed Project improvements do involve the operation of a WWTP and may involve the placement of sensitive receptors in close proximity to this odor-generating use. Wastewater treatment will contribute a new odorous emission. However the treatment process is anticipated to be fully enclosed for aesthetic as well as odor reasons, seeing as it is situated directly on a golf course. For this reason, no significant odorous emissions are anticipated. Further, pumping operations would be within fully enclosed structures and are not expected to result in the generation of objectionable odors during normal operation. The WWTP design will incorporate measures to decrease odorous emissions as a core component of the project.

Directly or Indirectly Increase Generation of Greenhouse Gas Emissions

Some gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. These layers of gas in the atmosphere can prevent the escape of heat much the same as glass in a greenhouse. Thus, climate change is often referred to as the "greenhouse effect". The gases most responsible for climate change are CO_2 and methane. Other greenhouse gases (GHG) include, but are not limited to, nitrous oxide (N_2O), sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons. It is becoming more widely accepted that continued increases in GHG will contribute to climate change, although there is uncertainty concerning the magnitude and timing of the trend.

Energy-related CO_2 emissions, resulting from petroleum and natural gas, represent 82% of total U.S. human-made GHG emissions. Methane, a GHG that comes from landfills, coal mines, oil and gas operations, and agriculture, represents 9% of total emissions. Emitted from burning fossil fuels and through the use of certain fertilizers and industrial processes, N_2O totals about 5% of U.S. emissions. These gases collectively contribute to a project's total CO_2 equivalent per year (MTCO2e/yr).

Assembly Bill 32 (AB32), the California Global Warming Solutions Act of 2006, and Executive Order S-3-05, signed in June 2005, focus on reducing GHG emissions in California. The impacts of global climate change described in AB32 include changing sea levels, changes in snow pack and availability of potable water, changes in storm flows and flood inundation zones, and other impacts. The list of impacts included in AB32 is considered substantial evidence of the potential environmental impacts that could result as a consequence of continued GHG outputs.

At minimum, the Proposed Project improvements will be required to comply with Title 24 energy efficiency standards, to the extent applicable; however, the extent to which these standards would help in achieving the goals outlined above is unknown. In response to this uncertainly and to provide clarification to lead agencies for assessing GHG impacts, CARB has developed statewide interim thresholds of significance for common project types that, collectively, are responsible for substantial GHG emissions. In applying these interim thresholds, CARB developed a preliminary threshold of 7,000 MTCO2e/yr for industrial projects. However, this applies to only operations and not construction. CARB has not established thresholds for construction projects, but rather has proposed mandatory performance standards. As such, BAAQMD has set a threshold of 1,100 MTCO2e/yr.

Quantification of GHGs for the Proposed Project was based on the CO_2 outputs generated during operations using the CALEEMOD 2013 Model, combined with new electrical loads required for the operation of the proposed treatment and pumping facilities. GHG emissions generated by the collective Proposed Project operations are conservatively estimated at 667 MTCO2e/yr for the construction and 195 MTCO2e/yr for the operation. Emission estimates are clearly less than either the CARB threshold or the BAAQMD threshold and, therefore, operational-related GHG emissions are less than significant.

Mitigation Measures

As described above, all air quality and GHG emissions from the Proposed Project will fall below significance thresholds. Standard mitigation measure will be implemented based on BAAQMD regulations, including dust control measures and best available control technologies for construction equipment as needed and as available. However, the following mitigation measure will be applied to further ensure that the Proposed Project does not contribute to cumulative air exceedances.

Mitigation Measure AIR-1: Implement BAAQMB Air Pollution Control Technologies

WBSD shall direct its construction contractor to implement the “Basic Construction Mitigation Measures” and “Additional Construction Mitigation Measures” in the BAAQMD CEQA Air Quality Guidelines (2012) during construction of the Proposed Project. Air pollution control efforts shall include watering and covering exposed surfaces, minimizing idling times, maintaining and properly tuning all construction equipment, repaving/replanting disturbed surfaces as quickly as possible, and others as applicable. When available, more efficient construction equipment will be procured to minimize NOx and VOC emissions.

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Appendix A: Air Quality and GHG Supporting Tables

Road Construction Emissions Model, Version 7.1.5.1

Emission Estimates for -> West Bay Sanitary District - Phase I				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.6	15.6	25.0	3.4	1.4	2.1	1.6	1.2	0.4	4,579.7
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	1.7	11.9	13.7	0.8	0.8	-	0.7	0.7	-	2,035.5
Maximum (pounds/day)	2.6	15.6	25.0	3.4	1.4	2.1	1.6	1.2	0.4	4,579.7
Total (tons/construction project)	0.3	1.8	2.6	0.2	0.1	0.1	0.1	0.1	0.0	436.6

Notes: Project Start Year -> 2018
Project Length (months) -> 6
Total Project Area (acres) -> 12
Maximum Area Disturbed/Day (acres) -> 0
Total Soil Imported/Exported (yd^3/day)-> 316

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> West Bay Sanitary District - Phase I				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.2	7.1	11.3	1.6	0.6	0.9	0.7	0.5	0.2	2,081.7
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	0.8	5.4	6.2	0.4	0.4	-	0.3	0.3	-	925.2
Maximum (kilograms/day)	1.2	7.1	11.3	1.6	0.6	0.9	0.7	0.5	0.2	2,081.7
Total (megagrams/construction project)	0.3	1.6	2.3	0.2	0.1	0.0	0.1	0.1	0.0	396.0

Notes: Project Start Year -> 2018
Project Length (months) -> 6
Total Project Area (hectares) -> 5
Maximum Area Disturbed/Day (hectares) -> 0
Total Soil Imported/Exported (meters ^{3}/day)-> 242

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model, Version 7.1.5.1

Emission Estimates for -> West Bay Sanitary District - Phase II				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.2	15.0	19.1	3.2	1.1	2.1	1.4	1.0	0.4	3,638.1
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	1.5	11.8	12.2	0.7	0.7	-	0.6	0.6	-	2,034.2
Maximum (pounds/day)	2.2	15.0	19.1	3.2	1.1	2.1	1.4	1.0	0.4	3,638.1
Total (tons/construction project)	0.1	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	93.6

Notes: Project Start Year -> 2019
Project Length (months) -> 2
Total Project Area (acres) -> 4
Maximum Area Disturbed/Day (acres) -> 0
Total Soil Imported/Exported (yd^3/day)-> 144

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> West Bay Sanitary District - Phase II				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.0	6.8	8.7	1.4	0.5	0.9	0.6	0.4	0.2	1,653.7
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	0.7	5.3	5.5	0.3	0.3	-	0.3	0.3	-	924.6
Maximum (kilograms/day)	1.0	6.8	8.7	1.4	0.5	0.9	0.6	0.4	0.2	1,653.7
Total (megagrams/construction project)	0.1	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	84.9

Notes: Project Start Year -> 2019
Project Length (months) -> 2
Total Project Area (hectares) -> 1
Maximum Area Disturbed/Day (hectares) -> 0
Total Soil Imported/Exported (meters ^{3}/day)-> 110

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

WBSD_RecycledWaterTreatmentPlant&PS

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	6.22	1000sqft	0.14	6,220.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Based on Malibu EIR, proportionally increased based on number of truck trips
For Paving/Architectural Coating assumed ~Malibu

Off-road Equipment - PWP RW Equipment Schedule

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Based on Malibu, included here instead of a Site Preparation Phase

Off-road Equipment -

Trips and VMT - Based on Project Description

Grading - Based on Project Description

Vehicle Trips - Based on Project Description

Consumer Products - No consumer products anticipated to be used on site

Area Coating -

Landscape Equipment - No landscaping equipment will be associated with the plant, area will be completeley paved

Water And Wastewater - Site may not have potable water hook-up, backwashing will used recycled water permeate. Potable water uses, if any, should be neglibible for this scale analysis.

Solid Waste - 169 tons total, adjusted for a per 1000 sqft metric

Land Use Change -

Construction Off-road Equipment Mitigation - Mitigation was not assessed in this analysis.

Operational Off-Road Equipment - None

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	250
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	250
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	5.00	15.00
tblConstructionPhase	NumDays	100.00	215.00
tblConstructionPhase	NumDays	2.00	42.00
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	PhaseEndDate	7/31/2018	7/30/2018
tblConstructionPhase	PhaseStartDate	7/11/2018	7/10/2018
tblGrading	AcresOfGrading	0.00	0.48
tblGrading	MaterialExported	0.00	11,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripNumber	1,375.00	1,100.00
tblTripsAndVMT	WorkerTripNumber	13.00	10.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.1007	0.9942	0.7452	1.2900e-003	0.0143	0.0580	0.0723	3.9900e-003	0.0539	0.0578	0.0000	117.3029	117.3029	0.0214	0.0000	117.7526
2018	0.1092	0.7604	0.5604	8.4000e-004	3.0200e-003	0.0486	0.0516	8.1000e-004	0.0448	0.0456	0.0000	75.9045	75.9045	0.0221	0.0000	76.3685
Total	**0.2100**	**1.7546**	**1.3056**	**2.1300e-003**	**0.0173**	**0.1065**	**0.1238**	**4.8000e-003**	**0.0986**	**0.1034**	**0.0000**	**193.2073**	**193.2073**	**0.0435**	**0.0000**	**194.1211**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.1007	0.9942	0.7452	1.2900e-003	0.0143	0.0580	0.0723	3.9900e-003	0.0539	0.0578	0.0000	117.3028	117.3028	0.0214	0.0000	117.7525
2018	0.1092	0.7604	0.5604	8.4000e-004	3.0200e-003	0.0486	0.0516	8.1000e-004	0.0448	0.0456	0.0000	75.9044	75.9044	0.0221	0.0000	76.3684
Total	**0.2100**	**1.7546**	**1.3056**	**2.1300e-003**	**0.0173**	**0.1065**	**0.1238**	**4.8000e-003**	**0.0986**	**0.1034**	**0.0000**	**193.2072**	**193.2072**	**0.0435**	**0.0000**	**194.1209**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0275	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.2000e-004
Energy	8.6000e-004	7.8300e-003	6.5800e-003	5.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	23.4881	23.4881	8.4000e-004	3.0000e-004	23.5976
Mobile	0.0279	0.0747	0.3099	5.0000e-004	0.0356	1.1000e-003	0.0367	9.5400e-003	1.0100e-003	0.0106	0.0000	42.2920	42.2920	2.0800e-003	0.0000	42.3356
Waste						0.0000	0.0000		0.0000	0.0000	1.5651	0.0000	1.5651	0.0925	0.0000	3.5074
Water						0.0000	0.0000		0.0000	0.0000	0.4563	2.2642	2.7205	0.0470	1.1300e-003	4.0566
Total	**0.0563**	**0.0826**	**0.3165**	**5.5000e-004**	**0.0356**	**1.7000e-003**	**0.0373**	**9.5400e-003**	**1.6100e-003**	**0.0112**	**2.0214**	**68.0444**	**70.0658**	**0.1424**	**1.4300e-003**	**73.4973**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0275	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.2000e-004
Energy	8.6000e-004	7.8300e-003	6.5800e-003	5.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	23.4881	23.4881	8.4000e-004	3.0000e-004	23.5976
Mobile	0.0279	0.0747	0.3099	5.0000e-004	0.0356	1.1000e-003	0.0367	9.5400e-003	1.0100e-003	0.0106	0.0000	42.2920	42.2920	2.0800e-003	0.0000	42.3356
Waste						0.0000	0.0000		0.0000	0.0000	1.5651	0.0000	1.5651	0.0925	0.0000	3.5074
Water						0.0000	0.0000		0.0000	0.0000	0.4563	2.2642	2.7205	0.0470	1.1300e-003	4.0558
Total	**0.0563**	**0.0826**	**0.3165**	**5.5000e-004**	**0.0356**	**1.7000e-003**	**0.0373**	**9.5400e-003**	**1.6100e-003**	**0.0112**	**2.0214**	**68.0444**	**70.0658**	**0.1424**	**1.4300e-003**	**73.4966**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	7/3/2017	8/29/2017	5	42	
2	Building Construction	Building Construction	8/30/2017	6/26/2018	5	215	
3	Paving	Paving	6/27/2018	7/10/2018	5	10	
4	Architectural Coating	Architectural Coating	7/10/2018	7/30/2018	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.48

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 9,330; Non-Residential Outdoor: 3,110 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	6.00	162	0.38
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	5	10.00	0.00	1,100.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	3.00	1.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.6300e-003	0.0000	1.6300e-003	5.4000e-004	0.0000	5.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0310	0.2833	0.2341	3.4000e-004		0.0184	0.0184		0.0174	0.0174	0.0000	30.2863	30.2863	6.8100e-003	0.0000	30.4294
Total	**0.0310**	**0.2833**	**0.2341**	**3.4000e-004**	**1.6300e-003**	**0.0184**	**0.0200**	**5.4000e-004**	**0.0174**	**0.0180**	**0.0000**	**30.2863**	**30.2863**	**6.8100e-003**	**0.0000**	**30.4294**

3.2 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						tons/yr								MT/yr		
Hauling	0.0120	0.1476	0.1351	4.1000e-004	9.2600e-003	1.8900e-003	0.0112	2.5500e-003	1.7400e-003	4.2800e-003	0.0000	37.0890	37.0890	2.7000e-004	0.0000	37.0946
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.1000e-004	1.0300e-003	9.9400e-003	2.0000e-005	1.9000e-003	2.0000e-005	1.9200e-003	5.1000e-004	1.0000e-005	5.2000e-004	0.0000	1.6629	1.6629	9.0000e-005	0.0000	1.6647
Total	**0.0127**	**0.1487**	**0.1450**	**4.3000e-004**	**0.0112**	**1.9100e-003**	**0.0131**	**3.0600e-003**	**1.7500e-003**	**4.8000e-003**	**0.0000**	**38.7518**	**38.7518**	**3.6000e-004**	**0.0000**	**38.7593**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						tons/yr								MT/yr		
Fugitive Dust					1.6300e-003	0.0000	1.6300e-003	5.4000e-004	0.0000	5.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0310	0.2833	0.2341	3.4000e-004		0.0184	0.0184		0.0174	0.0174	0.0000	30.2863	30.2863	6.8100e-003	0.0000	30.4294
Total	**0.0310**	**0.2833**	**0.2341**	**3.4000e-004**	**1.6300e-003**	**0.0184**	**0.0200**	**5.4000e-004**	**0.0174**	**0.0180**	**0.0000**	**30.2863**	**30.2863**	**6.8100e-003**	**0.0000**	**30.4294**

3.2 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						tons/yr								MT/yr		
Hauling	0.0120	0.1476	0.1351	4.1000e-004	9.2600e-003	1.8900e-003	0.0112	2.5500e-003	1.7400e-003	4.2800e-003	0.0000	37.0890	37.0890	2.7000e-004	0.0000	37.0946
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.1000e-004	1.0300e-003	9.9400e-003	2.0000e-005	1.9000e-003	2.0000e-005	1.9200e-003	5.1000e-004	1.0000e-005	5.2000e-004	0.0000	1.6629	1.6629	9.0000e-005	0.0000	1.6647
Total	**0.0127**	**0.1487**	**0.1450**	**4.3000e-004**	**0.0112**	**1.9100e-003**	**0.0131**	**3.0600e-003**	**1.7500e-003**	**4.8000e-003**	**0.0000**	**38.7518**	**38.7518**	**3.6000e-004**	**0.0000**	**38.7593**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						tons/yr								MT/yr		
Off-Road	0.0561	0.5577	0.3537	5.0000e-004		0.0376	0.0376		0.0346	0.0346	0.0000	46.2840	46.2840	0.0142	0.0000	46.5818
Total	**0.0561**	**0.5577**	**0.3537**	**5.0000e-004**		**0.0376**	**0.0376**		**0.0346**	**0.0346**	**0.0000**	**46.2840**	**46.2840**	**0.0142**	**0.0000**	**46.5818**

3.3 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.1000e-004	3.9500e-003	6.1200e-003	1.0000e-005	2.8000e-004	6.0000e-005	3.4000e-004	8.0000e-005	5.0000e-005	1.3000e-004	0.0000	0.9355	0.9355	1.0000e-005	0.0000	0.9356
Worker	4.4000e-004	6.5000e-004	6.2500e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0452	1.0452	5.0000e-005	0.0000	1.0464
Total	**9.5000e-004**	**4.6000e-003**	**0.0124**	**2.0000e-005**	**1.4800e-003**	**7.0000e-005**	**1.5500e-003**	**4.0000e-004**	**6.0000e-005**	**4.6000e-004**	**0.0000**	**1.9807**	**1.9807**	**6.0000e-005**	**0.0000**	**1.9820**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0561	0.5577	0.3537	5.0000e-004		0.0376	0.0376		0.0346	0.0346	0.0000	46.2839	46.2839	0.0142	0.0000	46.5817
Total	**0.0561**	**0.5577**	**0.3537**	**5.0000e-004**		**0.0376**	**0.0376**		**0.0346**	**0.0346**	**0.0000**	**46.2839**	**46.2839**	**0.0142**	**0.0000**	**46.5817**

3.3 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.1000e-004	3.9500e-003	6.1200e-003	1.0000e-005	2.8000e-004	6.0000e-005	3.4000e-004	8.0000e-005	5.0000e-005	1.3000e-004	0.0000	0.9355	0.9355	1.0000e-005	0.0000	0.9356
Worker	4.4000e-004	6.5000e-004	6.2500e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0452	1.0452	5.0000e-005	0.0000	1.0464
Total	**9.5000e-004**	**4.6000e-003**	**0.0124**	**2.0000e-005**	**1.4800e-003**	**7.0000e-005**	**1.5500e-003**	**4.0000e-004**	**6.0000e-005**	**4.6000e-004**	**0.0000**	**1.9807**	**1.9807**	**6.0000e-005**	**0.0000**	**1.9820**

3.3 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0685	0.6958	0.4905	7.2000e-004		0.0448	0.0448		0.0412	0.0412	0.0000	65.6854	65.6854	0.0205	0.0000	66.1149
Total	**0.0685**	**0.6958**	**0.4905**	**7.2000e-004**		**0.0448**	**0.0448**		**0.0412**	**0.0412**	**0.0000**	**65.6854**	**65.6854**	**0.0205**	**0.0000**	**66.1149**

3.3 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5000e-004	5.1700e-003	8.2200e-003	2.0000e-005	4.1000e-004	8.0000e-005	4.8000e-004	1.2000e-004	7.0000e-005	1.9000e-004	0.0000	1.3264	1.3264	1.0000e-005	0.0000	1.3266
Worker	5.7000e-004	8.4000e-004	8.0600e-003	2.0000e-005	1.7300e-003	1.0000e-005	1.7400e-003	4.6000e-004	1.0000e-005	4.7000e-004	0.0000	1.4525	1.4525	7.0000e-005	0.0000	1.4540
Total	**1.2200e-003**	**6.0100e-003**	**0.0163**	**4.0000e-005**	**2.1400e-003**	**9.0000e-005**	**2.2200e-003**	**5.8000e-004**	**8.0000e-005**	**6.6000e-004**	**0.0000**	**2.7789**	**2.7789**	**8.0000e-005**	**0.0000**	**2.7806**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0685	0.6958	0.4905	7.2000e-004		0.0448	0.0448		0.0412	0.0412	0.0000	65.6854	65.6854	0.0205	0.0000	66.1148
Total	**0.0685**	**0.6958**	**0.4905**	**7.2000e-004**		**0.0448**	**0.0448**		**0.0412**	**0.0412**	**0.0000**	**65.6854**	**65.6854**	**0.0205**	**0.0000**	**66.1148**

3.3 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5000e-004	5.1700e-003	8.2200e-003	2.0000e-005	4.1000e-004	8.0000e-005	4.8000e-004	1.2000e-004	7.0000e-005	1.9000e-004	0.0000	1.3264	1.3264	1.0000e-005	0.0000	1.3266
Worker	5.7000e-004	8.4000e-004	8.0600e-003	2.0000e-005	1.7300e-003	1.0000e-005	1.7400e-003	4.6000e-004	1.0000e-005	4.7000e-004	0.0000	1.4525	1.4525	7.0000e-005	0.0000	1.4540
Total	**1.2200e-003**	**6.0100e-003**	**0.0163**	**4.0000e-005**	**2.1400e-003**	**9.0000e-005**	**2.2200e-003**	**5.8000e-004**	**8.0000e-005**	**6.6000e-004**	**0.0000**	**2.7789**	**2.7789**	**8.0000e-005**	**0.0000**	**2.7806**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.5500e-003	0.0431	0.0356	6.0000e-005		2.5200e-003	2.5200e-003		2.3400e-003	2.3400e-003	0.0000	4.7818	4.7818	1.3500e-003	0.0000	4.8101
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.5500e-003**	**0.0431**	**0.0356**	**6.0000e-005**		**2.5200e-003**	**2.5200e-003**		**2.3400e-003**	**2.3400e-003**	**0.0000**	**4.7818**	**4.7818**	**1.3500e-003**	**0.0000**	**4.8101**

3.4 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	4.0000e-004	3.8100e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.6862	0.6862	3.0000e-005	0.0000	0.6869
Total	**2.7000e-004**	**4.0000e-004**	**3.8100e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.2000e-004**	**2.2000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.6862**	**0.6862**	**3.0000e-005**	**0.0000**	**0.6869**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.5500e-003	0.0431	0.0356	6.0000e-005		2.5200e-003	2.5200e-003		2.3400e-003	2.3400e-003	0.0000	4.7818	4.7818	1.3500e-003	0.0000	4.8101
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.5500e-003**	**0.0431**	**0.0356**	**6.0000e-005**		**2.5200e-003**	**2.5200e-003**		**2.3400e-003**	**2.3400e-003**	**0.0000**	**4.7818**	**4.7818**	**1.3500e-003**	**0.0000**	**4.8101**

3.4 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	4.0000e-004	3.8100e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.6862	0.6862	3.0000e-005	0.0000	0.6869
Total	**2.7000e-004**	**4.0000e-004**	**3.8100e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.2000e-004**	**2.2000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.6862**	**0.6862**	**3.0000e-005**	**0.0000**	**0.6869**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0324					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.2400e-003	0.0150	0.0139	2.0000e-005		1.1300e-003	1.1300e-003		1.1300e-003	1.1300e-003	0.0000	1.9149	1.9149	1.8000e-004	0.0000	1.9188
Total	**0.0347**	**0.0150**	**0.0139**	**2.0000e-005**		**1.1300e-003**	**1.1300e-003**		**1.1300e-003**	**1.1300e-003**	**0.0000**	**1.9149**	**1.9149**	**1.8000e-004**	**0.0000**	**1.9188**

3.5 Architectural Coating - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	3.0000e-005	3.2000e-004	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0572	0.0572	0.0000	0.0000	0.0573
Total	**2.0000e-005**	**3.0000e-005**	**3.2000e-004**	**0.0000**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0572**	**0.0572**	**0.0000**	**0.0000**	**0.0573**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0324					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.2400e-003	0.0150	0.0139	2.0000e-005		1.1300e-003	1.1300e-003		1.1300e-003	1.1300e-003	0.0000	1.9149	1.9149	1.8000e-004	0.0000	1.9188
Total	**0.0347**	**0.0150**	**0.0139**	**2.0000e-005**		**1.1300e-003**	**1.1300e-003**		**1.1300e-003**	**1.1300e-003**	**0.0000**	**1.9149**	**1.9149**	**1.8000e-004**	**0.0000**	**1.9188**

3.5 Architectural Coating - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	3.0000e-005	3.2000e-004	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0572	0.0572	0.0000	0.0000	0.0573
Total	**2.0000e-005**	**3.0000e-005**	**3.2000e-004**	**0.0000**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0572**	**0.0572**	**0.0000**	**0.0000**	**0.0573**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0279	0.0747	0.3099	5.0000e-004	0.0356	1.1000e-003	0.0367	9.5400e-003	1.0100e-003	0.0106	0.0000	42.2920	42.2920	2.0800e-003	0.0000	42.3356
Unmitigated	0.0279	0.0747	0.3099	5.0000e-004	0.0356	1.1000e-003	0.0367	9.5400e-003	1.0100e-003	0.0106	0.0000	42.2920	42.2920	2.0800e-003	0.0000	42.3356

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	43.35	8.21	4.23	95,596	95,596
Total	43.35	8.21	4.23	95,596	95,596

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546249	0.062948	0.174600	0.125189	0.034587	0.004960	0.015036	0.022157	0.002053	0.003311	0.006538	0.000702	0.001670

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	14.9643	14.9643	6.8000e-004	1.4000e-004	15.0219
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	14.9643	14.9643	6.8000e-004	1.4000e-004	15.0219
NaturalGas Mitigated	8.6000e-004	7.8300e-003	6.5800e-003	5.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	8.5238	8.5238	1.6000e-004	1.6000e-004	8.5757
NaturalGas Unmitigated	8.6000e-004	7.8300e-003	6.5800e-003	5.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	8.5238	8.5238	1.6000e-004	1.6000e-004	8.5757

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	159730	8.6000e-004	7.8300e-003	6.5800e-003	5.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	8.5238	8.5238	1.6000e-004	1.6000e-004	8.5757
Total		**8.6000e-004**	**7.8300e-003**	**6.5800e-003**	**5.0000e-005**		**6.0000e-004**	**6.0000e-004**		**6.0000e-004**	**6.0000e-004**	**0.0000**	**8.5238**	**8.5238**	**1.6000e-004**	**1.6000e-004**	**8.5757**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	159730	8.6000e-004	7.8300e-003	6.5800e-003	5.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	8.5238	8.5238	1.6000e-004	1.6000e-004	8.5757
Total		**8.6000e-004**	**7.8300e-003**	**6.5800e-003**	**5.0000e-005**		**6.0000e-004**	**6.0000e-004**		**6.0000e-004**	**6.0000e-004**	**0.0000**	**8.5238**	**8.5238**	**1.6000e-004**	**1.6000e-004**	**8.5757**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	51439.4	14.9643	6.8000e-004	1.4000e-004	15.0219
Total		**14.9643**	**6.8000e-004**	**1.4000e-004**	**15.0219**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	51439.4	14.9643	6.8000e-004	1.4000e-004	15.0219
Total		**14.9643**	**6.8000e-004**	**1.4000e-004**	**15.0219**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0275	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.2000e-004
Unmitigated	0.0275	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.2000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.2400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0243					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.2000e-004
Total	**0.0275**	**0.0000**	**6.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.2000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.2400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0243					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.2000e-004
Total	**0.0275**	**0.0000**	**6.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	2.7205	0.0470	1.1300e-003	4.0558
Unmitigated	2.7205	0.0470	1.1300e-003	4.0566

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	1.43838 / 0	2.7205	0.0470	1.1300e-003	4.0566
Total		**2.7205**	**0.0470**	**1.1300e-003**	**4.0566**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	1.43838 / 0	2.7205	0.0470	1.1300e-003	4.0558
Total		**2.7205**	**0.0470**	**1.1300e-003**	**4.0558**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	1.5651	0.0925	0.0000	3.5074
Unmitigated	1.5651	0.0925	0.0000	3.5074

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	7.71	1.5651	0.0925	0.0000	3.5074
Total		**1.5651**	**0.0925**	**0.0000**	**3.5074**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	7.71	1.5651	0.0925	0.0000	3.5074
Total		**1.5651**	**0.0925**	**0.0000**	**3.5074**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

WBSD_RecycledWaterTreatmentPlant&PS

Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	6.22	1000sqft	0.14	6,220.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Based on Malibu EIR, proportionally increased based on number of truck trips
For Paving/Architectural Coating assumed ~Malibu

Off-road Equipment - PWP RW Equipment Schedule

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Based on Malibu, included here instead of a Site Preparation Phase

Off-road Equipment -

Trips and VMT - Based on Project Description

Grading - Based on Project Description

Vehicle Trips - Based on Project Description

Consumer Products - No consumer products anticipated to be used on site

Area Coating -

Landscape Equipment - No landscaping equipment will be associated with the plant, area will be completeley paved

Water And Wastewater - Site may not have potable water hook-up, backwashing will used recycled water permeate. Potable water uses, if any, should be neglibible for this scale analysis.

Solid Waste - 169 tons total, adjusted for a per 1000 sqft metric

Land Use Change -

Construction Off-road Equipment Mitigation - Mitigation was not assessed in this analysis.

Operational Off-Road Equipment - None

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	250
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	250
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	5.00	15.00
tblConstructionPhase	NumDays	100.00	215.00
tblConstructionPhase	NumDays	2.00	42.00
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	PhaseEndDate	7/31/2018	7/30/2018
tblConstructionPhase	PhaseStartDate	7/11/2018	7/10/2018
tblGrading	AcresOfGrading	0.00	0.48
tblGrading	MaterialExported	0.00	11,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripNumber	1,375.00	1,100.00
tblTripsAndVMT	WorkerTripNumber	13.00	10.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	2.1367	20.6833	19.2767	0.0367	0.6282	0.9657	1.5939	0.1755	0.9129	1.0884	0.0000	3,620.4638	3,620.4638	0.3765	0.0000	3,628.3700
2018	5.5933	11.0547	9.8118	0.0161	0.1792	0.7069	0.8360	0.0475	0.6504	0.6674	0.0000	1,493.9320	1,493.9320	0.3564	0.0000	1,501.4167
Total	**7.7300**	**31.7379**	**29.0885**	**0.0528**	**0.8074**	**1.6726**	**2.4299**	**0.2230**	**1.5633**	**1.7557**	**0.0000**	**5,114.3958**	**5,114.3958**	**0.7329**	**0.0000**	**5,129.7867**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	2.1367	20.6833	19.2767	0.0367	0.6282	0.9657	1.5939	0.1755	0.9129	1.0884	0.0000	3,620.4638	3,620.4638	0.3765	0.0000	3,628.3700
2018	5.5933	11.0547	9.8118	0.0161	0.1792	0.7069	0.8360	0.0475	0.6504	0.6674	0.0000	1,493.9320	1,493.9320	0.3564	0.0000	1,501.4167
Total	**7.7300**	**31.7379**	**29.0885**	**0.0528**	**0.8074**	**1.6726**	**2.4299**	**0.2230**	**1.5633**	**1.7557**	**0.0000**	**5,114.3958**	**5,114.3958**	**0.7329**	**0.0000**	**5,129.7867**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1510	1.0000e-005	6.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.3600e-003	1.3600e-003	0.0000		1.4500e-003
Energy	4.7200e-003	0.0429	0.0360	2.6000e-004		3.2600e-003	3.2600e-003		3.2600e-003	3.2600e-003		51.4842	51.4842	9.9000e-004	9.4000e-004	51.7975
Mobile	0.2193	0.5669	2.4414	3.6500e-003	0.2687	8.0700e-003	0.2768	0.0719	7.4100e-003	0.0793		337.0459	337.0459	0.0167		337.3965
Total	**0.3750**	**0.6098**	**2.4781**	**3.9100e-003**	**0.2687**	**0.0113**	**0.2800**	**0.0719**	**0.0107**	**0.0825**		**388.5314**	**388.5314**	**0.0177**	**9.4000e-004**	**389.1955**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1510	1.0000e-005	6.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.3600e-003	1.3600e-003	0.0000		1.4500e-003
Energy	4.7200e-003	0.0429	0.0360	2.6000e-004		3.2600e-003	3.2600e-003		3.2600e-003	3.2600e-003		51.4842	51.4842	9.9000e-004	9.4000e-004	51.7975
Mobile	0.2193	0.5669	2.4414	3.6500e-003	0.2687	8.0700e-003	0.2768	0.0719	7.4100e-003	0.0793		337.0459	337.0459	0.0167		337.3965
Total	**0.3750**	**0.6098**	**2.4781**	**3.9100e-003**	**0.2687**	**0.0113**	**0.2800**	**0.0719**	**0.0107**	**0.0825**		**388.5314**	**388.5314**	**0.0177**	**9.4000e-004**	**389.1955**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	7/3/2017	8/29/2017	5	42	
2	Building Construction	Building Construction	8/30/2017	6/26/2018	5	215	
3	Paving	Paving	6/27/2018	7/10/2018	5	10	
4	Architectural Coating	Architectural Coating	7/10/2018	7/30/2018	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.48

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 9,330; Non-Residential Outdoor: 3,110 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	6.00	162	0.38
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	5	10.00	0.00	1,100.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	3.00	1.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0776	0.0000	0.0776	0.0255	0.0000	0.0255			0.0000			0.0000
Off-Road	1.4765	13.4887	11.1483	0.0160		0.8748	0.8748		0.8294	0.8294		1,589.7595	1,589.7595	0.3577		1,597.2702
Total	**1.4765**	**13.4887**	**11.1483**	**0.0160**	**0.0776**	**0.8748**	**0.9524**	**0.0255**	**0.8294**	**0.8549**		**1,589.7595**	**1,589.7595**	**0.3577**		**1,597.2702**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6240	7.1407	7.6369	0.0196	0.4564	0.0901	0.5465	0.1250	0.0829	0.2078		1,944.1946	1,944.1946	0.0143		1,944.4942
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.6601**	**7.1946**	**8.1285**	**0.0207**	**0.5507**	**0.0909**	**0.6415**	**0.1500**	**0.0836**	**0.2335**		**2,030.7043**	**2,030.7043**	**0.0188**		**2,031.0998**

3.2 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0776	0.0000	0.0776	0.0255	0.0000	0.0255			0.0000			0.0000
Off-Road	1.4765	13.4887	11.1483	0.0160		0.8748	0.8748		0.8294	0.8294	0.0000	1,589.7595	1,589.7595	0.3577		1,597.2702
Total	**1.4765**	**13.4887**	**11.1483**	**0.0160**	**0.0776**	**0.8748**	**0.9524**	**0.0255**	**0.8294**	**0.8549**	**0.0000**	**1,589.7595**	**1,589.7595**	**0.3577**		**1,597.2702**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6240	7.1407	7.6369	0.0196	0.4564	0.0901	0.5465	0.1250	0.0829	0.2078		1,944.1946	1,944.1946	0.0143		1,944.4942
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.6601**	**7.1946**	**8.1285**	**0.0207**	**0.5507**	**0.0909**	**0.6415**	**0.1500**	**0.0836**	**0.2335**		**2,030.7043**	**2,030.7043**	**0.0188**		**2,031.0998**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2740	12.6738	8.0395	0.0113		0.8553	0.8553		0.7869	0.7869		1,159.5310	1,159.5310	0.3553		1,166.9919
Total	**1.2740**	**12.6738**	**8.0395**	**0.0113**		**0.8553**	**0.8553**		**0.7869**	**0.7869**		**1,159.5310**	**1,159.5310**	**0.3553**		**1,166.9919**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.0909	0.1699	2.4000e-004	6.6500e-003	1.3000e-003	7.9500e-003	1.9000e-003	1.2000e-003	3.0900e-003		23.3316	23.3316	1.8000e-004		23.3354
Worker	0.0108	0.0161	0.1475	3.2000e-004	0.0283	2.2000e-004	0.0285	7.5000e-003	2.0000e-004	7.7000e-003		25.9529	25.9529	1.3700e-003		25.9817
Total	**0.0238**	**0.1071**	**0.3174**	**5.6000e-004**	**0.0349**	**1.5200e-003**	**0.0365**	**9.4000e-003**	**1.4000e-003**	**0.0108**		**49.2845**	**49.2845**	**1.5500e-003**		**49.3171**

3.3 Building Construction - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2740	12.6738	8.0395	0.0113		0.8553	0.8553		0.7869	0.7869	0.0000	1,159.5310	1,159.5310	0.3553		1,166.9919
Total	**1.2740**	**12.6738**	**8.0395**	**0.0113**		**0.8553**	**0.8553**		**0.7869**	**0.7869**	**0.0000**	**1,159.5310**	**1,159.5310**	**0.3553**		**1,166.9919**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.0909	0.1699	2.4000e-004	6.6500e-003	1.3000e-003	7.9500e-003	1.9000e-003	1.2000e-003	3.0900e-003		23.3316	23.3316	1.8000e-004		23.3354
Worker	0.0108	0.0161	0.1475	3.2000e-004	0.0283	2.2000e-004	0.0285	7.5000e-003	2.0000e-004	7.7000e-003		25.9529	25.9529	1.3700e-003		25.9817
Total	**0.0238**	**0.1071**	**0.3174**	**5.6000e-004**	**0.0349**	**1.5200e-003**	**0.0365**	**9.4000e-003**	**1.4000e-003**	**0.0108**		**49.2845**	**49.2845**	**1.5500e-003**		**49.3171**

3.3 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0786	10.9578	7.7239	0.0113		0.7055	0.7055		0.6491	0.6491		1,140.2487	1,140.2487	0.3550		1,147.7032
Total	**1.0786**	**10.9578**	**7.7239**	**0.0113**		**0.7055**	**0.7055**		**0.6491**	**0.6491**		**1,140.2487**	**1,140.2487**	**0.3550**		**1,147.7032**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0114	0.0823	0.1599	2.4000e-004	6.6500e-003	1.2000e-003	7.8500e-003	1.9000e-003	1.1100e-003	3.0100e-003		22.9213	22.9213	1.8000e-004		22.9251
Worker	9.6400e-003	0.0145	0.1314	3.2000e-004	0.0283	2.1000e-004	0.0285	7.5000e-003	1.9000e-004	7.7000e-003		24.9898	24.9898	1.2600e-003		25.0163
Total	**0.0210**	**0.0969**	**0.2913**	**5.6000e-004**	**0.0349**	**1.4100e-003**	**0.0364**	**9.4000e-003**	**1.3000e-003**	**0.0107**		**47.9111**	**47.9111**	**1.4400e-003**		**47.9414**

3.3 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0786	10.9578	7.7239	0.0113		0.7055	0.7055		0.6491	0.6491	0.0000	1,140.2487	1,140.2487	0.3550		1,147.7032
Total	**1.0786**	**10.9578**	**7.7239**	**0.0113**		**0.7055**	**0.7055**		**0.6491**	**0.6491**	**0.0000**	**1,140.2487**	**1,140.2487**	**0.3550**		**1,147.7032**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0114	0.0823	0.1599	2.4000e-004	6.6500e-003	1.2000e-003	7.8500e-003	1.9000e-003	1.1100e-003	3.0100e-003		22.9213	22.9213	1.8000e-004		22.9251
Worker	9.6400e-003	0.0145	0.1314	3.2000e-004	0.0283	2.1000e-004	0.0285	7.5000e-003	1.9000e-004	7.7000e-003		24.9898	24.9898	1.2600e-003		25.0163
Total	**0.0210**	**0.0969**	**0.2913**	**5.6000e-004**	**0.0349**	**1.4100e-003**	**0.0364**	**9.4000e-003**	**1.3000e-003**	**0.0107**		**47.9111**	**47.9111**	**1.4400e-003**		**47.9414**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9092	8.6233	7.1255	0.0111		0.5050	0.5050		0.4681	0.4681		1,054.2145	1,054.2145	0.2968		1,060.4462
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9092**	**8.6233**	**7.1255**	**0.0111**		**0.5050**	**0.5050**		**0.4681**	**0.4681**		**1,054.2145**	**1,054.2145**	**0.2968**		**1,060.4462**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0578	0.0872	0.7882	1.9300e-003	0.1698	1.2600e-003	0.1710	0.0450	1.1600e-003	0.0462		149.9390	149.9390	7.5600e-003		150.0977
Total	**0.0578**	**0.0872**	**0.7882**	**1.9300e-003**	**0.1698**	**1.2600e-003**	**0.1710**	**0.0450**	**1.1600e-003**	**0.0462**		**149.9390**	**149.9390**	**7.5600e-003**		**150.0977**

3.4 Paving - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9092	8.6233	7.1255	0.0111		0.5050	0.5050		0.4681	0.4681	0.0000	1,054.2145	1,054.2145	0.2968		1,060.4462
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9092**	**8.6233**	**7.1255**	**0.0111**		**0.5050**	**0.5050**		**0.4681**	**0.4681**	**0.0000**	**1,054.2145**	**1,054.2145**	**0.2968**		**1,060.4462**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0578	0.0872	0.7882	1.9300e-003	0.1698	1.2600e-003	0.1710	0.0450	1.1600e-003	0.0462		149.9390	149.9390	7.5600e-003		150.0977
Total	**0.0578**	**0.0872**	**0.7882**	**1.9300e-003**	**0.1698**	**1.2600e-003**	**0.1710**	**0.0450**	**1.1600e-003**	**0.0462**		**149.9390**	**149.9390**	**7.5600e-003**		**150.0977**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	4.3245					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.0102
Total	**4.6231**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.0102**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	3.2100e-003	4.8500e-003	0.0438	1.1000e-004	9.4300e-003	7.0000e-005	9.5000e-003	2.5000e-003	6.0000e-005	2.5700e-003		8.3299	8.3299	4.2000e-004		8.3388
Total	**3.2100e-003**	**4.8500e-003**	**0.0438**	**1.1000e-004**	**9.4300e-003**	**7.0000e-005**	**9.5000e-003**	**2.5000e-003**	**6.0000e-005**	**2.5700e-003**		**8.3299**	**8.3299**	**4.2000e-004**		**8.3388**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	4.3245					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506	0.0000	281.4485	281.4485	0.0267		282.0102
Total	**4.6231**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**	**0.0000**	**281.4485**	**281.4485**	**0.0267**		**282.0102**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	3.2100e-003	4.8500e-003	0.0438	1.1000e-004	9.4300e-003	7.0000e-005	9.5000e-003	2.5000e-003	6.0000e-005	2.5700e-003		8.3299	8.3299	4.2000e-004		8.3388
Total	**3.2100e-003**	**4.8500e-003**	**0.0438**	**1.1000e-004**	**9.4300e-003**	**7.0000e-005**	**9.5000e-003**	**2.5000e-003**	**6.0000e-005**	**2.5700e-003**		**8.3299**	**8.3299**	**4.2000e-004**		**8.3388**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2193	0.5669	2.4414	3.6500e-003	0.2687	8.0700e-003	0.2768	0.0719	7.4100e-003	0.0793		337.0459	337.0459	0.0167		337.3965
Unmitigated	0.2193	0.5669	2.4414	3.6500e-003	0.2687	8.0700e-003	0.2768	0.0719	7.4100e-003	0.0793		337.0459	337.0459	0.0167		337.3965

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	43.35	8.21	4.23	95,596	95,596
Total	43.35	8.21	4.23	95,596	95,596

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546249	0.062948	0.174600	0.125189	0.034587	0.004960	0.015036	0.022157	0.002053	0.003311	0.006538	0.000702	0.001670

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	4.7200e-003	0.0429	0.0360	2.6000e-004		3.2600e-003	3.2600e-003		3.2600e-003	3.2600e-003		51.4842	51.4842	9.9000e-004	9.4000e-004	51.7975
NaturalGas Unmitigated	4.7200e-003	0.0429	0.0360	2.6000e-004		3.2600e-003	3.2600e-003		3.2600e-003	3.2600e-003		51.4842	51.4842	9.9000e-004	9.4000e-004	51.7975

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	437.615	4.7200e-003	0.0429	0.0360	2.6000e-004		3.2600e-003	3.2600e-003		3.2600e-003	3.2600e-003		51.4842	51.4842	9.9000e-004	9.4000e-004	51.7975
Total		**4.7200e-003**	**0.0429**	**0.0360**	**2.6000e-004**		**3.2600e-003**	**3.2600e-003**		**3.2600e-003**	**3.2600e-003**		**51.4842**	**51.4842**	**9.9000e-004**	**9.4000e-004**	**51.7975**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0.437615	4.7200e-003	0.0429	0.0360	2.6000e-004		3.2600e-003	3.2600e-003		3.2600e-003	3.2600e-003		51.4842	51.4842	9.9000e-004	9.4000e-004	51.7975
Total		**4.7200e-003**	**0.0429**	**0.0360**	**2.6000e-004**		**3.2600e-003**	**3.2600e-003**		**3.2600e-003**	**3.2600e-003**		**51.4842**	**51.4842**	**9.9000e-004**	**9.4000e-004**	**51.7975**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1510	1.0000e-005	6.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.3600e-003	1.3600e-003	0.0000		1.4500e-003
Unmitigated	0.1510	1.0000e-005	6.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.3600e-003	1.3600e-003	0.0000		1.4500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0178					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1331					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	7.0000e-005	1.0000e-005	6.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.3600e-003	1.3600e-003	0.0000		1.4500e-003
Total	**0.1510**	**1.0000e-005**	**6.6000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.3600e-003**	**1.3600e-003**	**0.0000**		**1.4500e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0178					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1331					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	7.0000e-005	1.0000e-005	6.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.3600e-003	1.3600e-003	0.0000		1.4500e-003
Total	**0.1510**	**1.0000e-005**	**6.6000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.3600e-003**	**1.3600e-003**	**0.0000**		**1.4500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

WBSD_PumpWW

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	0.00	200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total footprint of 136 SF based on Project Description for pumpstation and valve box, assume more space will be excavated to accomodate construction

Construction Phase - Based on Project Description

Off-road Equipment - PWP RW Equipment Schedule

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Based on Pasadena

Grading - Based on Project Description

Vehicle Trips - Based on Project Description

Vechicle Emission Factors -

Vechicle Emission Factors -

Vechicle Emission Factors -

Consumer Products - Operational emission not assessed in this analysis

Area Coating - Assume pump and pipes are painted and will require reapplication of paint

Landscape Equipment - no operation emission considered

Water And Wastewater - no operation emission considered

Solid Waste - no operation emission considered

Construction Off-road Equipment Mitigation - Mitigation was not assessed in this analysis.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Interior	300	100
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	250
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	250
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	0.00	80.00
tblConstructionPhase	NumDays	0.00	30.00
tblConstructionPhase	NumDays	0.00	5.00
tblConstructionPhase	NumDays	0.00	5.00
tblGrading	AcresOfGrading	0.00	0.05
tblGrading	AcresOfGrading	2.50	0.05
tblGrading	MaterialExported	0.00	40.00
tblLandUse	LandUseSquareFeet	0.00	200.00
tblProjectCharacteristics	OperationalYear	2014	2018
tblTripsAndVMT	HaulingTripNumber	5.00	4.00
tblTripsAndVMT	WorkerTripNumber	5.00	10.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	18.00	10.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.0769	0.7239	0.5154	7.5000e-004	0.0168	0.0486	0.0654	7.6700e-003	0.0451	0.0528	0.0000	67.6635	67.6635	0.0177	0.0000	68.0343
Total	**0.0769**	**0.7239**	**0.5154**	**7.5000e-004**	**0.0168**	**0.0486**	**0.0654**	**7.6700e-003**	**0.0451**	**0.0528**	**0.0000**	**67.6635**	**67.6635**	**0.0177**	**0.0000**	**68.0343**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.0769	0.7239	0.5154	7.5000e-004	0.0168	0.0486	0.0654	7.6700e-003	0.0451	0.0528	0.0000	67.6635	67.6635	0.0177	0.0000	68.0342
Total	**0.0769**	**0.7239**	**0.5154**	**7.5000e-004**	**0.0168**	**0.0486**	**0.0654**	**7.6700e-003**	**0.0451**	**0.0528**	**0.0000**	**67.6635**	**67.6635**	**0.0177**	**0.0000**	**68.0342**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	8.4000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.4000e-004**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	8.4000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.4000e-004**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	7/3/2017	7/7/2017	5	5	
2	Grading	Grading	7/8/2017	8/18/2017	5	30	
3	Building Construction	Building Construction	8/19/2017	12/8/2017	5	80	
4	Paving	Paving	12/9/2017	12/15/2017	5	5	

Acres of Grading (Site Preparation Phase): 0.05

Acres of Grading (Grading Phase): 0.05

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	174	0.41
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	2	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	4.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.1700e-003	0.0317	0.0181	2.0000e-005		1.9300e-003	1.9300e-003		1.7700e-003	1.7700e-003	0.0000	2.1679	2.1679	6.6000e-004	0.0000	2.1818
Total	**3.1700e-003**	**0.0317**	**0.0181**	**2.0000e-005**	**3.0000e-005**	**1.9300e-003**	**1.9600e-003**	**0.0000**	**1.7700e-003**	**1.7700e-003**	**0.0000**	**2.1679**	**2.1679**	**6.6000e-004**	**0.0000**	**2.1818**

3.2 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	1.2000e-004	1.1800e-003	0.0000	2.3000e-004	0.0000	2.3000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1980	0.1980	1.0000e-005	0.0000	0.1982
Total	**8.0000e-005**	**1.2000e-004**	**1.1800e-003**	**0.0000**	**2.3000e-004**	**0.0000**	**2.3000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.1980**	**0.1980**	**1.0000e-005**	**0.0000**	**0.1982**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.1700e-003	0.0317	0.0181	2.0000e-005		1.9300e-003	1.9300e-003		1.7700e-003	1.7700e-003	0.0000	2.1679	2.1679	6.6000e-004	0.0000	2.1818
Total	**3.1700e-003**	**0.0317**	**0.0181**	**2.0000e-005**	**3.0000e-005**	**1.9300e-003**	**1.9600e-003**	**0.0000**	**1.7700e-003**	**1.7700e-003**	**0.0000**	**2.1679**	**2.1679**	**6.6000e-004**	**0.0000**	**2.1818**

3.2 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr									MT/yr		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	1.2000e-004	1.1800e-003	0.0000	2.3000e-004	0.0000	2.3000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1980	0.1980	1.0000e-005	0.0000	0.1982
Total	**8.0000e-005**	**1.2000e-004**	**1.1800e-003**	**0.0000**	**2.3000e-004**	**0.0000**	**2.3000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.1980**	**0.1980**	**1.0000e-005**	**0.0000**	**0.1982**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr									MT/yr		
Fugitive Dust					0.0113	0.0000	0.0113	6.2100e-003	0.0000	6.2100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0181	0.1571	0.1287	1.8000e-004		0.0109	0.0109		0.0104	0.0104	0.0000	16.1091	16.1091	3.1700e-003	0.0000	16.1757
Total	**0.0181**	**0.1571**	**0.1287**	**1.8000e-004**	**0.0113**	**0.0109**	**0.0222**	**6.2100e-003**	**0.0104**	**0.0166**	**0.0000**	**16.1091**	**16.1091**	**3.1700e-003**	**0.0000**	**16.1757**

3.3 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr									MT/yr		
Hauling	4.0000e-005	5.4000e-004	4.9000e-004	0.0000	3.0000e-005	1.0000e-005	4.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.1349	0.1349	0.0000	0.0000	0.1349
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-004	7.4000e-004	7.1000e-003	2.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1878	1.1878	6.0000e-005	0.0000	1.1891
Total	**5.4000e-004**	**1.2800e-003**	**7.5900e-003**	**2.0000e-005**	**1.3900e-003**	**2.0000e-005**	**1.4100e-003**	**3.7000e-004**	**2.0000e-005**	**3.9000e-004**	**0.0000**	**1.3226**	**1.3226**	**6.0000e-005**	**0.0000**	**1.3240**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr									MT/yr		
Fugitive Dust					0.0113	0.0000	0.0113	6.2100e-003	0.0000	6.2100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0181	0.1571	0.1287	1.8000e-004		0.0109	0.0109		0.0104	0.0104	0.0000	16.1090	16.1090	3.1700e-003	0.0000	16.1757
Total	**0.0181**	**0.1571**	**0.1287**	**1.8000e-004**	**0.0113**	**0.0109**	**0.0222**	**6.2100e-003**	**0.0104**	**0.0166**	**0.0000**	**16.1090**	**16.1090**	**3.1700e-003**	**0.0000**	**16.1757**

3.3 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	5.4000e-004	4.9000e-004	0.0000	3.0000e-005	1.0000e-005	4.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.1349	0.1349	0.0000	0.0000	0.1349
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-004	7.4000e-004	7.1000e-003	2.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1878	1.1878	6.0000e-005	0.0000	1.1891
Total	**5.4000e-004**	**1.2800e-003**	**7.5900e-003**	**2.0000e-005**	**1.3900e-003**	**2.0000e-005**	**1.4100e-003**	**3.7000e-004**	**2.0000e-005**	**3.9000e-004**	**0.0000**	**1.3226**	**1.3226**	**6.0000e-005**	**0.0000**	**1.3240**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0510	0.5070	0.3216	4.5000e-004		0.0342	0.0342		0.0315	0.0315	0.0000	42.0764	42.0764	0.0129	0.0000	42.3471
Total	**0.0510**	**0.5070**	**0.3216**	**4.5000e-004**		**0.0342**	**0.0342**		**0.0315**	**0.0315**	**0.0000**	**42.0764**	**42.0764**	**0.0129**	**0.0000**	**42.3471**

3.4 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3500e-003	1.9700e-003	0.0189	4.0000e-005	3.6300e-003	3.0000e-005	3.6600e-003	9.7000e-004	3.0000e-005	9.9000e-004	0.0000	3.1674	3.1674	1.7000e-004	0.0000	3.1709
Total	**1.3500e-003**	**1.9700e-003**	**0.0189**	**4.0000e-005**	**3.6300e-003**	**3.0000e-005**	**3.6600e-003**	**9.7000e-004**	**3.0000e-005**	**9.9000e-004**	**0.0000**	**3.1674**	**3.1674**	**1.7000e-004**	**0.0000**	**3.1709**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0510	0.5070	0.3216	4.5000e-004		0.0342	0.0342		0.0315	0.0315	0.0000	42.0763	42.0763	0.0129	0.0000	42.3470
Total	**0.0510**	**0.5070**	**0.3216**	**4.5000e-004**		**0.0342**	**0.0342**		**0.0315**	**0.0315**	**0.0000**	**42.0763**	**42.0763**	**0.0129**	**0.0000**	**42.3470**

3.4 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3500e-003	1.9700e-003	0.0189	4.0000e-005	3.6300e-003	3.0000e-005	3.6600e-003	9.7000e-004	3.0000e-005	9.9000e-004	0.0000	3.1674	3.1674	1.7000e-004	0.0000	3.1709
Total	**1.3500e-003**	**1.9700e-003**	**0.0189**	**4.0000e-005**	**3.6300e-003**	**3.0000e-005**	**3.6600e-003**	**9.7000e-004**	**3.0000e-005**	**9.9000e-004**	**0.0000**	**3.1674**	**3.1674**	**1.7000e-004**	**0.0000**	**3.1709**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.6000e-003	0.0246	0.0181	3.0000e-005		1.5000e-003	1.5000e-003		1.3900e-003	1.3900e-003	0.0000	2.4243	2.4243	6.7000e-004	0.0000	2.4384
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.6000e-003**	**0.0246**	**0.0181**	**3.0000e-005**		**1.5000e-003**	**1.5000e-003**		**1.3900e-003**	**1.3900e-003**	**0.0000**	**2.4243**	**2.4243**	**6.7000e-004**	**0.0000**	**2.4384**

3.5 Paving - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	1.2000e-004	1.1800e-003	0.0000	2.3000e-004	0.0000	2.3000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1980	0.1980	1.0000e-005	0.0000	0.1982
Total	**8.0000e-005**	**1.2000e-004**	**1.1800e-003**	**0.0000**	**2.3000e-004**	**0.0000**	**2.3000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.1980**	**0.1980**	**1.0000e-005**	**0.0000**	**0.1982**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.6000e-003	0.0246	0.0181	3.0000e-005		1.5000e-003	1.5000e-003		1.3900e-003	1.3900e-003	0.0000	2.4243	2.4243	6.7000e-004	0.0000	2.4384
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.6000e-003**	**0.0246**	**0.0181**	**3.0000e-005**		**1.5000e-003**	**1.5000e-003**		**1.3900e-003**	**1.3900e-003**	**0.0000**	**2.4243**	**2.4243**	**6.7000e-004**	**0.0000**	**2.4384**

3.5 Paving - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	1.2000e-004	1.1800e-003	0.0000	2.3000e-004	0.0000	2.3000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1980	0.1980	1.0000e-005	0.0000	0.1982
Total	**8.0000e-005**	**1.2000e-004**	**1.1800e-003**	**0.0000**	**2.3000e-004**	**0.0000**	**2.3000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.1980**	**0.1980**	**1.0000e-005**	**0.0000**	**0.1982**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546229	0.063048	0.174586	0.122573	0.033968	0.004845	0.015596	0.024745	0.002089	0.003270	0.006707	0.000678	0.001667

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

Land Use	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

Land Use	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

Land Use	Electricity Use	Total CO2	CH4	N2O	CO2e
	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	8.4000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	8.4000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.0000e-005					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.8000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**8.4000e-004**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.0000e-005					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.8000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**8.4000e-004**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

WBSD_PumpWW

Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	0.00	200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total footprint of 136 SF based on Project Description for pumpstation and valve box, assume more space will be excavated to accomodate construction

Construction Phase - Based on Project Description

Off-road Equipment - PWP RW Equipment Schedule

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Based on Pasadena

Grading - Based on Project Description

Vehicle Trips - Based on Project Description

Vechicle Emission Factors -

Vechicle Emission Factors -

Vechicle Emission Factors -

Consumer Products - Operational emission not assessed in this analysis

Area Coating - Assume pump and pipes are painted and will require reapplication of paint

Landscape Equipment - no operation emission considered

Water And Wastewater - no operation emission considered

Solid Waste - no operation emission considered

Construction Off-road Equipment Mitigation - Mitigation was not assessed in this analysis.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Interior	300	100
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	250
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	250
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	0.00	80.00
tblConstructionPhase	NumDays	0.00	30.00
tblConstructionPhase	NumDays	0.00	5.00
tblConstructionPhase	NumDays	0.00	5.00
tblGrading	AcresOfGrading	0.00	0.05
tblGrading	AcresOfGrading	2.50	0.05
tblGrading	MaterialExported	0.00	40.00
tblLandUse	LandUseSquareFeet	0.00	200.00
tblProjectCharacteristics	OperationalYear	2014	2018
tblTripsAndVMT	HaulingTripNumber	5.00	4.00
tblTripsAndVMT	WorkerTripNumber	5.00	10.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	18.00	10.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	1.3101	12.7390	9.1129	0.0132	0.8513	0.8561	1.5791	0.4396	0.7876	1.1337	0.0000	1,280.2206	1,280.2206	0.3598	0.0000	1,287.7774
Total	**1.3101**	**12.7390**	**9.1129**	**0.0132**	**0.8513**	**0.8561**	**1.5791**	**0.4396**	**0.7876**	**1.1337**	**0.0000**	**1,280.2206**	**1,280.2206**	**0.3598**	**0.0000**	**1,287.7774**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	1.3101	12.7390	9.1129	0.0132	0.8513	0.8561	1.5791	0.4396	0.7876	1.1337	0.0000	1,280.2206	1,280.2206	0.3598	0.0000	1,287.7774
Total	**1.3101**	**12.7390**	**9.1129**	**0.0132**	**0.8513**	**0.8561**	**1.5791**	**0.4396**	**0.7876**	**1.1337**	**0.0000**	**1,280.2206**	**1,280.2206**	**0.3598**	**0.0000**	**1,287.7774**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.6100e-003	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**4.6100e-003**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.6100e-003	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**4.6100e-003**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	7/3/2017	7/7/2017	5	5	
2	Grading	Grading	7/8/2017	8/18/2017	5	30	
3	Building Construction	Building Construction	8/19/2017	12/8/2017	5	80	
4	Paving	Paving	12/9/2017	12/15/2017	5	5	

Acres of Grading (Site Preparation Phase): 0.05

Acres of Grading (Grading Phase): 0.05

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	174	0.41
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	2	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	4.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0106	0.0000	0.0106	1.1500e-003	0.0000	1.1500e-003			0.0000			0.0000
Off-Road	1.2694	12.6852	7.2319	9.3300e-003		0.7705	0.7705		0.7089	0.7089		955.8663	955.8663	0.2929		962.0167
Total	**1.2694**	**12.6852**	**7.2319**	**9.3300e-003**	**0.0106**	**0.7705**	**0.7811**	**1.1500e-003**	**0.7089**	**0.7100**		**955.8663**	**955.8663**	**0.2929**		**962.0167**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0361**	**0.0538**	**0.4915**	**1.0700e-003**	**0.0943**	**7.2000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**86.5098**	**86.5098**	**4.5700e-003**		**86.6057**

3.2 Site Preparation - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Fugitive Dust					0.0106	0.0000	0.0106	1.1500e-003	0.0000	1.1500e-003			0.0000			0.0000
Off-Road	1.2694	12.6852	7.2319	9.3300e-003		0.7705	0.7705		0.7089	0.7089	0.0000	955.8663	955.8663	0.2929		962.0167
Total	**1.2694**	**12.6852**	**7.2319**	**9.3300e-003**	**0.0106**	**0.7705**	**0.7811**	**1.1500e-003**	**0.7089**	**0.7100**	**0.0000**	**955.8663**	**955.8663**	**0.2929**		**962.0167**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0361**	**0.0538**	**0.4915**	**1.0700e-003**	**0.0943**	**7.2000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**86.5098**	**86.5098**	**4.5700e-003**		**86.6057**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Fugitive Dust					0.7547	0.0000	0.7547	0.4140	0.0000	0.4140			0.0000			0.0000
Off-Road	1.2049	10.4761	8.5825	0.0120		0.7266	0.7266		0.6930	0.6930		1,183.813 1	1,183.813 1	0.2333		1,188.711 8
Total	**1.2049**	**10.4761**	**8.5825**	**0.0120**	**0.7547**	**0.7266**	**1.4813**	**0.4140**	**0.6930**	**1.1070**		**1,183.813 1**	**1,183.813 1**	**0.2333**		**1,188.711 8**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Hauling	3.1800e-003	0.0364	0.0389	1.0000e-004	2.3200e-003	4.6000e-004	2.7800e-003	6.4000e-004	4.2000e-004	1.0600e-003		9.8977	9.8977	7.0000e-005		9.8992
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0393**	**0.0902**	**0.5304**	**1.1700e-003**	**0.0966**	**1.1800e-003**	**0.0978**	**0.0257**	**1.0900e-003**	**0.0267**		**96.4075**	**96.4075**	**4.6400e-003**		**96.5049**

3.3 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7547	0.0000	0.7547	0.4140	0.0000	0.4140			0.0000			0.0000
Off-Road	1.2049	10.4761	8.5825	0.0120		0.7266	0.7266		0.6930	0.6930	0.0000	1,183.8131	1,183.8131	0.2333		1,188.7118
Total	**1.2049**	**10.4761**	**8.5825**	**0.0120**	**0.7547**	**0.7266**	**1.4813**	**0.4140**	**0.6930**	**1.1070**	**0.0000**	**1,183.8131**	**1,183.8131**	**0.2333**		**1,188.7118**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.1800e-003	0.0364	0.0389	1.0000e-004	2.3200e-003	4.6000e-004	2.7800e-003	6.4000e-004	4.2000e-004	1.0600e-003		9.8977	9.8977	7.0000e-005		9.8992
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0393**	**0.0902**	**0.5304**	**1.1700e-003**	**0.0966**	**1.1800e-003**	**0.0978**	**0.0257**	**1.0900e-003**	**0.0267**		**96.4075**	**96.4075**	**4.6400e-003**		**96.5049**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2740	12.6738	8.0395	0.0113		0.8553	0.8553		0.7869	0.7869		1,159.5310	1,159.5310	0.3553		1,166.9919
Total	**1.2740**	**12.6738**	**8.0395**	**0.0113**		**0.8553**	**0.8553**		**0.7869**	**0.7869**		**1,159.5310**	**1,159.5310**	**0.3553**		**1,166.9919**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0361**	**0.0538**	**0.4915**	**1.0700e-003**	**0.0943**	**7.2000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**86.5098**	**86.5098**	**4.5700e-003**		**86.6057**

3.4 Building Construction - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2740	12.6738	8.0395	0.0113		0.8553	0.8553		0.7869	0.7869	0.0000	1,159.5310	1,159.5310	0.3553		1,166.9919
Total	**1.2740**	**12.6738**	**8.0395**	**0.0113**		**0.8553**	**0.8553**		**0.7869**	**0.7869**	**0.0000**	**1,159.5310**	**1,159.5310**	**0.3553**		**1,166.9919**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0361**	**0.0538**	**0.4915**	**1.0700e-003**	**0.0943**	**7.2000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**86.5098**	**86.5098**	**4.5700e-003**		**86.6057**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0406	9.8344	7.2432	0.0111		0.6018	0.6018		0.5572	0.5572		1,068.9366	1,068.9366	0.2968		1,075.1698
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0406**	**9.8344**	**7.2432**	**0.0111**		**0.6018**	**0.6018**		**0.5572**	**0.5572**		**1,068.9366**	**1,068.9366**	**0.2968**		**1,075.1698**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0361**	**0.0538**	**0.4915**	**1.0700e-003**	**0.0943**	**7.2000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**86.5098**	**86.5098**	**4.5700e-003**		**86.6057**

3.5 Paving - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0406	9.8344	7.2432	0.0111		0.6018	0.6018		0.5572	0.5572	0.0000	1,068.9366	1,068.9366	0.2968		1,075.1698
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0406**	**9.8344**	**7.2432**	**0.0111**		**0.6018**	**0.6018**		**0.5572**	**0.5572**	**0.0000**	**1,068.9366**	**1,068.9366**	**0.2968**		**1,075.1698**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0361	0.0538	0.4915	1.0700e-003	0.0943	7.2000e-004	0.0950	0.0250	6.7000e-004	0.0257		86.5098	86.5098	4.5700e-003		86.6057
Total	**0.0361**	**0.0538**	**0.4915**	**1.0700e-003**	**0.0943**	**7.2000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**86.5098**	**86.5098**	**4.5700e-003**		**86.6057**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546229	0.063048	0.174586	0.122573	0.033968	0.004845	0.015596	0.024745	0.002089	0.003270	0.006707	0.000678	0.001667

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.6100e-003	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	4.6100e-003	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	3.2000e-004					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.2800e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**4.6100e-003**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	3.2000e-004					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.2800e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**4.6100e-003**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Appendix C - Biological Resources Assessment

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West Bay Sanitary District

West Bay Sanitary District Recycled Water Project - Sharon Heights

Biological Resources Assessment

October 2015

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Environmental Scientists Planners Engineers

West Bay Sanitary District

West Bay Sanitary District Recycled Water Project - Sharon Heights

Biological Resources Assessment

October 2015

BIOLOCIGAL RESOURCES ASSESSMENT

WEST BAY SANITARY DISTRICT RECYCLED WATER PROJECT - SHARON HEIGHTS

MENLO PARK, SAN MATEO COUNTY, CALIFORNIA

Prepared for:

RMC Water and Environment
10509 Vista Sorrento Pkwy, Suite 205
San Diego, California 92121
Contact: Rosalyn Prickett, Principal/Senior Water Resources Planner
831-875-7420

Prepared by:

Rincon Consultants, Inc.
437 Figueroa Street, Suite 203
Monterey, California 93940
831-333-0310

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EXECUTIVE SUMMARY

This Biological Resources Assessment evaluates the proposed West Bay Sanitary District Recycled Water Project - Sharon Heights in Menlo Park, California. Rincon Consultants, Inc. conducted reconnaissance-level biological surveys within an approximately 3.25-mile waterline corridor and approximately 1.0 acre of infrastructure footprint that comprises the project site. The surveys and analysis were conducted to document the existing site conditions and to evaluate the potential for adverse impacts to biological resources from project development. The project site is located in an urban setting and consists of developed and ruderal habitats. Developed areas include paved roads, ornamental landscaping, and several native tree species.

It was determined that the project site contains suitable habitat for five special status wildlife species. Special status plant species are not expected to occur within the project site. Three of the animals are listed under the Federal Endangered Species Act, California Endangered Species Act, or both. Most of the project site consists of ruderal/developed areas and lacks suitable habitat for special status species. Breeding habitat is potentially present in the project site for white-tailed kite. San Francisquito Creek, adjacent to and east of the northeastern end of the project site, provides potentially suitable breeding habitat for California tiger salamander, California red-legged frog, western pond turtle, and San Francisco garter snake. The California Natural Diversity Database contains records for these four species within the vicinity of the project site. These four special status species may occur within riparian habitat on the project site or within other adjacent upland habitats during favorable climatic conditions (i.e., rain events). Additionally, California tiger salamander and California red-legged frog could potentially use small mammal burrows in the project site for aestivation. Ruderal habitat and landscaped areas in the project site provide potential suitable nesting habitat for birds protected by the Migratory Bird Treaty Act and California Fish and Game Code. Special status species with potential to occur within the project site and the potential impacts to those species from project development are discussed in greater detail within this report. Avoidance, minimization, and mitigation measures to address potential impacts to special status species are recommended herein to reduce the potential project-related impacts to less than significant levels.

1 INTRODUCTION

Rincon Consultants, Inc. (Rincon) prepared this Biological Resources Assessment (BRA) to document the existing conditions within the project site and to evaluate the potential for project-related impacts to biological resources during implementation of the West Bay Sanitary District Recycled Water Project - Sharon Heights (project). The approximately 3.25-mile waterline corridor and approximately 1.0 acre of infrastructure footprint that comprises the project site is located within the City of Menlo Park, San Mateo County, California.

1.1 PROJECT LOCATION

The project site is located primarily within the City of Menlo Park, San Mateo County, California, with a small portion on the eastern end within the City of West Menlo Park. The site is located in the Sharon Heights neighborhood of Menlo Park, east of Interstate 280 and west of the Stanford University campus (Figures 1 and 2). The project site includes the Sharon Heights Golf and Country Club (SHG&CC), Sand Hill Road, and other paved roads in commercial and residential areas. San Francisquito Creek is approximately 28 feet east of the northeastern end of the project site. The approximate center of the project site occurs at latitude 37.42 N and longitude 122.20 W (WGS-84 datum) and is depicted on the *Palo Alto, California*, U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle within Section 9, Township 6 South, and Range 3 West.

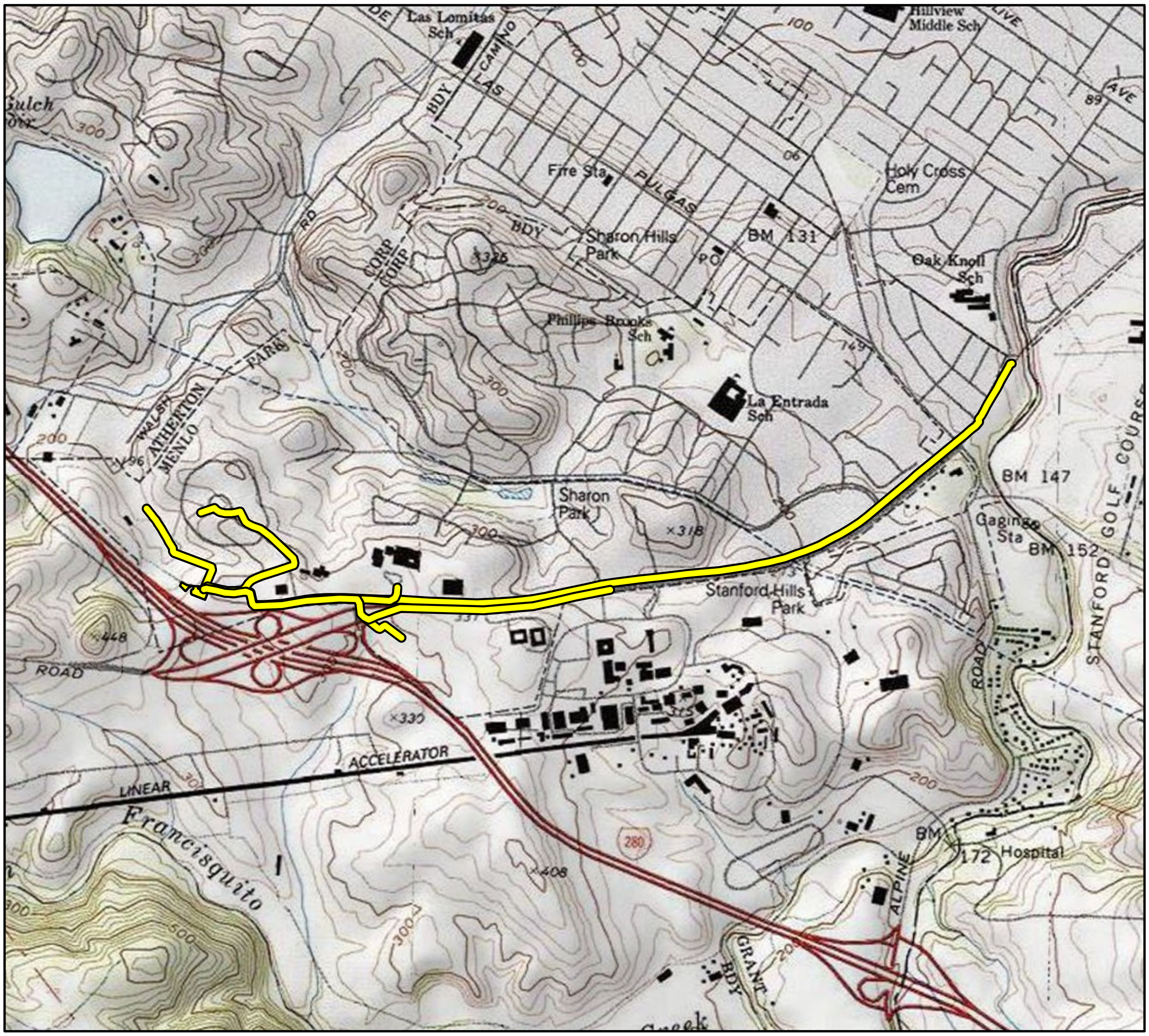
1.2 PROJECT DESCRIPTION

The proposed project is located in the City of Menlo Park, generally within the SHG&CC and along Sand Hill Road between its intersection with Oak Avenue on the east and Interstate 280 on the west. The biological study area includes the area of direct impact (ADI), consisting of all areas where work related to the project will occur. The ADI includes approximately one acre of footprint for the satellite treatment plant, approximately 200 square feet for the pump station site, and approximately 3.25 miles of corridor for pipeline installation within existing roadways, parking lots, and the SHG&CC. Land uses immediately adjacent to the project site include land developed for residential and commercial purposes.

The West Bay Sanitary District Recycled Water Project - Sharon Heights proposes to provide recycled water to the SHG&CC as well as other local users in the West Bay Sanitary District area. Components of the project would include wastewater supply conveyance, treatment plant, discharge pipelines, and pump stations. The pump station and forcemain would convey raw wastewater from the collection system main at the intersection of Sand Hill Road and Oak Avenue to the golf course, including pipeline installation within a 3.25-mile corridor in existing roadways, parking lots, and the SHG&CC. The wastewater treatment plant would be constructed immediately adjacent to an existing retention pond on the southern edge of the SHG&CC. Solid wastes from the treatment plant would be discharged through 1,600 feet of pipeline to be constructed from the plant to an existing sewer on the far side of the golf course.

The first phase of recycled water distribution pipelines would require approximately 5,300 LF of 6-inch PVC pipe to deliver recycled water from the treatment facility site to SLAC. The second phase of recycled water distribution pipelines would require approximately 6,340 LF of 6-inch

PVC pipe to deliver recycled water from the treatment facilities to the Rosewood Sand Hill, Sand Hill Commons, and Sharon Land Co.



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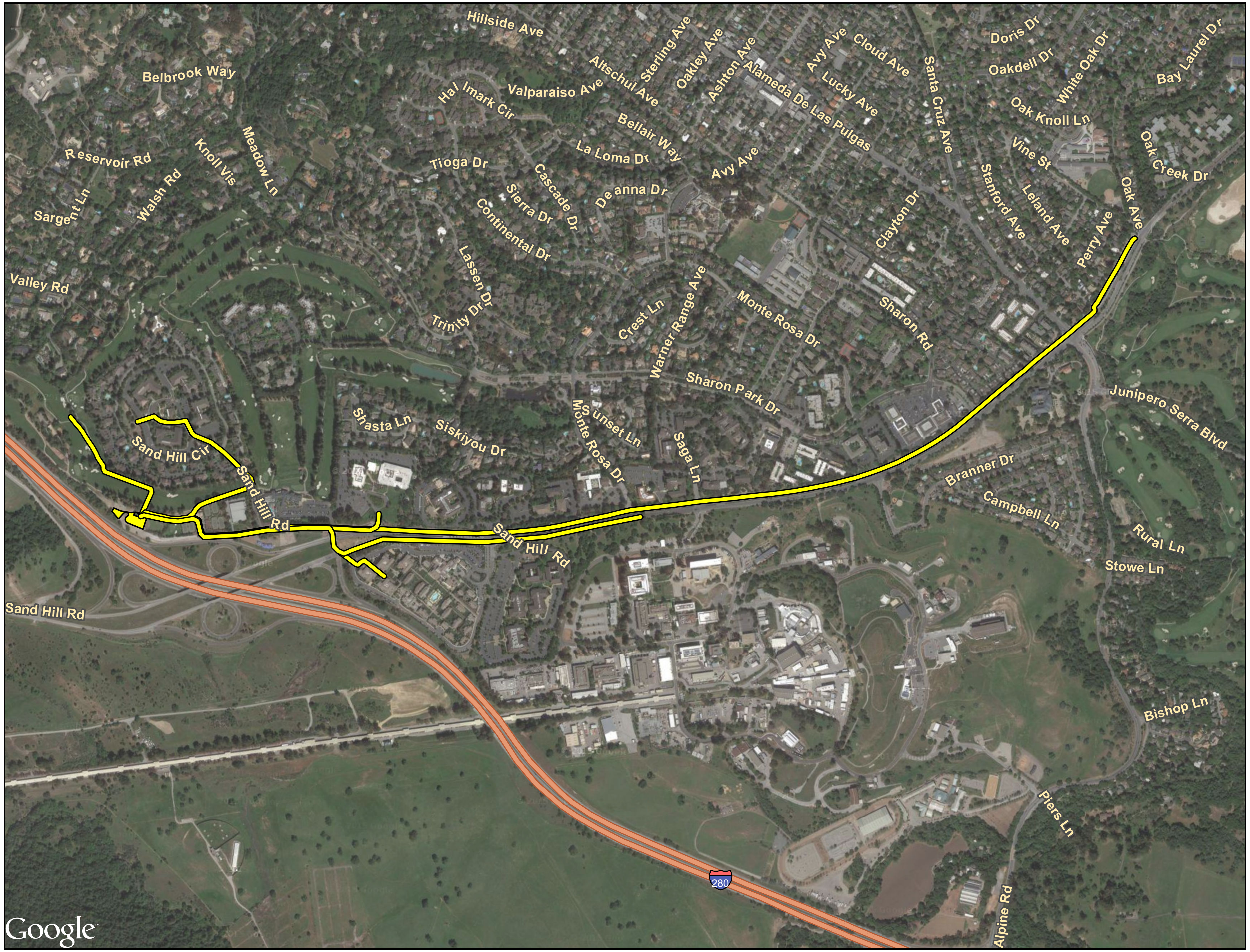
Project Area

0 1,000 2,000
Feet

N

Regional Location

Figure 1



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Project Area

0 500 1,000 Feet

N

Project Location

Figure 2

West Bay Sanitary District

2 METHODOLOGY

2.1 REGULATORY OVERVIEW

The West Bay Sanitary District is the responsible lead agency for this Project under the California Environmental Quality Act (CEQA). This project may also involve the use of funds provided by the federal government and would need to meet CEQA-Plus regulatory standards. The State Water Resources Control Board would have the responsibility for CEQA-Plus review which applies federal standards to the CEQA process.

This section provides a general summary of the applicable federal, state, and local regulations related to biological resources that could occur within the project site and immediate vicinity. Regulated or sensitive biological resources considered and evaluated in this BRA include special status plant and wildlife species, other nesting birds and raptors, sensitive plant communities, potentially jurisdictional waters and wetlands, wildlife movement corridors, and other biological resources afforded protection under local and regional jurisdictions, such as protected trees.

2.1.1 Environmental Statutes

For the purposes of this BRA, potential project-related impacts to biological resources were analyzed on the basis of the following regulatory statutes and guiding documents:

- California Environmental Quality Act (CEQA);
- Federal Endangered Species Act (FESA);
- California Endangered Species Act (CESA);
- Federal Clean Water Act (CWA);
- California Fish and Game Code (CFGC);
- Migratory Bird Treaty Act (MBTA);
- The Bald and Golden Eagle Protection Act; and
- Porter-Cologne Water Quality Control Act.

A more detailed account of the current regulatory framework that the proposed project is subject to is presented as Appendix A.

2.1.2 Guidelines for Determining CEQA Significance

The following threshold criteria, as defined within the *CEQA Guidelines*, Appendix G – Initial Study Checklist, were used to evaluate potential environmental effects. Based on these criteria, a proposed project would have a significant effect on biological resources if it would:

a. Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.

c. *Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc…) through direct removal, filling, hydrological interruption, or other means.*
d. *Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.*
e. *Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.*
f. *Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.*

2.2 DATABASE AND LITERATURE REVIEW

Prior to conducting the field survey, Rincon reviewed literature to obtain baseline information about biological resources with potential to occur in the project site, vicinity of the project and the region. The literature review included information from peer reviewed scientific publications, standard biological reference materials, and regionally applicable regulatory guiding documents. These included: Baldwin et al., 2012; Bowers et al., 2004; Holland, 1986; Sawyer et al., 2009; CDFW, 2010; Stebbins, 2003; Zeiner et al., 1988; and Zeiner et al., 1990. In addition, Rincon conducted queries of several relevant scientific databases that provide information about occurrences of sensitive biological resources: the California Department of Fish and Wildlife (CDFW; formerly the California Department of Fish and Game) California Natural Diversity Data Base (CNDDB) (CDFW, 2015a) and Biogeographic Information and Observation System (CDFW, 2015b); the U.S. Fish and Wildlife Service (USFWS) Critical Habitat Portal (USFWS, 2015a) and Information, Planning, and Conservation System Query (USFWS, 2015b); the United States Department of Agriculture, Natural Resource Conservation Service (NRCS) Web Soil Survey (USDA NRCS, 2015); and the California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Plants of California (CNPS, 2015). The queries included the *Palo Alto, California* USGS 7.5-minute topographic quadrangle and the other eight USGS quadrangles that surround it (Mountain View, Cupertino, Mindego Hill, La Honda, Woodside, San Mateo, Redwood Point, and Newark). Other sources of information used to evaluate the project site include aerial photographs, topographic maps, geologic maps, climatic data, and general project plans.

A complete list of the regionally occurring special status species reported from the scientific literature review and database queries was compiled for the project site (Appendix E). Then an analysis to determine which of these special status species have the potential to occur within the project site was conducted. The habitat requirements for each regionally occurring species were assessed and compared to the type and quality of habitats observed in the project site during the field survey. Conclusions regarding which species have the potential to occur onsite were based not only on background research and literature review previously mentioned; but also on the data collected in the field during the site survey. Several regionally occurring special status species were eliminated due to lack of suitable habitat within the project site, range in elevation, and/or geographic distribution. Special status species determined to have the potential to occur within the project site are discussed in Section 4.1. Special status species that were determined not to have potential to occur within the project site are not discussed further in this BRA.

2.3 RECONNAISSANCE FIELD SURVEY

Rincon Botanist/Biologist Michele Lee and Senior Biologist Dr. David Daitch conducted a reconnaissance survey and prepared this BRA. Ms. Lee has more than 15 years of experience as a biological resources consultant, and holds a Master of Science degree in Wildland Resource Science (Ecology and Resource Management) from the University of California, Berkeley. Dr. Daitch has more than 20 years of experience as a biologist and biological resources consultant, holds a Doctorate degree in Ecology and Evolutionary Biology from University of Colorado, Boulder. Rincon biologists completed the reconnaissance-level field survey within the project site and the immediate vicinity on April 20, 2014. The survey area included a larger project site that was subsequently reduced in size to the current project site that is analyzed in this BRA. It was conducted between approximately 9:30 a.m. and 4:30 p.m. in order to document the existing site conditions and to assess the overall potential for the habitats observed onsite to support special status species. All of the project site was observed by walking or driving, except for the Waste Solids Discharge alignment from the proposed Wastewater Treatment Plant to an existing sewer in the westernmost portion of the project site in the SHG&CC. This alignment was added to the project site after the reconnaissance survey, but it is located within golf course turf so this addition did not require an additional reconnaissance survey for biological resources.

Weather conditions were mild and generally favorable for the detection of wildlife species typically active during the day. It was partly cloudy to sunny throughout the duration of the site visit. The temperature ranged from approximately 57-68 degrees Fahrenheit and winds were mild at approximately 0-7 miles per hour out of the north-northeast.

During the field surveys, an inventory of all plant and animal species observed was compiled and an evaluation of potential jurisdictional aquatic features was conducted. Plant species nomenclature and taxonomy followed *The Jepson Manual: Vascular Plants of California*, second edition (Baldwin et al., 2012), and Supplement I (The Jepson Herbarium, 2013) and Supplement II (The Jepson Herbarium, 2014) of that publication. All plant species encountered were noted and identified to the lowest possible taxonomic level. The vegetation classification used for the analysis was based on Holland (1986) and Sawyer et al. (2009); but has been modified as needed to accurately describe the existing habitats observed onsite. Nomenclature for birds is based on the American Ornithologists' Union (AUO) Check-list of North and Middle American Birds, 7th edition and the 55th supplement (AOU, 2014).

2.4 JURISDICTIONAL WATERS

The reconnaissance-level field survey also evaluated the project site for the presence of potentially jurisdictional aquatic features. The reconnaissance survey was based solely on visual inspection of the project site and a formal jurisdictional delineation of waters and wetlands was not conducted.

3 EXISTING CONDITIONS

This section summarizes the results of the reconnaissance-level field survey and provides further analysis of the data collected in the field. Discussions regarding the general environmental setting, vegetation communities present, plants and wildlife observed, potential special status species issues, and other possible constraints regarding the biological resources onsite are presented below. Representative photographs of the project site are provided in Appendix B. A complete list of all the plant species observed in the project site during the field survey is presented as Appendix C. A complete list of all the wildlife species observed in the project site during the field survey is presented as Appendix D.

3.1 ENVIRONMENTAL SETTING

The project site is situated in a developed, urban landscape (Figures 2 and 3), and supports developed and ruderal habitats/land cover types and is primarily bordered by developed areas. Most of project site is located in Sand Hill Road and other existing paved roads. Unpaved portions of the project site include golf course turf at the SHG&CC, ornamental landscaping, and disturbed ruderal areas. Although the project site lacks aquatic habitat and wetlands, there are several aquatic habitats in the vicinity of the project site. The northeastern end of the project site is approximately 28 feet west of San Francisquito Creek, and an artificial pond and a detention basin at the SHG&CC are located in the vicinity of the project site. Remnant coast live oak (*Quercus agrifolia* var. *agrifolia*) and valley oak (*Quercus lobata*) stands are also located adjacent to the project site.

The project site is relatively flat, with a gradual increase in elevation from east to west. Elevations onsite range from approximately 120 feet (37 meters) above mean sea level at the northeastern end of the project site to 336 feet (102 meters) above mean sea level in the central portion of the project site.

The project site is located in eastern San Mateo County. The climate within San Mateo County is moderate and typifies a Mediterranean coastal climate throughout the year. The majority of rainfall occurs during the winter months and the summers are mild. Summer temperatures are influenced by low fog and marine air.

3.1.1 WATERSHED AND DRAINAGES

The project site is located within the San Francisco Bay West Watershed (Hydrologic Unit Code # 18050004) (USGS, 1978). No rivers or creeks are located in the project site, but the northeastern end of the project site is approximately 28 feet from San Francisquito Creek. The headwaters of San Francisquito Creek are located near Searsville Dam on Stanford University property and drains into the San Francisco Bay approximately 2.5 miles south of the Dumbarton Bridge. The San Francisquito Creek watershed encompasses approximately 45 square miles from the ridge of the Santa Cruz Mountains to the San Francisco Bay (USACE, 2005).

3.1.2 SOILS

According to the NRCS Web Soil Survey of San Mateo County (eastern part) and Santa Clara County (western part), the following soil map units occur within the project site: Accelerator-Fagan association, 5 to 15 percent slopes; Accelerator-Fagan-Urban land complex, 5 to 15 percent slopes; Botella-Urban land complex, 0 to 5 percent slopes; Urban land; Urban land-

Elpaloalto complex, 0 to 2 percent slopes; and Flaskan sandy clay loam, 5 to 9 percent slopes (USDS NRCS, 2015). Most of the project site is mapped as Accelerator-Fagan-Urban land complex, 5 to 15 percent slopes (102) and Accelerator-Fagan association, 5 to 15 percent slopes (101).

Accelerator-Fagan association, 5 to 15 percent slopes (101). The Accelerator soil and other similar components comprise 45 percent of this association. The Fagan soil and other similar components comprise 30 percent of this association. Minor unknown components comprise approximately 9 percent of this association. The soil horizon of the Accelerator-Fagan is typically 41-43 inches deep and is underlain by a 4 inch layer of weathered bedrock. The natural drainage class of this association is well drained. Accelerator soil has a soil profile that is comprised of layers of loam, clay loam, and gravelly clay loam. The parent material is residuum weathered from sandstone and siltstone. Accelerator soil typically occurs on hills in grasslands. Fagan soil has a soil profile that is comprised of layers of loam, clay loam, and clay. The parent material is derived from sandstone and/or shale. Fagan soil typically occurs on hills in association with oak woodlands or other hardwood trees.

Accelerator-Fagan-Urban land complex, 5 to 15 percent slopes (102). The Accelerator soil and other similar components comprise 35 percent of this complex. The Fagan soil and other similar components comprise 15 percent of this complex. Urban land comprises 25 percent of this complex. Minor unknown components and Botella soils comprise approximately 15 percent of this complex. The Accelerator-Fagan component of this complex was described above. The Urban land component typically occurs on hills and consists of asphalt concrete, buildings and other structures. The soil type underlying these structures is the Accelerator-Fagan association.

Botella-Urban land complex, 0 to 5 percent slopes (108). The Botella soil and other similar components comprise 45 percent of this map unit. Urban land comprises 30 percent of this complex. Minor unknown components and Orthents cut & fill comprise approximately 24 percent of this complex. Botella soil is typically well drained soil that occurs on stream terraces, flood plains, and alluvial fans. The parent material is alluvium and derived from mixed sources. The soil horizon is typically 60 inches deep and has a clay loam texture.

Urban land (131). The map unit of Urban land occurs on alluvial fans and consists of disturbed and human transported material.

Urban land-Elpaloalto complex, 0 to 2 percent slopes (131). Urban land comprises 70 percent of this complex. Elpaloalto ans similar soils comprise 23 percent of this complex. The Minor components consisting of Still and Hangerone, drained comprise approximately 7 percent of this complex. Elpaloalto soil is well drained soil that occurs on alluvial fans. The alluvium is derived from metamorphic and sedimentary rock and/or derived from metavolcanics. The Oi horizon consists of slightly decomposed plant material and is approximately 8 inches thick. The underlying A horizon at 8 to 16 inches in the profile consists of clay loam. The B and C horizons at 16 to 94 inches in the profile consist of silty clay loam.

Flaskan sandy clay loam, 5 to 9 percent slopes (143). Flaskan sandy clay loam comprises 85 percent of this complex. The Minor components consisting of Stevenscreek, Minlum, and Pachic haploxerolls, loamy-skeletal comprise approximately 15 percent of this complex. Flaskan sandy clay loam is well drained soil that occurs on alluvial fans and stream terraces. The alluvium is derived from metamorphic and sedimentary rock and/or derived from metavolcanics. The underlying B and C and horizons at 30 to 59 inches in the profile consist of sandy clay loam. The B and C horizons at 16 to 94 inches in the profile consist of layers of gravelly clay loam, gravelly sandy clay loam, and very gravelly sandy clay loam.

3.2 VEGETATION COMMUNITIES AND HABITATS

The project site is situated in a developed, urban landscape and supports developed and ruderal habitats (Figures 2 and 3). Most of project site is located in Sand Hill Road and other existing paved roads. Unpaved portions of the project site support golf course turf, ornamental landscaping, and disturbed ruderal areas. The westernmost portion of the project site is located in golf course turf. The proposed location of a wastewater treatment plant (WWWTP) consists of barren ground and ruderal vegetation. There are several other ruderal areas in the project site where the pipeline alignment traverses unpaved areas on the SHG&CC and at a commercial complex south of Sand Hill Road (Figures 2 and 3). Ruderal vegetation present in the project site and in the vicinity of the project site includes non-native grasses such as wild oats (*Avena fatua* and *A. barbata*), ripgut brome (*Bromus diandrus*), Harding grass (*Phalaris aquatica*), and soft chess (*Bromus hordeaceus*). Non-native forbs in this habitat and adjacent to the project site include sourclover (*Melilotus indicus*), black mustard (*Brassica nigra*), rose clover (*Trifolium hirtum*), scarlet pimpernel (*Lysimachia arvensis*) and cut-leaved geranium (*Geranium dissectum*). The canopies of two native valley oak trees occur within footprint of the proposed WWWTP (Figures 2 and 3). Planted native coast redwood (*Sequoia sempervirens*) trees are also located adjacent to the pipeline alignment that runs north from the proposed WWWTP. Coast live oak and ornamental trees and shrubs are adjacent to the pipeline alignment at various locations throughout the rest of the project site.

The project site itself does not include aquatic habitat and wetlands; however, there are several aquatic habitats in the vicinity of the project site (Figures 2 and 3). Three specific aquatic areas were identified immediately adjacent to proposed project activity.

1) The northeastern end of the project site (i.e. the pipeline terminus on Sand Hill Road at Oak Avenue) is approximately 28 feet from San Francisquito Creek and riparian habitat associated with this creek. During the April 20, 2015 reconnaissance survey the channel was inundated.

2) A previously excavated retention basin is located approximately 25-50 feet east of the footprint of the proposed WWTP. On April 20, 2015 this basin was shallowly inundated, and the surface was covered with a dense layer of mosquito fern (*Azolla* sp.), a native floating aquatic plant. Small patches of cattail (*Typha* sp.) that appeared to be pruned occurred throughout this basin. Trees are absent from the basin except for one small red willow (*Salix laevigata*). Other hydrophytic vegetation observed in this basin include tall flatsedge (*Cyperus eragrostis*), hyssop loosestrife (*Lythrum hyssopifolia*), and rabbit's-foot grass (*Polypogon monspeliensis*).

3) A concrete-lined drainage channel that flows parallel to Interstate 280 is approximately 40 feet from the southwestern part of the WWTP. The channel was dry on April 20, 2015.

Oak woodlands are not present in the project site but are located adjacent to the project site (Figures 2 and 3). A small valley oak stand adjacent to Interstate 280 and the proposed WWTP supports mature valley oak and an understory of ruderal vegetation and non-native grasses. Remnant stands of coast live oak are located adjacent to the project site north of Sand Hill Road on and south of Sand Hill Road on Stanford Linear Accelerator Center (SLAC) National Accelerator Laboratory property. The stand on SLAC property is connected to a larger undeveloped coast live oak and annual grassland complex along Sand Hill Road. A small patch of purple needle grass (*Stipa pulchra*) (approximately 80 feet long and 50 feet wide) is present adjacent to the sidewalk fence just outside the project site.

3.3 GENERAL WILDLIFE

Wildlife was observed throughout the project site and vicinity during the field survey. All observed wildlife was consistent with the typical wildlife that would be expected in mixed urban/suburban residential areas, golf course developments, or otherwise associated with urbanized areas. Appendix D provides a list of animal species that were observed in the project site and in the vicinity during the April 20, 2015 site survey. Animals observed include western gray squirrel (*Sciurus griseus*), western fence lizard (*Sceloporus occidentalis*), and southern alligator lizard (*Elgaria multicarinata*). Several small mammal burrows were observed in upland banks of the retention basin adjacent to the project site. A California ground squirrel (*Otospermophilus beecheyi*) was heard in close proximity to these burrows. Common bird species that are adapted to urban environments were also observed and included American crow (*Corvus brachyrhynchos*), dark-eyed junco (*Junco hyemalis*), western scrub-jay (*Aphelocoma californica*), and red-tailed hawk (*Buteo jamaicensis*). A great egret (*Ardea alba*) and killdeer (*Charadrius vociferus*) were observed just outside the project site at the retention basin.

4 SENSITIVE BIOLOGICAL RESOURCES

This section discusses the general potential for special status species to occur within the project site. 'Potential to occur' is based on the presence or absence of suitable habitat for each special status species reported in the scientific database queries that were conducted for the proposed project. Several scientific databases were queried, multiple sources of pertinent scientific literature were reviewed, and the technical expertise of Rincon's staff was utilized to determine the habitat requirements, ecology, and distribution of the special status species potentially affected by the proposed project. All occurrences of special status species, sensitive vegetation communities, and USFWS designated critical habitats that have been reported by the resource agencies within a five-mile radius of the project site were plotted on a map using geographic information system (GIS) software (Figure 3). As discussed in Section 2.2, an analysis was conducted to determine which of the regionally occurring special status species have potential to occur within the project site (Appendix E).

4.1 SPECIAL STATUS SPECIES

Fifty special status plants and animals were evaluated for their potential to occur in the project site (Appendix E). Figure 3 shows the CNDDB records of special status species within five miles of the project site. Rincon staff determined that the project site contains suitable habitat for only five special status animal species. No special status plants are expected to occur within the project site. Three of these animals are listed either under FESA, CESA, or both. The project site is developed with patches of ruderal habitat and lacks suitable habitat for many special status species. Breeding habitat for California tiger salamander, California red-legged frog, western pond turtle, and San Francisco garter snake is not present in the project site; however, the northeastern end of the project site is immediately adjacent to suitable breeding habitat within San Francisquito Creek for all three of these species. In addition, there are CNDDB records of these species within five miles of the project site. Ruderal habitat and landscaped areas in the project site provide potential suitable nesting habitat for white-tailed kite, as well as birds protected under the MBTA and CFGC. Special status animal species with potential to occur within the project site are discussed in greater detail below.

4.1.1 Special Status Plant Species

Thirty four special status plant species were evaluated for their potential to occur in the project site (Appendix E). The project site is developed with patches of ruderal habitat and lacks suitable habitat for special status plants. There are two CNDDB records of two special status plant species that overlap with the boundaries of the project site (Figure 3). One record is a historical record for fragrant fritillary (*Fritillaria liliacea*) and the other is a historical record for western leatherwood (*Dirca occidentalis*). Habitat for these species is not present in the project site and existing records were broadly mapped in the vicinity of the project site. Based on the lack of suitable habitat within the project site at this time, it is unlikely that these or any other special status plants could occur within the project site.

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Study Area

0 500 1,000 Feet

N

Vegetation Communities and Habitats

Figure 3

4.1.2 Special Status Animal Species

Sixteen special status animal species were evaluated for their potential to occur in the project site (Appendix E). Of these, only five special status animal species may occur in the project site based on the presence of suitable habitat in the project site or adjacent to the project site. Three of these species are listed under the FESA and/or CESA. Species that are potentially present in the project site include:

- California tiger salamander (*Ambystoma californiense*) – Federal Threatened (FT), State Threatened (ST)
- California red-legged frog (*Rana draytonii*) – ST and state Species of Special Concern (SSC)
- Northern western pond turtle (*Actinemys* [=*Emys*] *marmorata*) – SSC
- San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) – Federal Endangered (FE), State Endangered (SE), and a state Fully Protected (FP)
- White-tailed kite (*Elanus leucurus)* – FP

The project site lacks breeding habitat for any of these special status species except for white-tailed kite. San Francisquito Creek is approximately 28 feet east of the northeastern end of the project site. This riparian corridor potentially provides suitable breeding habitat for California tiger salamander, California red-legged frog, western pond turtle, and San Francisco garter snake. These species may be present in the project site within riparian habitat, or during favorable climatic conditions when dispersal and/or foraging through other areas of the project site could occur. CRLF and CTS could potentially use small mammal burrows in the project site for aestivation, in particular within the existing retention basin near the WWTP. The following discussions provide more detail about these five special status animal species and their potential to occur in the project site.

California tiger salamander (*Ambystoma californiense*) – FT, ST. California tiger salamander (CTS) is a lowland species found primarily in grasslands and low foothill and oak woodland habitats located within approximately 2,200 ft (671 meters [m]) of breeding pools (Trenham and Shaffer, 2005). CTS breed in long-lasting rain pools (e.g., seasonal ponds, vernal pools, slow moving streams) that are often turbid, and occasionally in permanent ponds lacking fish predators. During the non-breeding season, adults occur in upland habitats and occupy ground squirrel or pocket gopher burrows. They migrate nocturnally to aquatic sites to breed during relatively warm winter or spring rains. CTS has been documented to migrate up to 1.0 mile from breeding sites to refugia sites (Austin and Shaffer, 1992). Following breeding, adults move 9 to 518 ft (3 to 158 m) away from breeding ponds within the first night (Loredo et al., 1996; Trenham, 2001). Most salamanders continue to move to different burrow systems further from the pond over the next one to four months, with an average distance of 374 ft (114 m) from the pond (Trenham, 2001). Trenham and Shaffer (2005) estimated that conserving upland habitats within 2,200 ft (671 m) of breeding ponds would protect 95 percent of CTS at their study location in Solano County.

There are five CNDDB occurrences within a 5-mile radius of the project site (Figure 3). A 2002 record is mapped along San Francisquito Creek and overlaps with the project site. This record is based on documentation of six adults that were trapped in a cistern near the creek but the exact location along the creek is unknown. This occurrence extends along the riparian corridor from

Interstate 280 north to El Camino Real. The next closest record is approximately 0.4 mile southeast of the project site at Lake Lagunita at Stanford University. CTS breed at this lake and surrounding seasonal ponds and use the surrounding uplands during the non-breeding season. According to the Stanford University Habitat Conservation Plan (HCP), CTS have been breeding in Lake Lagunita since the early 1900s (Stanford University, 2013). CTS on Stanford properties are concentrated around Lake Lagunita, with the density of salamanders decreasing significantly as the distance from Lake Lagunita exceeds 0.75 mile (Stanford University, 2013). The project site is approximately 0.75 mile northwest of Lake Lagunita. The other three CNDDB records within a 5-mile radius are based on museum records and are extirpated or possibly extirpated. The project site is not within federally designated critical habitat for CTS (Figure 3; USFWS, 2015a).

In the late 1990s Stanford University began constructing CTS breeding ponds in the foothills south of Lake Lagunita and south of Junipero Serra Boulevard as part of their 1998 California Tiger Salamander Management Agreement with Santa Clara County, CDFW, and USFWS (Stanford University, 2013). There are currently eight ponds. These ponds are located approximately 1.0 mile southeast of the project site. Since 2011, CTS have successively reproduced in three of these ponds.

The project site does not provide suitable breeding habitat for CTS, but potentially provides upland refugia habitat for CTS. The retention basin near the WWTP does not have a suitable hydroperiod for the CTS breeding cycle, and does not remain inundated long enough for CTS breeding. Breeding habitat for CTS is documented within 0.4 mile of the project site. CTS have been documented migrating up to 1.0 mile from breeding sites to refugia sites. California ground squirrels and small mammal burrows that could provide refugia for CTS during the non-breeding season were observed adjacent to the project site in the upland banks of the retention basin. Other suitable burrows could potentially be present in ruderal areas within the project site or adjacent to the project site. Breeding habitat and upland refugia could also potentially be present along the San Francisquito Creek corridor near the project site. Therefore, CTS could be present in burrows in the project site during the non-breeding season or they could be dispersing throughout the project site during migration periods.

California red-legged frog (*Rana draytonii*) – FT, SSC. The California red-legged frog (CRLF) inhabits quiet pools of streams, marshes, and ponds. All life history stages are most likely to be encountered in and around breeding sites, which include coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, and ponded and backwater portions of streams, as well as artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds. Essential breeding should hold water for a minimum of 20 weeks in all but the driest of years (USFWS, 2010). Eggs are typically deposited in permanent pools, attached to emergent vegetation.

CRLF generally prefer to remain close to water, but disperse along streams and in uplands. During rainy periods CRLF disperse through uplands for distances up to 2.0 miles (USFWS, 2002). They have been documented dispersing along stream systems up to 1.7 miles from breeding sites (Fellers and Kleeman, 2007). During the summer, they disperse in response to drying breeding habitats, to forage, and to seek habitat in moist habitats such as non-breeding wetlands and riparian habitats and seek refuge in rodent burrows, boulders, logs, trees, organic debris, drains, watering troughs, abandoned sheds, and hay-ricks (Fellers and Kleeman, 2007; USFWS, 2002; USFWS, 2005). CRLF will also move from breeding sites to forage in riparian vegetation (USFWS, 2002).

There are seven CNDDB occurrences within a 5-mile radius of the project site (Figure 3). All of these records are considered extant. The project site is located east of Interstate 280. Five of the seven records are located west of Interstate 280, which forms a significant barrier to CRLF that are potentially dispersing to the project site. One of these records reports CRLF breeding in San Francisquito Creek in a reach that is approximately 0.6 mile south of the project site. There are two records where Interstate 280 is not a barrier. One record is approximately 0.4 mile north of the project site at a creek off of Walsh Road. This occurrence is in a residential neighborhood that is adjacent to the SHG&CC. One juvenile was observed there in 2003. The second record is a documented breeding site located approximately 2.2 miles southeast of the project site on Stanford and Santa Clara Valley Water District property at Matadero Creek and Deer Creek. There are no records of breeding CRLF within 1.0 mile of the project site and that are east of Interstate 280. The project site is not within federally designated critical habitat for CRLF (Figure 3; USFWS 2015a).

The Stanford University HCP (2013) describes several observations of CRLF that are not in the CNDDB. The HCP describes reports of two red-legged frogs that were observed in 2006 from an area between SLAC and Sand Hill Road. However, during multiple subsequent surveys CRLF were not observed at the site. This location could potentially be in or near the project site. The HCP also reports a CRLF road-kill in 2000 along Junipero Serra Boulevard, opposite Frenchman’s Road, approximately 1.0 mile from the nearest CRLF creek. Other historic Stanford records report that in the early- and mid-part of the last century, CRLF were occasionally found in Lake Lagunita, which is approximately 0.75 mile from the project site, and in a goldfish pond on the Stanford campus.

The project site does not provide suitable breeding habitat for CRLF, but CRLF could be dispersing through uplands in the project site or seek summer refuge in burrows in the project site. The retention basin near the project site does not provide suitable breeding habitat for CRLF. CRLF breeding habitat is usually in deep water that is at least 2 feet deep and usually associated with dense emergent vegetation (Hayes and Jennings, 1988; USFWS, 2002). The retention basin was inundated with less than a foot of water on April 20, 2015 and only small patches of cattail were present. This basin potentially provides limited and marginal non-breeding aquatic habitat for CRLF. Rodent burrows are present on the banks of this basin. CRLF have been documented in a creek within 0.4 mile from the northern portion of the project site and San Francisquito Creek could potentially provide breeding and non-breeding habitat for CRLF. Many reaches of the San Francisquito Creek and its tributaries are dry by mid-summer, except in wet years (Stanford University, 2013). The creek could potentially provide non-breeding aquatic habitat in addition to breeding habitat where water is retained longer than most reaches. CRLF could be dispersing through uplands in the project site from San Francisquito Creek or the unnamed creek north of the project site, or could seek summer refuge in burrows in the project site. Overall the lack of suitable habitat on the project site indicates a low potential for CRLF to be present on the site other than during dispersal or aestivation.

San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) – FE, SE FP. San Francisco garter snake (SFGS) occurs in freshwater marshes, slow moving streams, ponds, and seasonal wetlands. They avoid brackish water habitats because California red-legged frogs, their preferred prey, is limited to freshwater habitats (USFWS, 2007). San Francisco garter snakes prefer densely vegetated aquatic habitats near open uplands where they can sun themselves, hunt, and take refuge in rodent burrows (USFWS, 2006; USFWS, 2007). Emergent vegetation that has been documented in SFGS habitat includes cattails (*Typha* spp.), bulrushes (*Schoenoplectus* spp.), rushes (*Juncus* spp. and *Eleocharis* spp.), and water plantains (*Alisma* spp.) (USFWS, 2006; USFWS, 2007). Studies have shown that SFGS do not generally move farther than 0.6 mile (1.0 kilometer) from suitable aquatic habitat or wintering uplands (USFWS, 2006). Adults are primarily active during the day. San Francisco garter snakes primarily breed in the spring, and will also breed in the fall. They hibernate in rodent burrows in the winter, and sometimes in the summer. They have been documented to move over several hundred yards away from wetlands to hibernate/aestivate in upland burrows (USFWS, 2007).

The project site is within an intergrade zone on the eastern flank of the Santa Cruz Mountains that supports hybrids of the San Francisco garter snake and red-sided garter snake (*Thamnophis sirtalis infernalis*) and both subspecies (USFWS, 2006). The red-sided garter snake is not a special status species and the legal protection status of these hybrids has been complicated by the uncertain taxonomic status of these hybrids (Stanford University, 2013). Stanford University, which is located just west of the project site, has studied SFGS and hybrids for the last 100 years and reports that the SFGS, red-sided garter snake, and hybrids are all currently uncommon on Stanford properties (Stanford University, 2013). The Stanford HCP refers to various studies conducted at the SLAC facility and the nearby former Christmas tree farm and states that the only specimen found was one hybrid that was captured in 1981 in a drainage near the main SLAC accelerator building (Stanford University, 2013). Some of the SLAC buildings are in the vicinity of the project site, but the exact location of the drainage mentioned in the HCP is unclear. The HCP also states that only common garter snakes (*Thamnophis sirtalis*), not subspecies or hybrids, have been found at Stanford's Lake Lagunita, approximately 0.7 mile southeast of the project site (Stanford University, 2013). The Stanford HCP also reports that no SFGS, red-sided garter snakes or hybrids have not been found in the vicinity of San Francisquito Creek although it potentially provides suitable habitat.

There are six CNDDB occurrences within a 5-mile radius of the project site (CDFW, 2015c). Figure 3 does not show these occurrences because their specific location is suppressed by the CNDDB. Location data for these records was requested from CDFW (2015c). These occurrences are located south, southwest, and northwest of the project site. Interstate 280 forms a significant barrier between these occurrences and the project site. All six records are presumed extant although two of them were recorded over 20 years ago. None of these records are located on SLAC or Stanford property adjacent to the project site. The closest occurrence is a 1922 record that is approximately 1.2 miles southwest of the project site. The next closest occurrence is from 2007 and is approximately 1.7 miles southwest of the project site. The other four occurrences are located within a 3- to 5-mile radius from the project site. The CNDDB records do not provide any information about the snake's taxonomic status for each occurrence.

The project site does not provide suitable aquatic habitat for SFGS, but suitable habitat potentially occurs in the vicinity of the project site. The retention basin lack significant emergent vegetation and as such do not provide suitable breeding habitat for this species. San Francisquito Creek is approximately 28 feet from the northwestern end of the project site and it could potentially provide suitable aquatic and upland habitat for this species. Overall the lack of suitable habitat on the project site indicates a low potential for this species to be present on the site other than during dispersal or aestivation.

Western pond turtle (*Emys marmorata*) – SSC. Western pond turtle (WPT) is an aquatic turtle that occurs in ponds, marshes, rivers, streams and irrigation ditches that typically support aquatic vegetation. It requires downed logs, rocks, mats of vegetation, or exposed banks for basking. Western pond turtle lay their eggs in nests that are dug along the banks of streams or other uplands in sandy, friable soils. Northern western pond turtles, especially those that reside in creeks are also known to over winter in upland habitats. Upland movements can be quite extensive and individuals have been recorded nesting or overwintering hundreds of feet from aquatic habitats. The typical nesting season is usually from April through August; however, variation exists depending upon geographic location.

There are three CNDDB occurrences within a 5-mile radius of the project site (Figure 3). All of these records are considered extant, but two of them are historic. One record is based on a California Academy of Science (CAS) specimen and is broadly mapped along the San Francisquito Creek corridor, extending along the corridor from Interstate 280 north to Highway 82 and overlapping with the project site. There is little information about this record. The CNDDB also has a record of a CAS specimen at Stanford's Lake Lagunita. The date of this collection is unknown. This record is mapped approximately 0.7 mile southwest of the project site. The third CNDDB record is at Stanford property along San Francisquito Creek approximately 0.25 mile north of Searsville Lake. This record is approximately 1.0 mile southwest of the project site, but Interstate 280 forms a significant barrier between this occurrence and the project site.

The project site does not provide suitable breeding or upland habitat for WPT, but the San Francisquito Creek corridor is immediately adjacent to the northwestern end of the project site, where suitable aquatic and upland habitat for this species could be present. If WPT uses this riparian corridor, they could potentially be present in the project site during dispersal.

White-tailed kite (*Elanus leucurus*) – FP. Mature trees in the project site potentially provide nesting habitat for this species. The remnant coast live oak woodlands outside the project site provide foraging habitat, but foraging habitat is limited to one narrow strip of ruderal habitat adjacent to the Sand Hill Road. There are no CNNDB records of this species within five miles of the project site (Figure 3). However, white-tailed kites are fairly adapted to urban environments and could be present either nesting or foraging in and immediately adjacent to the project site.

Nesting Birds

Nesting birds afforded protection under the CFGC and/or MBTA have the potential to occur within the project site. Landscaped areas with mature trees and shrubs, ruderal areas with grassland vegetation or cleared areas, and oak woodland and grassland immediately adjacent to the project site all provide suitable nesting habitat for a wide variety of birds.

4.2 SENSITIVE PLANT COMMUNITIES

Sensitive plant communities that are recognized by the CDFW (2010) are not present in the project site. Valley oak woodland (*Quercus lobata* alliance) and purple needle grass grassland alliance (*Nassella pulchra*) are sensitive plant communities that are present adjacent to the project site.

4.3 JURSIDICTIONAL WATERS AND WETLANDS

There are no jurisdictional wetlands or waters of the United States in the project site. A concrete drainage in the valley oak stand adjacent to, but outside the WWTP footprint, is potentially considered a jurisdictional feature. It does not support any hydrophytic vegetation and the adjacent banks support upland vegetation. This channel collects runoff from Interstate 280 and directs it northwest outside the project site. This drainage channel could be considered a non-wetland water of the United States if it drains to a jurisdictional water.

4.4 WILDLIFE MOVEMENT

The project site is not located within any known regional wildlife movement corridors. The project site is situated on the western side of an extensively disturbed and developed area along the western side of the southern San Francisco Bay. To the west of the project site is a mix of residential developments and open Coast Range woodland and grassland areas. Wildlife movement to the east of the project site has long been disrupted. Widlife movement to the west would be expected to be generally directed in a north-south orientation along existing areas of undeveloped woodland and grassland areas. San Francisquito Creek may function as a small local movement corridor for wildlife between the Coast Eange and the San Francisco Bay; however, the project will not directly impact this corridor, and project activity is not expected to disrupt wildlife movement along San Francisquito Creek. Given the disturbed nature of the site, the predominantly urban setting that the project site is situated within, and the placement of the proposed development within existing roadways and golf course areas, implementation of the proposed project is not expected to interfere with wildlife movement.

4.5 RESOURCES PROTECTED BY LOCAL POLICIES AND ORDINANCES

The following policies in the Open Space Element of the City of Menlo Park General Plan (2013) biological resources include the following:

- Policy OSC1.1: Natural Resources Integration with Other Uses. Protect Menlo Park's natural environment and integrate creeks, utility corridors, and other significant natural and scenic features into development plans.
- Policy OSC1.3: Sensitive Habitats. Require new development on or near sensitive habitats to provide baseline assessments prepared by qualified biologists, and specify requirements relative to the baseline assessments.

- Policy OSC1.4: Habitat Enhancement. Require new development to minimize the disturbance of natural habitats and vegetation, and requires re-vegetation of disturbed natural habitat areas with native or non-invasive naturalized species.
- Policy OSC1.5: Invasive, Non-Native Plant Species. Avoid the use of invasive, non-native species, as identified on the lists of invasive plants maintained at the California Invasive Plant Inventory and United States Department of Agriculture invasive and noxious weeds database, or other authoritative sources, in landscaping on public property.
- Policy OSC1.15: Heritage Trees. Protect Heritage Trees, including during construction activities through enforcement of the Heritage Tree Ordinance (Chapter 13.24 of the Municipal Code).

4.5.1 Protected Trees

The City of Menlo Park Municipal Code (Municipal Code) Chapter 13.24 regulates the preservation of heritage trees (City of Menlo Park, 2010). Chapter 13.24 defines heritage trees as:

- A tree or group of trees of historical significance, special character or community benefit, specifically designated by resolution of the City Council;
- An oak tree (*Quercus* spp.) which is native to California and has a trunk with a circumference of 31.4 inches (diameter of ten [10] inches) or more, measured at fifty-four (54) inches above natural grade. Trees with more than one trunk shall be measured at the point where the trunks divide, with the exception of trees that are under twelve (12) feet in height, which will be exempt from this section; and
- All trees other than oaks which have a trunk with a circumference of 47.1 inches (diameter of fifteen (15) inches) or more, measured fifty-four (54) inches above natural grade. Trees with more than one trunk shall be measured at the point where the trunks divide, with the exception of trees that are less than twelve (12) feet in height, which will be exempt from this section. (Ord. 928 Section 1 (part), 2004).

In accordance with the City of Menlo Park's Municipal Code, the removal of protected trees or pruning more than one fourth of it canopy and/or roots requires a permit. Prior to construction activities, a site plan should be prepared depicting the locations of trees in the project site. A tree protection plan is required for any work performed within an area 10 times the diameter of the tree (the tree protection zone). The removal of two or more protected trees also requires the submission of a tree replacement plan. Commercial applicants are required to replace trees on a 2 to 1 basis with at least a #15 container size.

5 IMPACT ANALYSIS AND MITIGATION MEASURES

This section discusses the possible adverse impacts to biological resources that may occur from implementation of the proposed project and suggests appropriate mitigation measures that would reduce those impacts to less than significant levels. The criteria used to evaluate potential project-related impacts to biological resources are presented in Section 2.1.2.

Impact E-1 Special Status Animals

The proposed project has potential to result in direct impacts to two special status reptiles and two special status amphibians: California red-legged frog, California tiger salamander, San Francisco garter snake and western pond turtle.

The following avoidance, minimization, and mitigation measures are recommended to reduce potential impacts to special status animals.

California Red-legged Frog (CRLF) and California Tiger Salamander (CTS) - Recommended Measures

- Prior to start of project activities, a qualified biologist should prepare and administer a Worker Environmental Awareness Program (WEAP) training to familiarize all personnel conducting project activities with the identification and life-history of CRLF and CTS.
- If feasible, initial ground disturbing activities and any work associated with the project should be conducted between May 1 and October 31 during dry weather conditions to minimize the potential for encountering CRLF and CTS. Work should be restricted to daylight hours.
- A qualified biologist should conduct a survey of the project site within 48 hours prior to initial ground disturbing activities. The survey area should include all potential suitable upland habitat in the project site and suitable aquatic and upland habitat located within 50 feet of the project site. The survey will also include identifying all mammal burrows in the project site that are suitable for CRLF and CTS. If any life stage of CRLF or CTS is found within the survey area, the biologist should revisit the site on subsequent days to determine if the CRLF or CTS has left the site. If the CRLF or CTS has not left the site after three days, the USFWS (for CRLF and CTS) and CDFW (for CTS) should be consulted to determine the appropriate course of action.
- All work areas within 25 feet of suitable aquatic habitat should be flagged for monitoring during construction activity.
- If construction must occur between November 1 and April 30, the qualified biologist should conduct a pre-activity clearance sweep prior to start of project activities within 48 hours after any rain events of 0.1 inch or greater or if wet conditions are present on site.
- All trash should be removed from the site daily and disposed of properly to avoid attracting potential predators to the site.
- No pets should be permitted on-site during project activities.
- All vehicles should be in good working condition and free of leaks. All leaks should be contained and cleaned up immediately to reduce the potential or soil/vegetation contamination.
- All refueling, maintenance, and staging of equipment and vehicles should occur at least 100 feet from riparian habitat or water bodies and in a location from where a spill would

not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water).

- The number of access routes, size of staging areas, and the total area of the activity should be limited to the minimum necessary to achieve the project goals.
- To ensure that diseases are not conveyed between work sites by the qualified biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force should be followed at all times.
- No herbicide should be use on-site.
- A qualified biologist shall be present on site during initial ground disturbance in portions of the project site that are suitable upland habitat for CRLF or CTS or within 25 feet of potential CRLF or CTS aquatic habitat. If any life stage of CRLF or CTS is found, work shall cease within 100 feet of the CRLF or CTS and the USFWS and CDFW contacted immediately to determine the appropriate course of action.

San Francisco Garter Snake - Recommended Measures

- Prior to start of project activities, a qualified biologist should conduct a WEAP training to familiarize all personnel conducting project activities with the identification and life-history of SFGS.
- A qualified biologist should conduct a survey within 48 hours of initial ground disturbing activities. The survey area should include all potential suitable upland habitat in the project site and suitable aquatic and upland habitat located within a 100 feet of the project site. The survey will also include identifying all mammal burrows in the project site that are suitable for SFGS. If any life stage of SFGS is found within the survey area, the biologist should revisit the site on subsequent days to determine if the SFGS has left the site. If the SFGS has not left the site after three days, the USFWS should be consulted to determine the appropriate course of action.
- A qualified biologist shall be present on site during initial ground disturbance in portions of the project site that are within 25 feet of potential SFGS aquatic habitat.
- If a SFGS is encountered, all activities within 100 feet of the snake shall cease until appropriate corrective measures have been completed or it has been determined that the snake will not be harmed. Reports of any SFGS sightings and any project-related incidental take shall be reported to the USFWS immediately by telephone at (916) 414-6600.

Western Pond Turtle (WPT) - Recommended Measures

- Prior to start of project activities, a qualified biologist should conduct a WEAP trianing to familiarize all personnel conducting project activities with the identification and life-history of WPT.
- A pre-construction survey for WPT should be conducted in the project site, plus a 50-foot buffer, not less than two weeks prior to the initiation of construction. The survey should include San Francisquito Creek adjacent to the project site.
- If WPT is found and these individuals are likely to be killed or injured by construction activities, a qualified biologist should be allowed sufficient time to capture and relocate the animals from the project site before construction activities begin. A qualified biologist(s) should relocate the individuals the shortest distance possible to a location that contains suitable habitat not likely to be affected by activities associated with the proposed project. The biologist(s) should maintain sufficiently detailed records of any

individual observed, captured, relocated, etc., including size, coloration, any distinguishing features and photographs (preferably digital) to assist him or her in determining whether translocated animals are returning to the project site.

Implementation of these recommended measures would reduce potential impacts to special status animals to less than significant levels.

Impact E-2 Nesting Birds

The proposed project has potential to result in direct impacts to nesting birds, including raptors such as white-tailed kite, and other species protected under the MBTA and/or CFGC. Birds nesting on or adjacent to the project site during construction activities may be killed or injured by crushing or tree/shrub removal (direct impact) or may abandon active nests as a result of construction activity and/or noise (indirect impact). The following avoidance, minimization, and mitigation measures are recommended to reduce potential impacts to nesting birds.

Recommended Measures

- Nesting bird surveys are not required for construction activities that occur between September 1 and January 31. If construction must occur within the bird breeding season (February 1 through August 31), then no more than two weeks prior to initiation of ground disturbance and/or vegetation removal, a nesting bird and raptor pre-construction survey should be conducted by a qualified biologist within the disturbance footprint plus a 300-foot buffer, where feasible. If the project is phased, a subsequent pre-construction nesting bird and raptor survey may be required prior to each phase of construction within the project site.
- Pre-construction nesting bird and raptor surveys should be conducted during the time of day when birds are active and should be of sufficient duration to reliably conclude presence/absence of nesting birds and raptors onsite and within the designated vicinity. A report of the nesting bird and raptor survey results, if applicable, should be submitted to the lead agency for review and approval prior to land use clearance for grading.
- If nests are found, their locations should be flagged. An appropriate avoidance buffer ranging in size from 25 to 50 feet for song birds, and up to 250 feet for raptors depending upon the species and the proposed work activity should be determined and demarcated by a qualified biologist with bright orange construction fencing or other suitable flagging. Active nests should be monitored at a minimum of once per week until it has been determined that the nest is no longer being used by either the young or adults. No ground disturbance should occur within this buffer until the qualified biologist confirms that the breeding/nesting is completed and all the young have fledged.

Implementation of these recommended measures would reduce potential impacts to nesting birds and raptors to less than significant levels.

Impact E-3 Protected Trees

The proposed project has the potential to result in impacts to protected trees. Two mature valley oak trees are within the footprint of the WWTP and other protected trees are potentially located adjacent to other portions of the project site. These trees will not be removed during the construction of the WWTP. However, trenching, soil compaction, grade changes, and the installation of pavement within the tree protection zone (TPZ) of these valley oak trees is likely to impact the roots of these trees. Other portions of the project site are adjacent to protected trees, including coast redwood that could potentially be impacted by the proposed project.

Recommended Mitigation Measures

- Once final project impact areas have been defined (final design), but prior to the implementation of the proposed project (construction activity), an arborist or botanist should assess potential impacts to protected trees within and adjacent to the project site, including staging areas and access routes and prepare a tree preservation plan. When feasible, the project footprint should be modified to avoid the critical root zone (CRZ) and TPZ of protected trees. Prior to the commencement of construction activities, the TPZ of protected trees should be identified in the field by an arborist or botanist and clearly delineated with temporary orange fencing. Construction activities and equipment should be excluded from the TPZ.
- During construction, if activities encroach on the TPZ of a protected tree, an arborist or botanist should be consulted about whether or not the tree is likely to be impacted and whether a tree removal permit and tree replacement plan is required. Tree replacement should be in accordance with the relevant City of Menlo Park ordinances.

Implementation of these recommended measures would reduce potential impacts to protected trees to less than significant levels.

6 LIMITATIONS, ASSUMPTIONS, AND USER RELIANCE

This BRA has been performed in accordance with professionally accepted biological investigation practices conducted at this time and in this geographic area. The biological investigation is limited by the scope of work performed; namely, only a reconnaissance survey was conducted. Biological surveys for the presence or absence of certain taxa have been conducted as part of this assessment but were not performed during a particular blooming period, nesting period, or particular portion of the season when positive identification would be expected if present, and therefore, cannot be considered definitive. The biological surveys are limited also by the environmental conditions present at the time of the surveys. In addition, general biological (or protocol) surveys do not guarantee that the organisms are not present and will not be discovered in the future within the site. In particular, mobile wildlife species could occupy the site on a transient basis, or re-establish populations in the future. Our field studies were based on current industry practices, which change over time and may not be applicable in the future. No other guarantees or warranties, expressed or implied, are provided. The findings and opinions conveyed in this report are based on findings derived from site reconnaissance, jurisdictional areas, review of CNDDB RareFind3, and specified historical and literature sources. Standard data sources relied upon during the completion of this report, such as the CNDDB, may vary with regard to accuracy and completeness. In particular, the CNDDB is compiled from research and observations reported to CDFW that may or may not have been the result of comprehensive or site-specific field surveys. Although Rincon believes the data sources are reasonably reliable, Rincon cannot and does not guarantee the authenticity or reliability of the data sources it has used. Additionally, pursuant to our contract, the data sources reviewed included only those that are practically reviewable without the need for extraordinary research and analysis.

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8 LIST OF PREPARERS

RINCON CONSULTANTS, INC.

- Primary Author
  - Michele Lee, Botanist/Biologist
- Senior Technical Review
  - David Daitch, Program Manager/Senior Biologist
- Principal Review
  - Colby J. Boggs, Principal/Senior Ecologist
- Graphics
  - Craig Huff, Program Manager – Information Technology and Graphics Services
  - Katherine Warner, GIS Analyst
- Field Reconnaissance Survey
  - Michele Lee, Botanist/ Biologist
  - David Daitch, Program Manager/Senior Biologist

Appendix A

Regulatory Framework

Appendix A
Regulatory Framework

The following is a brief summary of the regulatory context under which biological resources are managed at the federal and state levels. A number of federal and state statutes provide a regulatory structure that guides the protection of biological resources. Agencies with the responsibility and regulatory guiding documents for protection of biological resources within the project area include:

- *U.S. Army Corps of Engineers (wetlands and other waters of the United States);*
- *U.S. Fish and Wildlife Service (federally listed species and migratory birds);*
- *California Department Fish and Wildlife (formerly California Department of Fish and Game) (riparian areas and other waters of the State, state-listed species);*
- *Regional Water Quality Control Board (waters of the State).*

These agencies are responsible for ensuring the implementation of regulations under the following acts and laws:

- *California Environmental Quality Act (CEQA);*
- *Federal Endangered Species Act (FESA);*
- *California Endangered Species Act (CESA);*
- *Federal Clean Water Act (CWA);*
- *California Fish and Game Code (CFGC);*
- *Migratory Bird Treaty Act (MBTA);*
- *The Bald and Golden Eagle Protection Act;* and
- *Porter-Cologne Water Quality Control Act.*

Federal Regulations

Federal Endangered Species Act. The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Oceanic and Atmospheric Administration Fisheries Service or National Marine Fisheries Service (NMFS). The USFWS maintains a worldwide list of endangered species. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees.

The law requires federal agencies, in consultation with the USFWS and/or NMFS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife. Likewise, import, export, interstate, and foreign commerce of listed species are all generally prohibited.

Clean Water Act and U.S. Army Corps of Engineers. Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) has authority to regulate activities that could discharge fill of material or otherwise adversely modify wetlands or other “waters of the

United States." Perennial and intermittent creeks are considered waters of the United States if they are hydrologically connected to other jurisdictional waters. The USACE also implements the federal policy embodied in Executive Order 11990, which is intended to result in no net loss of wetland value or acres. In achieving the goals of the Clean Water Act, the USACE seeks to avoid adverse impacts and offset unavoidable adverse impacts on existing aquatic resources. Any fill or adverse modification of wetlands that are hydrologically connected to jurisdictional waters would require a permit from the USACE prior to the start of work. Typically, when a project involves impacts to waters of the United States, the goal of no net loss of wetland acres or values is met through compensatory mitigation involving the creation or enhancement of similar habitats.

State Water Resources Control Board. The CWA established the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards, granting these agencies the responsibility for controlling water quality in California. This act created a water quality policy, enforced standards for water quality, and regulated the discharge of pollutants from point and non-point sources. The State Control Board was additionally authorized to establish water quality guidelines for long range resource planning concerning ground and surface water management and the use of recycled water. This act has become the cornerstone of water protection regulations in California and was used as the basis of several sections of the Federal Water Pollution Control Act Amendments of 1972.

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act (Cal. Water Code § 13000 et seq.) provides for implementation of the federal CWA by SWRCB, including issuance of Section 401 Certifications and Section 402 NPDES Permits. Issuance of a Section 401 Certification requires documenting compliance with state water quality standards, including watershed plans, designated beneficial uses, and the total maximum daily load (TMDL) program. The Porter-Cologne Water Quality Control Act requires the regulation of all pollutant discharges, including wastes in Project runoff that could affect the quality of the state's water. Any entity proposing to discharge a waste must file a Report of Waste Discharge with the appropriate RWQCB or SWRCB. The RWQCBs are responsible for implementing CWA Sections 401, 402, and 303(d). The act also provides for the development and periodic reviews of basin plans that designate beneficial uses of California's major rivers and groundwater basins and establish water quality objectives for those waters. The Act regulates discharges that could affect the quality of waters of the state and requires a waste discharge requirements (WDR) form be obtained for discharges, including fill of wetlands that are not otherwise authorized by Section 404 or Section 402 of the federal CWA.

Migratory Bird Treaty Act. The Migratory Bird Treaty Act (16 United States Code [USC] Section 703-711) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful. Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. According to the Act, a person, association, partnership or corporation which violates the Act or its regulations is guilty of a misdemeanor and subject to a fine of up to $500, jail up to six months, or both. Anyone who knowingly takes a migratory bird and intends to, offers to, or actually sells or barters the bird is guilty of a felony, with fines up to $2,000, jail up to two years, or both. (Permissible fines are increased significantly by the Sentencing Reform Act of 1984, as amended in 1987, which is summarized separately in this Handbook.). The Act should not be construed to prevent states and territories from making or enforcing laws or regulations not inconsistent with the Act or which give further protection to migratory birds, nests and eggs, if such laws and regulations do not extend open seasons.

The Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." As defined by the act "Disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment. A violation of the Act can result in a fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. The USFWS implements the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (16 USC Section 668). The USFWS and NMFS share responsibility for implementing the FESA (16 USC § 153 *et seq.)*. The USFWS generally implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadramous species. Projects that would result in "take" of any federally listed threatened or endangered species are required to obtain permits from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of FESA, depending on the involvement by the federal government in permitting and/or funding of the project. The permitting process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species.

"Take" under federal definition means to harass, harm (which includes habitat modification), pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Proposed or candidate species do not have the full protection of FESA; however, the USFWS and NMFS advise project applicants that they could be elevated to listed status at any time.

State Regulations

California Endangered Species Act. The California Endangered Species Act (CESA) states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. The California Department of Fish and Wildlife will work with all interested persons, agencies and organizations to protect and preserve such sensitive resources and their habitats. CESA allows for take incidental to otherwise lawful activity. CESA emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate mitigation planning to offset project caused losses of listed species.

California Department of Fish and Wildlife. The California Department of Fish and Wildlife (CDFW, formerly the California Department of Fish and Game) derives its authority from the Fish and Game Code (Code) of California. The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 *et. seq.)* prohibits take of state listed threatened, endangered or fully protected species. Take under CESA is restricted to direct mortality of a listed species and does not prohibit indirect harm by way of habitat modification. The CDFW also prohibits take for species designated as Fully Protected under Fish and Game Code.

California Fish and Game Code sections 3503, 3503.5, and 3511 describe unlawful take, possession, or destruction of birds, nests, and eggs. Fully protected birds (Section 3511) may not be taken or possessed except under specific permit. Section 3503.5 of the Code protects all birds-of-prey and their eggs and nests against take, possession, or destruction of nests or eggs.

Species of Special Concern (SSC) is a category used by the CDFW for those species which are considered to be indicators of regional habitat changes or are considered to be potential future protected species. Species of Special Concern do not have any special legal status except that which may be afforded by the Fish and Game Code as noted above. The SSC category is intended by the CDFW for use as a management tool to include these species into special consideration when decisions are made concerning the development of natural lands.

The CDFW also has authority to administer the Native Plant Protection Act (NPPA) (Fish and Game Code Section 1900 *et seq.*). The NPPA requires the CDFW to establish criteria for determining if a species, subspecies, or variety of native plant is endangered or rare. Under Section 1913(c) of the NPPA, the owner of land where a rare or endangered native plant is growing is required to notify the department at least 10 days in advance of changing the land use to allow for salvage of plant.

Perennial and intermittent streams and associated riparian vegetation, when present, also fall under the jurisdiction of the CDFW. Section 1600 et seq. of the Fish and Game Code (Lake and Streambed Alteration Agreements) gives the CDFW regulatory authority over work within the stream zone (which could extend to the 100-year flood plain) consisting of, but not limited to, the diversion or obstruction of the natural flow or changes in the channel, bed, or bank of any river, stream or lake.

Regional Water Quality Control Board. The State Water Resources Control Board (SWRCB) and the local Central Coast Regional Water Quality Control Board (RWQCB) have jurisdiction over "waters of the State," pursuant to the Porter-Cologne Water Quality Control Act, which are defined as any surface water or groundwater, including saline waters, within the boundaries of the State. The SWRCB has issued general Waste Discharge Requirements (WDRs) regarding discharges to "isolated" waters of the State (Water Quality Order No. 2004-0004-DWQ, Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the U.S. Army Corps of Engineers to be Outside of Federal Jurisdiction). The Central Coast RWQCB enforces actions under this general order for isolated waters not subject to federal jurisdiction, and is also responsible for the issuance of water quality certifications pursuant to Section 401 of the Clean Water Act for waters subject to federal jurisdiction.

Appendix B

Site Photographs s

Appendix B
Representative Site Photographs

Photo 1. Proposed Water Treatment Plant (WTP) facility location.

Photo 2. Existing retention basin adjacent to the proposed WTP.

Photo 3. Drainage in oak woodland adjacent to proposed WTP site.

Photo 4. San Francisquito Creek (outside of project area).

Photo 5. Section of the alignment at the golf course club house.

Photo 6. View looking west along the alignment on Sand Hill Road from east of golf course.

Photo7. View of the northeast terminus of the alignment on Sand Hill Road.

Photos 8. View of the central section of the alignment along Sand Hill Road.

Appendix C

Plant Species Observed Onsite

Appendix C
Plant Species Observed in the Vicinity of the Project Area[1]

April 20, 2015

Family Name	Scientific Name	Common Name
Aizoaceae	*Carpobrotus* sp.**	ice plant
Apocynaceae	*Oleander nerium**	oleander
Asteraceae	*Baccharis pilularis*	coyote brush
Asteraceae	*Carduus pycnocephalus***	Italian thistle
Asteraceae	*Dittrichia graveolens***	stinkwort
Asteraceae	*Helminthotheca echioides***	bristly ox-tongue
Asteraceae	*Hypochaeris glabra***	smooth cat's ears
Asteraceae	*Hypochaeris radicata***	rough cat's ears
Asteraceae	*Lactuca serriola**	prickly lettuce
Asteraceae	*Silybum marianum***	milk thistle
Asteraceae	*Sonchus asper* ssp. *asper**	common sow thistle
Brassicaceae	*Brassica nigra***	black mustard
Brassicaceae	*Brassica rapa***	field mustard
Cupressaceae	*Sequoia sempervirens*	coast redwood
Fabaceae	*Acmispon americanus var. americanus*	Spanish clover
Fabaceae	*Lupinus nanus*	sky lupine
Fabaceae	*Medicago polymorpha***	California burclover
Fabaceae	*Melilotus indicus**	sourclover
Fabaceae	*Trifolium dubium**	shamrock clover
Fabaceae	*Trifolium hirtum***	rose clover
Fabaceae	*Vicia villosa**	hairy vetch
Fagaceae	*Quercus agrifolia*	coast live oak
Fagaceae	*Quercus lobata*	valley oak
Geraniaceae	*Erodium botrys**	broadleaf filaree
Geraniaceae	*Erodium cicutarium**	redstem filaree
Geraniaceae	*Geranium dissectum***	cut-leaved geranium
Myrsinaceae	*Lysimachia arvensis* [*Anagallis arvensis*]*	scarlet pimpernel
Onagraceae	*Epilobium brachycarpum*	fireweed
Pinaceae	*Pinus pinea**	Italian stone pine
Poaceae	*Avena barbata***	slender wild oat
Poaceae	*Avena fatua***	wild oat
Poaceae	*Briza minor**	quaking grass
Poaceae	*Bromus diandrus***	ripgut grass
Poaceae	*Bromus hordeaceus***	soft chess
Poaceae	*Festuca bromoides**	brome fescue

Family Name	Scientific Name	Common Name
Poaceae	*Festuca myuros***	rattail sixweeks grass
Poaceae	*Festuca perennis***	rye grass
Poaceae	*Phalaris aquatica***	Harding grass
Poaceae	*Stipa pulchra*	purple needle grass
Polygonaceae	*Rumex crispus***	curly dock
Rosaceae	*Heteromeles arbutifolia*	toyon

*Indicates a non-native species.
** Indicates a non-native species that is recognized and being tracked by the California Invasive Plant Council (Cal-IPC).

Notes[1]: This list includes plant species that were observed in the immediate vicinity of the project area as well as the project area because the April 20, 2015 reconnaissance survey included a broader study area that was subsequently reduced to the project area. Not all ornamental trees in the project area and vicinity are included on this list.

Appendix D

Wildlife Species Observed Onsite

Appendix D
Animal Species Observed in the Vicinity of the Project Area[1]

April 20, 2015

Common Name	**Scientific Name**
REPTILES	
southern alligator lizard	*Elgaria multicarinata*
western fence lizard	*Sceloporus occidentalis*
BIRDS	
mallard	*Anas platyrhynchos*
western scrub-jay	*Aphelocoma californica*
red-tailed hawk	*Buteo jamaicensis*
great egret	*Ardea alba*
killdeer	*Charadrius vociferus*
American crow	*Corvus brachyrhynchos*
dark-eyed junco	*Junco hyemalis*
MAMMALS	
western gray squirrel	*Sciurus griseus*
California ground squirrel	*Otospermophilus beecheyi*

*Indicates a non-native species.

Note[1]: This list includes animal species that were observed in the immediate vicinity of the project area as well as the project area because the April 20, 2015 reconnaissance survey included a broader study area that was subsequently reduced to a smaller project area.

Appendix E

Regionally Occurring Special Status Species

Appendix E - Regionally Occurring Special Status Species

Table E1. Special Status Plants

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Plants					
Acanthomintha duttonii San Mateo thorn-mint Alliaceae	FE/SE/1B.2	San Mateo county.	Occurs in chaparral and valley and foothill grassland in serpentinite. Elevations: 50 – 300 meters.	April - June	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support serpentine substrates.
Allium peninsulare var. *franciscanum* Franciscan onion Alliaceae	--/--/1B.2	Mendocino, Santa Clara, San Mateo, Sonoma counties.	Occurs in cismontane woodland and valley and foothill grassland on clay and volcanic substrates that are often serpentine. Elevations: 52-300 meters.	April-June	**No.** Suitable habitat for this species does not occur within the project area.
Amsinckia lunaris bent-flowered fiddleneck Boraginaceae	--/--/1B.2	Alameda, Contra Costa, Colusa, Lake, Marin, Napa, San Benito, Santa Clara, Santa Cruz, San Mateo, Sonoma, and Yolo counties.	Occurs in coastal bluff scrub, cismontane woodland, and valley and foothill grassland. Elevations: 3-500 meters.	March - June	**No.** Suitable habitat for this species does not occur within the project area.
Arctostaphylos andersonii Anderson's manzanita Ericaceae	--/--/1B.2	Santa Clara, Santa Cruz, and San Mateo counties.	Occurs in openings and edges in broadleafed upland forest, chaparral, and north Coast coniferous forest. Elevations: 60-760 meters	November - May	**No.** Suitable habitat for this species does not occur within the project area.
Arctostaphylos regismontana Kings Mountain arctostaphylos Ericaceae	--/--/1B.2	Santa Clara, Santa Cruz?, and San Mateo counties.	Occurs on granitic and sandstone substrates in broadleafed upland forest, chaparral, and North Coast coniferous forest. Elevations: 305-730 meters.	January - April	**No.** Suitable habitat for this species does not occur within the project area.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Astragalus tener var. *tener* alkali milk-vetch Fabaceae	--/--/1B.2	Alameda, Contra Costa*, Merced, Monterey*, Napa, San Benito*, Santa Clara*, San Francisco*, San Joaquin*, Solano, Sonoma*, Stanislaus*, and Yolo counties.	Occurs in alkaline regions within playas, adobe clay valley and foothill grassland, and vernal pools. Elevations: 1-60 meters.	March-June	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support alkaline substrates.
California macrophylla round-leaved filaree Geraniaceae	--/--/1B.1	Alameda, Butte (BUT), Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Lassen, Los Angeles, Merced, Monterey, Napa, Riverside, Santa Barbara, San Benito, Santa Clara, Santa Cruz Island*, San Diego, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, Stanislaus, Tehama, Tulare, Ventura, and Yolo counties.	Occurs in clay soils within cismontane woodland and valley and foothill grassland. Elevations: 15-1200 meters.	March-May	**No.** Suitable habitat for this species does not occur within the project area.
Centromadia parryi ssp. *congdonii* Congdon's tarplant Asteraceae	--/--/1B.2	Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz*, San Luis Obispo, San Mateo, and Solano* counties.	Occurs on alkaline substrates within valley and foothill grassland. Elevations: 0-230 meters.	May-November	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support alkaline substrates.
Cirsium fontinale var. *fontinale* Crystal Springs fountain thistle Asteraceae	FE/CE/1B.1	San Mateo County.	Occurs in serpentinite seeps within chaparral (openings), cismontane woodland, meadows and valley and foothill grassland. Elevations: 45-175 meters.	April - October	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support serpentine substrates.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Cirsium praeteriens lost thistle Asteraceae	--/--/1A	San Mateo County*.	Unknown. Elevations: 0-100 meters.	June - July	**No.** Suitable habitat for this species does not occur within the project area. This species is believed to be extirpated from California.
Collinsia multicolor San Francisco collinsia Polygonaceae	--/--/1B.2	Monterey, Marin, Santa Clara, Santa Cruz, San Francisco, and San Mateo counties.	Occurs in closed-cone coniferous forest and coastal scrub, occasionally found on serpentine substrates. Elevations: 30-250 meters.	March-May	**No.** Suitable habitat for this species does not occur within the project area.
Dirca occidentalis western leatherwood Thymelaeaceae	--/--/1B.2	Alameda, Contra Costa, Marin, Santa Clara, San Mateo, and Sonoma counties.	Occurs in mesic sites and brushy slopes in broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, north Coast coniferous forest, riparian forest, and riparian woodland. Elevations: 25-425 meters.	January - April	**No.** Suitable habitat for this species does not occur within the project area.
Eriophyllum latilobum San Mateo woolly sunflower Asteraceae	FE/CE/1B.1	San Mateo County.	Cismontane woodland (often serpentinite and on roadcuts). Elevations: 45-150 meters.	May - June	**No.** Suitable habitat for this species does not occur within the project area.
Eryngium aristulatum var. *hooveri* Hoover's button-celery Apiaceae	--/--/1B.1	Alameda, San Benito, Santa Clara*?, San Diego, and San Luis Obispo counties.	Vernal pools. Elevations: 3-45 meters.	June - August	**No.** Suitable habitat for this species does not occur within the project area.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Etriplex joaquinana San Joaquin spearscale Chenopodiaceae	--/--/1B.2	Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Santa Clara*, San Joaquin*, San Luis Obispo?, Solano, Tulare?*, and Yolo counties.	Occurs on alkaline substrates within chenopod scrub, meadows and seeps, playas, and valley and foothill grassland. Elevations: 1-835 meters.	April - October	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support alkaline substrates.
Fritillaria biflora var. *ineziana* Hillsborough chocolate lily Liliaceae	--/--/1B.1	San Mateo County.	Occurs on serpentine substrates in cismontane woodland and valley and foothill grassland. Elevations: 90-160 meters.	March - April	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support serpentine substrates.
Fritillaria liliacea fragrant fritillary Liliaceae	--/--/1B.2	Alameda, Contra Costa, Monterey, Marin, San Benito, Santa Clara, San Francisco, San Mateo, Solano, and Sonoma Counties.	Often occurs on serpentine substrates within cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland. Elevations: 3-410 meters.	February-April	**No.** Suitable habitat for this species does not occur within the project area.
Hesperolinon congestum Marin western flax Linaceae	FT/CT/1B.1	Marin, San Francisco, and San Mateo counties.	Occurs serpentine substrates within chaparral, and valley and foothill grassland. Elevations: 5 - 370 meters.	April - July	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support serpentine substrates.
Legenere limosa legenere Campanulaceae	--/--/1B.1	Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus*, Tehama, and Yuba counties.	Occurs in vernal pools. Elevations: 1-880 meters.	April-June	**No.** Suitable habitat for this species does not occur within the project area.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Lessingia micradenia var. *arachnoidea* Crystal Springs lessingia Asteraceae	--/--/1B.2	San Mateo and Sonoma counties.	Occurs in serpentine substrates and often on roadsides within cismontane woodland, coastal scrub, and valley and foothill grassland. Elevations: 60-200 meters	July - October	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support serpentine substrates.
Malacothamnus aboriginum Indian Valley bush-mallow Malvaceae	--/--/1B.2	Fresno, Kings, Monterey, San Benito, Santa Clara, and San Mateo counties.	Occurs in rocky and granitic, substrates and often in burned areas within chaparral and cismontane woodland. Elevations: 150-1700 meters.	April - October	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support rocky substrates.
Malacothamnus arcuatus arcuate bush-mallow Malvaceae	--/--/1B.2	Santa Clara, Santa Cruz, and San Mateo counties.	Occurs in chaparral and cismontane woodland. Elevations: 15-355 meters.	April - September	**No.** Suitable habitat for this species does not occur within the project area.
Malacothamnus davidsonii Davidson's bush-mallow Malvaceae	--/--/1B.2	Kern, Los Angeles, Monterey, Santa Barbara, Santa Clara, San Luis Obispo, San Mateo, and Ventura counties.	Occurs in chaparral, cismontane woodland, coastal scrub, and riparian woodland. Elevations: 185-855 meters.	June - January	**No.** While oak woodland in the project area is potentially suitable habitat for this species, it has not been previously documented within a five-mile radius of the project area and is considered unlikely to occur.
Malacothamnus hallii Hall's bush-mallow Malvaceae	--/--/1B.2	Contra Costa, Lake, Mendocino, Merced, Santa Clara, San Mateo, and Stanislaus counties.	Occurs in chaparral and coastal scrub. Elevations: 10-760 meters.	May - October	**No.** Suitable habitat for this species does not occur within the project area.
Monolopia gracilens woodland woolythreads Asteraceae	--/--/1B.2	Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz, San Luis Obispo, and San Mateo counties.	Occurs on serpentine substrates in openings within broadleafed upland forest, north coast coniferous forest, chaparral, cismontane woodland, and valley and foothill grassland. Elevations: 100-1200 meters.	February-July	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support serpentine substrates.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Pedicularis dudleyi Dudley's lousewort Orobanchaceae	--/CR/1B.2	Monterey, Santa Cruz*, San Luis Obispo, and San Mateo counties.	Occurs in chaparral (maritime), cismontane woodland, north coast coniferous forest, and valley and foothill grassland. Elevations: 60-900 meters.	April - June	**No.** While oak woodland in the project area is potentially suitable habitat for this species, it has not been previously documented within a five-mile radius of the project area and is considered unlikely to occur.
Pentachaeta bellidiflora white-rayed pentachaeta Asteraceae	FE/CE/1B.1	Marin*, Santa Cruz*, and San Mateo counties.	Occurs in cismontane woodland, and valley and foothill grassland (often serpentinite). Elevations: 35-620 meters	March - May	**No.** Suitable microhabitat for this species does not occur within the project area. This species is a small annual plant that inhabits open, rocky areas.
Piperia candida white-flowered rein orchid Orchidaceae	--/--/1B.2	Del Norte, Humboldt, Mendocino, Santa Clara, Santa Cruz, Siskiyou, San Mateo, Sonoma, and Trinity counties.	Occurs sometimes in serpentinite in broadleafed upland forest, lower montane coniferous forest, and north coast coniferous forest. Elevations: 30-1310 meters.	March - September	**No.** Suitable habitat for this species does not occur within the project area.
Plagiobothrys chorisianus var. *chorisianus* Choris' popcorn-flower Boraginaceae	--/--/1B.2	Alameda*?, Monterey, Santa Clara, Santa Cruz, San Francisco, and San Mateo counties.	Occurs in mesic areas in chaparral, coastal prairie, and coastal scrub. Elevations: 15 - 160 meters.	March - June	**No.** Suitable habitat for this species does not occur within the project area.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Senecio aphanactis chaparral ragwort Asteraceae	--/--/2B.2	Alameda, Contra Costa, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, Santa Barbara, San Benito, Santa Clara, Santa Cruz, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, Solano, Santa Rosa Island, and Ventura counties.	Sometimes occurs on alkaline substrates in chaparral, cismontane woodland, and coastal scrub. Elevations: 15 - 800 meters.	January - April	**No.** While oak woodland in the project area is potentially suitable habitat for this species, it has not been previously documented within a five-mile radius of the project area and is considered unlikely to occur.
Stuckenia filiformis ssp. *alpina* slender-leaved pondweed	--/--/2B.2	Alameda, Butte, Contra Costa, El Dorado, Lassen, Merced, Mono, Modoc, Mariposa, Nevada, Placer, Santa Clara*, Shasta, Sierra, San Mateo, Solano, and Sonoma counties.	Occurs in shallow, clear water of freshwater marshes and drainage channels. Elevations: 300-2150 meters.	May - July	**No.** Suitable habitat for this species does not occur within the project area.
Trifolium amoenum two-fork clover Fabaceae	--/CE/1B.1	Marin, Napa*, Santa Clara *, San Mateo, Solano*, and Sonoma*? counties.	Occurs in coastal bluff scrub and valley and foothill grassland (sometimes serpentinite). Elevations: 105-610 meters.	April - June	**Yes.** The valley oak woodland and coast live oak woodland are potentially suitable habitat for this species.
Trifolium hydrophilum saline clover Fabaceae	--/--/1B.2	Alameda, Contra Costa, Colusa?, Lake, Monterey, Napa, Sacramento, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Solano, Sonoma, and Yolo counties.	Occurs in mesic, alkaline areas in vernal pools, seasonal wetlands, and marshes within valley and foothill grassland. Elevations: 0-300 meters.	April-June	**No.** Suitable habitat for this species does not occur within the project area. The project area does not support alkaline substrates.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Triphysaria floribunda San Francisco owl's-clover Orobanchaceae	--/--/1B.2	Marin, San Francisco, San Mateo and counties.	Usually occurs on serpentine substrates within coastal prairie, coastal scrub, and valley and foothill grassland. Elevations: 10-160 meters.	April - June	**No.** Suitable habitat for this species does not occur within the project area.

Table E2. Special Status Wildlife

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Invertebrates					
Euphydryas editha bayensis Bay checkspot butterfly	FT/--/--	Monterey, Santa Clara, San Francisco, and San Mateo counties.	Restricted to native grasslands and dunes on outcrops of serpentine soil in the vicinity of San Francisco Bay. *Plantago erecta* is the primary host plant; *Orthocarpus densiflorus* and *O. purpurscens* are the secondary host plants.	Spring (synchronized with peak flowering period of host plants)	**No.** Suitable habitat for this species does not occur within the project area.
Amphibians					
Ambystoma californiense California tiger salamander Central CA DPS	FT/CT, CSSC/--	Central Valley and surrounding Sierra Nevada foothills and Coast Ranges, occurs from northern Yolo County, near the town of Dunnigan, southward to northwestern Kern County and northern Tulare and Kings counties. Along the coast the range includes southern San Mateo County south to San Luis Obispo County.	Breeding and aestivation habitat includes vernal pools, seasonal and perennial ponds, and surrounding upland areas in grassland and oak savannah.	Adults: wet season (approximately September-April with at least 70% average rainfall) Aquatic Larvae: March-May	**Yes.** Suitable breeding habitat for this species does not occur in the project area, but is documented within 0.4 mile of the project area. The project area could provide suitable burrows for CTS and CTS could be dispersing throughout the project area during migration periods. San Francisquito Creek could potentially provide breeding and upland habitat.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Rana draytonii California red-legged frog	FT/CSSC/--	Found primarily in coastal drainages of central California, from Marin County, south to San Diego County. Also found inland as far north as Shasta County south, west of the crest of the Sierra Nevada in a few isolated locations, south to eastern Tulare County. Current range does not include the Central Valley.	Found in permanent and temporary pools of deep water in streams, marshes, and ponds with dense grassy, shrubby, or emergent vegetation and sometimes in stock ponds without emergent vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to upland aestivation habitat.	November-June	**Yes.** Suitable breeding habitat for this species does not occur in the project area, but the project area provides limited upland dispersal habitat and burrows provide summer refugia. There is a non-breeding record of CRLF within 0.4 mile of the project area. San Francisquito Creek could potentially provide breeding and non-breeding habitat.
Reptiles					
Emys marmorata western pond turtle	--/CSSC/--	Found along the entire western part of California, including the coast ranges and the central valley, west of the crest of Cascades and Sierra Nevadas.	Occurs in ponds, marshes, rivers, streams, and irrigation canals with moderate amounts of riparian and emergent vegetation. Requires open sunny sites for basking and gently sloped open upland habitat for egg laying.	March-October	**Yes.** Suitable breeding habitat for this species does not occur in the project area, but this species could potentially be present in the project area if it is present in the adjacent San Francisquito Creek riparian corridor or the golf course pond.
Thamnophis sirtalis tetrataenia San Francisco garter snake	FE/SE, CFP/--	San Mateo County and extreme northern Santa Cruz County.	Freshwater marshes, ponds, seasonal wetlands, and slow moving streams. Prefers dense cover and water depths of at least one foot. Grasslands and open shrublands near water are important for hunting, basking, and refuge in small mammal burrows.	Spring-Fall	**Yes.** Suitable breeding habitat for this species does not occur in the project area, but this species could potentially be present in the project area if it is present in the adjacent San Francisquito Creek riparian corridor.
Birds					

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Agelaius tricolor tricolored blackbird	--/CE, CSSC/--	Breeds primarily in the Central Valley and a few other locations west of the Cascades and Sierra Nevadas.	Requires riparian habitat, ponds, and other wetland features with emergent vegetation such as cattails or blackberry for nesting. Forages in open fields, grasslands, and agricultural croplands.	Year Round	**No.** Suitable breeding habitat for this species does not occur in the project area.
Asio flammeus short-eared owl	--/CSSC/--	Breeds sparsely in the northeast portion of California, south to Lassen County, southern Sacramento Valley, around the San Francisco Bay, and south to Monterey County.	Occurs in open areas with few trees and grasslands, dunes, meadows, and irrigated croplands. Frequents saline and emergent wetlands. Nests on the ground in prairies, tundra, savannahs, or meadows with enough vegetation to conceal the incubating female.	Year Round	**No.** Suitable breeding habitat for this species does not occur in the project area.
Athene cunicularia burrowing owl	--/CSSC/--	Occurs throughout the Central Valley, the Modoc Plateau and northeastern California, and the southeastern portions of the State.	Occurs in open dry grasslands and desert habitats. Also occurs in open areas within pinyon-juniper shrublands.	Year Round	**No.** Suitable breeding habitat for this species does not occur in the project area. Ruderal/developed areas are densely vegetated. Few burrows were observed.
Circus cyaneus northern harrier	--/CSSC/--	Occurs in California in coastal areas, Central Valley, northeastern California, and Sierra Nevada region up to 3,600 feet.	Occurs in open areas, particularly in grasslands, wet meadows and marshes; requires larges areas for foraging. Nests and forages in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation.	Year Round	**No.** Suitable habitat for this species does not occur in the project area.
Elanus leucurus white-tailed kite	--/CFP/--	Occurs throughout most of California's coastal and valley regions excluding the Cascades, Sierra Nevadas, Mojave Desert, and Peninsular Ranges.	Grasslands, dry farmed agricultural fields, savannahs and relatively open oak woodlands, and other relatively open lowland scrublands.	Year Round	**Yes.** Potentially suitable nesting habitat for this species occurs in the project area. Large mature trees may provide suitable nesting sites. Foraging habitat is limited to one narrow strip of ruderal habitat adjacent to the Sand Hill Road.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Lanius ludovicianus Loggerhead shrike	--/CSSC/--		Occurs in broken woodlands, savannah, pinyon-juniper, Joshua tree, riparian woodlands, desert oases, and scrub and washes. Nests in dense shrubs and prefers open grasslands for perching and hunting.	(Breeding) February- June	**No.** Suitable habitat for this species does not occur within the project area.
Riparia riparia bank swallow	--/CT/--	Found primarily along the Sacramento and Feather Rivers, within eastern Siskiyou, Shasta, and Lassen counties, and south to eastern Monterey County.	Breeds on vertical banks or bluffs with friable soils to excavate burrows. Will also breed along steep roadcuts and sand or gravel mines. Associated with streams and riparian vegetation if banks are present. Forages over lakes, streams, meadows, fields, pastures, bogs, forests, and woodlands.	March-August (Breeding)	**No.** Suitable habitat for this species does not occur within the project area.
Mammals					
Antrozous pallidus pallid bat	--/CSSC/--	Occurs throughout California except for the high Sierra range.	Typically inhabits deserts, grasslands, shrublands, woodlands and forests in arid to semi-arid areas. Most common in open, dry habitats with rocky areas for roosting. Prefers rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings. Very sensitive to disturbance of roosting sites.	Year Round	**No.** Suitable habitat for this species does not occur within the project area.
Corynorhinus townsendii Townsend's big-eared bat	--/C, CSSC/--	Throughout California.	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	Year Round	**No.** Suitable habitat for this species does not occur within the project area.

Scientific Name/ Common Name Family (Plants Only)	Status Federal/State/ CRPR- Other	Distribution	Habitat Requirements	Period of Identification	Rationale
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	--/CSSC/--	Occurs in the San Francisco Bay area in Alameda, Contra Costa, San Mateo, Santa Cruz, and Santa Clara counties.	Typically inhabits chaparral and forest and oak woodland habitats, with a moderate canopy and a moderate to dense understory. May prefer chaparral and redwood habitats. Builds nests/middens in suitable habitat and lives in these structures year-round.	Year Round	**No.** Suitable habitat for this species does not occur within the project area.
Taxidea taxus American badger	--/CSSC/--	Although relatively uncommon, found throughout most of California within suitable habitat.	Requires open, arid habitats, but are most commonly associated with grasslands, savannahs, mountain meadows, and open areas of desert scrub. Soils must be friable for burrow excavation.	Year Round	**No.** Suitable habitat for this species does not occur within the project area.

STATUS CODES
FE: Federally Endangered
FT: Federally Threatened
FD: Federally Delisted
C: Candidate Threatened
CE: California Endangered
CT: California Threatened
CR: California Rare
CSSC: California Species of Special Concern
CFP: California Fully Protected
CRPS 1A: Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
CRPS 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
CRPS 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
? Uncertain About Distribution or Identity
*May be Extirpated

Sources: CDFW, 2015a; USFWS, 2015b; and CNPS, 2015.

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Appendix D - Cultural Resources Assessment

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West Bay Sanitary District

West Bay Sanitary District Recycled Water Project – Sharon Heights

Phase I Cultural Resources Study

U.S.G.S. *Palo Alto* quadrangle

Prepared for:
RMC Water and Environment
10509 Vista Sorrento Parkway, Suite 205
San Diego, California 92121

Prepared by:
Rincon Consultants, Inc.
180 Grand Avenue
Oakland, CA 94612

Authors: Breana Campbell, B.A., Hannah Haas, B.A.,
and Kyle Brudvik, M.A., RPA

October 15, 2015

rincon

Keywords: Palo Alto, CA quadrangle;
San Mateo County; intensive pedestrian survey;
Resource P-41-000259/P-43-002239; negative findings; monitoring

E n v i r o n m e n t a l   S c i e n t i s t s   P l a n n e r s   E n g i n e e r s

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Campbell, B., H. Haas, and K. Brudvik

2015 *Phase I Cultural Resources Study for the West Bay Sanitary District Recycled Water Project – Sharon Heights, San Mateo County, California*. Rincon Consultants Project No. 15-01334 Report on file at the Northwest Information Center, Rohnert Park, California.

West Bay Sanitary District
Recycled Water Project – Sharon Heights
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EXECUTIVE SUMMARY

Rincon Consultants, Inc. (Rincon) was retained by RMC Water and Environment to conduct a Phase I cultural resources study for the West Bay Sanitary District Water Recycling Project – Sharon Heights, located within the City of Menlo Park, San Mateo County, California. This study was conducted in accordance with the California Environmental Quality Act (CEQA) and CEQA-Plus, which requires compliance with Section 106 of the National Historic Preservation Act (NHPA), and presents the results of a cultural resources records search of the project area of potential effects (APE) and 0.5-mile buffer, consultation with Native American groups and individuals, local interested parties consultation, an intensive pedestrian survey of the APE, and preparation of this technical report. The proposed APE is situated within the City of Menlo Park and includes approximately 3.25 miles of pipeline corridor and approximately one acre of footprint for the satellite treatment plant, and approximately 200 square feet for the pump station. The pipeline corridor extends through existing roads, parking lots, and the Sharon Heights Golf and Country Club.

Three previously recorded archaeological resources were identified adjacent to the current project APE as a result of the records search and Native American scoping. One of these resources (P-41-000259/P-43-002239) is recorded directly adjacent to the eastern extension of the project APE and is presumed eligible under the California Register of Historical Resource (CRHR). This site was excavated from 1987 to 2004 by Ohlone Family Consulting Services in cooperation with Stanford University. The excavations took place to recover burial deposits and associated artifacts identified during construction activities for the widening of Sand Hill Road. One burial associated with the site was found along the western margin of Sand Hill Road approximately 10 feet east of the eastern extent of the APE.

No new archaeological resources were identified as a result of the pedestrian survey conducted for this report. Based on the results of the field investigation, Rincon recommends a finding of no impact to historical resources under CEQA and no effect to historic properties under the NHPA. Although no resources were identified within the APE, the area is sensitive for buried archaeological resources, including human remains. Based on this sensitivity, Rincon recommends archaeological and Native American monitoring for all ground-disturbance activities and measures for the unanticipated discovery of human remains. These measures are discussed here.

ARCHAEOLOGICAL AND NATIVE AMERICAN MONITORING

Rincon recommends archaeological and Native American monitoring of all project-related ground-disturbing activities under the direction of an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (National Park Service 1983). If archaeological resources are encountered during ground-disturbing activities, all earth disturbing work within the vicinity of the find shall be temporarily suspended or redirected until an archaeologist has evaluated the nature and significance of the find. Evaluation of significance for the find may include the determination of whether or not the find qualifies as an archaeological site. Isolated finds do not qualify as historical resources under CEQA or historic properties under the NHPA and typically require no management consideration under either regulation. Should any resource(s) be identified, an evaluation of eligibility for the CRHR and NRHP may be required through the development of a treatment plan including a research design and subsurface testing through the excavation of test units and shovel test pits. After effects to the find have been appropriately mitigated, work in the area may resume. Mitigation of effects to the find may include a damage assessment of the find, archival research, and/or data recovery to remove any identified archaeological deposits, as determined by a qualified archaeologist.

UNANTICIPATED DISCOVERY OF HUMAN REMAINS

The discovery of human remains is always a possibility during ground disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the San Mateo County coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

1.0 INTRODUCTION

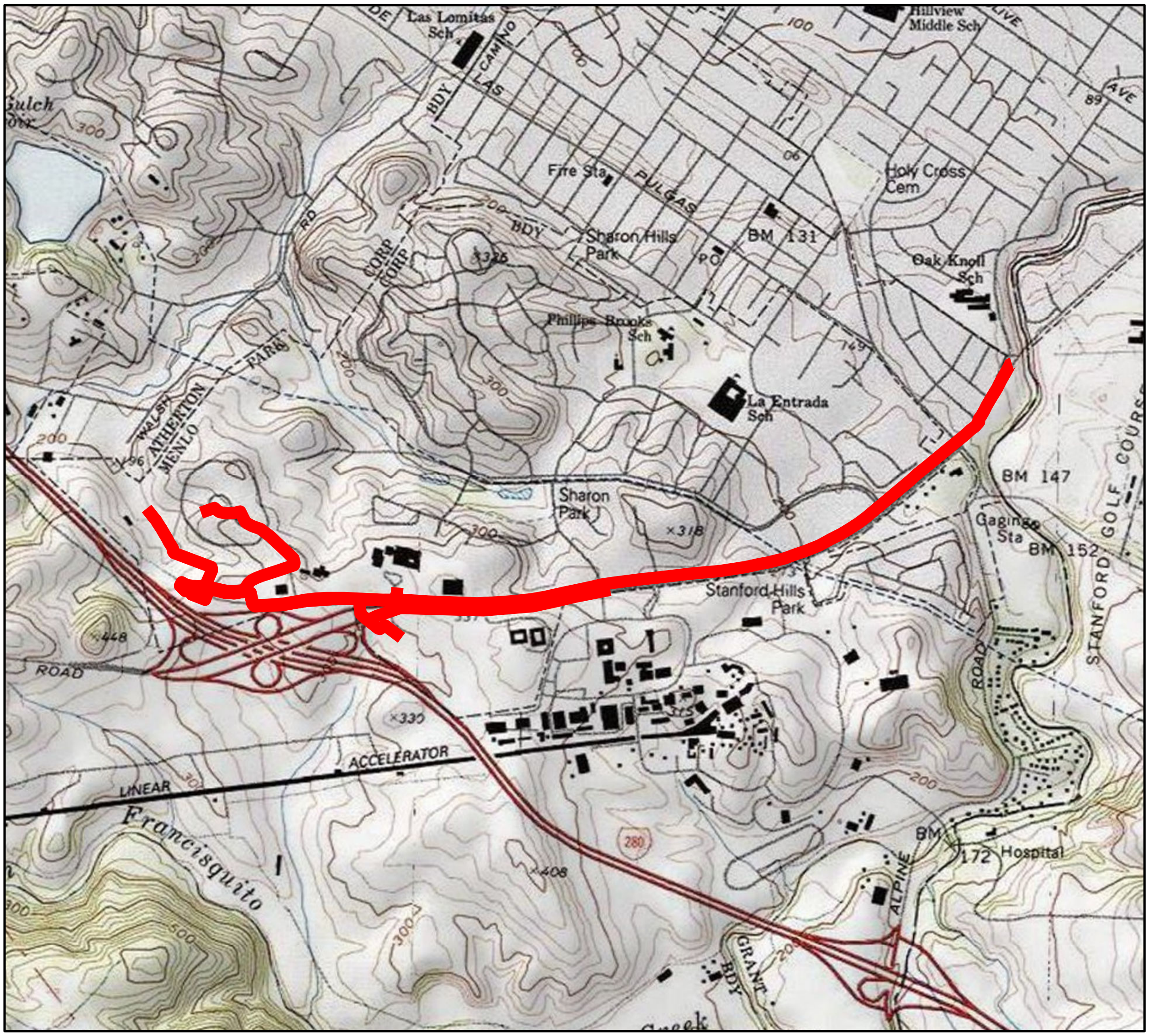
Rincon Consultants, Inc. (Rincon) was retained by RMC Water and Environment to conduct a Phase I cultural resources study for the West Bay Sanitary District Recycled Water Project – Sharon Heights, located within the City of Menlo Park, San Mateo County, California. This study has been prepared in accordance with the California Environmental Quality Act (CEQA) statutes and guidelines, the California State Water Resources Control Board's Clean Water State Revolving Funds criteria for CEQA-Plus cultural resources study, and in consideration of the National Environmental Policy Act (NEPA) in the event that a Federal nexus with the project is established (e.g., federal funding or permit/approval). This cultural resources study includes a records search, Native American consultation, local interested parties consultation, an intensive pedestrian survey of the project site, and preparation of this report.

1.1 PROJECT DESCRIPTION

The proposed project is located in the City of Menlo Park, generally within the Sharon Heights Golf Course (SHG&CC) and along Sand Hill Road between its intersection with Oak Avenue on the east and Highway 280 on the west. The Area of Potential Effects (APE) includes the area of direct impact (ADI), consisting of all areas where work related to the project will occur. The ADI includes approximately one acre of footprint for the satellite treatment plant, approximately 200 square feet for the pump station site, and approximately 3.25 miles of corridor for pipeline installation within existing roadways, parking lots, and the SHG&CC. The APE is depicted on the United States Geological Survey (USGS) Palo Alto, 7.5-minute topographic quadrangle within Township 6 South, Range 3 West, Section 8, 9, 16, and 17 (Figure 1). Land uses immediately adjacent to the project APE includes land developed for residential and commercial purposes.

The West Bay Sanitary District Recycled Water Project – Sharon Heights proposes to provide recycled water to the SHG&CC as well as other local users in the West Bay Sanitary District area. Components of the project would include wastewater supply conveyance, treatment plant, discharge pipelines, and pump stations. The pump station and forcemain would convey raw wastewater from the collection system main at the intersection of Sand Hill Road and Oak Avenue to the SHG&CC, including pipeline installation within a 3.25-mile corridor in existing roadways, parking lots, and the SHG&CC. The treatment plant would be constructed immediately adjacent to an existing storage pond on the southern edge of the SHG&CC. Solid wastes from the treatment plant would be discharged through 1,600-feet of pipeline to be constructed from the plant to an existing sewer on the far side of the golf course.

The first phase of recycled water distribution pipelines would require approximately 5,300 LF of 6-inch PVC pipe to deliver recycled water from the treatment facility site to SLAC. The second phase of recycled water distribution pipelines would require approximately 6,340 LF of 6-inch PVC pipe to deliver recycled water from the treatment facilities to the Rosewood Sand Hill, Sand Hill Commons, and Sharon Land Co.



Imagery provided by National Geographic Society, ESRI and its licensors © 2015. Palo Alto Quadrangle. T6S, R3W S8,9,16 & 17. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Area of Potential Effects

0 1,000 2,000
Feet
1:24,000

N

Area of Potential Effects

Figure 1

West Bay Sanitary District

1.2 REGULATORY SETTING

1.2.1 State

CEQA requires a lead agency determine whether a project may have a significant effect on historical resources (Public Resources Code [PRC], Section 21084.1). A *historical resource* is a resource listed in, or determined to be eligible for listing, in the California Register of Historical Resources (CRHR), a resource included in a local register of historical resources or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be *historically significant* (State CEQA Guidelines, Section 15064.5[a][1-3]).

A resource shall be considered *historically significant* if it meets any of the following criteria:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, if it can be demonstrated that a project will cause damage to a *unique archaeological resource*, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC, Section 21083.2[a], [b], and PRC, Section 21083.2(g) defines a *unique archaeological resource* as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
2) Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

1.2.2 Federal

This project may involve the use of funds provided by the federal government. Therefore, this project has been conducted according to the CEQA-Plus regulatory standards. To ensure compliance with the NHPA, cultural resources are considered during federal undertakings chiefly under Section 106 of the NHPA of 1966 (as amended) through one of its implementing regulations, 36 CFR 800 (Protection of Historic Properties), as well as the National Environmental Policy Act (NEPA). Properties of traditional religious and cultural importance to Native Americans are considered under Section 101(d)(6)(A) of NHPA. Other federal laws include the Archaeological and Historic Preservation Act of 1974, the American Indian

Religious Freedom Act (AIRFA) of 1978, the Archaeological Resources Protection Act (ARPA) of 1979, and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1989, among others.

Section 106 of the NHPA (16 United States Code [USC] 470f) requires federal agencies to take into account the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (36 CFR 800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed to reduce any impacts to an acceptable level. Significant cultural resources are those resources that are listed in or are eligible for listing in the NRHP per the criteria listed below (36 CFR 60.4).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and that:

(a) Are associated with events that have made a significant contribution to the broad patterns of our history; or
(b) Are associated with the lives of persons significant in our past; or
(c) Embody the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
(d) Have yielded, or may be likely to yield, information important in prehistory or history.

1.3 AREA OF POTENTIAL EFFECTS

The area of potential effects (APE) of an undertaking is defined in 36 CFR 800.16(d) as the "geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties if any such property exists." Additionally CEQA-Plus guidelines state that the APE is "three-dimensional (depth, length, width) and includes all areas directly affected by the proposed construction" (State Water Resources Control Board 2004). The current undertaking is located within the existing SHG&CC and along the paved Sand Hill Road. The APE includes the area of direct impact (ADI), consisting of all areas where work related to the project will occur. The ADI includes approximately one acre of footprint for the satellite treatment plant, approximately 200 square feet for the pump station site, and approximately 3.25 miles of corridor for pipeline installation within existing roadways, parking lots, and the SHG&CC. These components are largely expected to remain below the surface after construction. Therefore, any indirect effects to surrounding properties will be temporary and will not persist after completion of the undertaking. The depth, length, and width of the APE for these elements are discussed here.

An influent submersible pump station and valve box will be installed in the cul-de-sac immediately west of Sand Hill Road, just south of the intersection with Oak Avenue. Together, the pump station and valve box measure approximately 20 feet (north-south dimension) by 10 feet (west-east). They will be placed at a depth sufficient to intercept the currently installed 36-inch sewer mainline under Oak Avenue and Sand Hill Road via an 8-inch connector pipe (RMC 2015). The depth of the pump station is expected to be at least 4-6 feet below the surface to tie into existing sewage lines.

Pipelines will be installed along a 3.25-mile corridor beneath the surface of existing roads, parking lots, and the SHG&CC. The pipelines will be tied the new facilities and existing sewage lines. The width of surface trenching may be expected at approximately 5 feet in width. The depth of the pipeline is expected to be consistent with existing infrastructure (5.25 feet) for integration.

The Satellite Treatment Facility will measure approximately 150 feet (east-west) by 300 feet (north-south), encompassing an area of nearly one acre. The Treatment Facility will include tanks, pumps, and grit removal features that will largely be placed below grade so that odors are reduced as much as possible (RMC 2015). The depth of the satellite treatment facility will be approximately 20 feet below the surface.

The distribution pipelines will be installed in two phases. The first phase will include approximately 5,300 linear feet (LF) of 6-inch PVC pipe to be installed at a depth of 5.25 feet. The second phase will involve the installation of 6,340 LF of 6-inch PVC pipe to deliver water from treatment facilities to the Rosewood Sand Hill, Sand Hill Commons, and Sharon Land Co. and will be placed at a depth of 5.25 feet.

1.4 PERSONNEL

Rincon archaeologist Kyle Brudvik, M.A., Registered Professional Archaeologist (RPA), conducted the records search at the Northwestern Information Center (NWIC) performed the pedestrian survey, and served as principal investigator for this study. Mr. Brudvik meets the Secretary of the Interior's *Professional Qualification Standards* for prehistoric and historic archaeology (NPS 1983). Rincon Archaeologists Breana Campbell and Hannah Hass served as the primary authors of this report and conducted the Native American consultation. Rincon Cultural Resources Principal Investigator Christopher Duran, M.A., RPA, provided senior cultural resources oversight. Rincon Cultural Resources Program Manager Kevin Hunt, B.A., managed this cultural resources study and provided program-level oversight. Rincon GIS Analyst Marcus Klatt prepared the figures found in the report. Rincon Vice President Duane Vander Pluym, D. Env., reviewed this report for quality control.

2.0 ENVIRONMENTAL SETTING

The project APE is located within the corporate limits of the City of Menlo Park at an approximate elevation of 50-100 meters (165-330 feet) above mean sea level. The project is located generally along Sand Hill Road and within the SHG&CC. Vegetation within the golf course portion of the project site consists of non-native grass. Most of the APE is covered by pavement or golf course lawn.

3.0 CULTURAL SETTING

3.1 PREHISTORIC SETTING

The project APE lies in the San Francisco Bay Area archaeological region (Milliken et al. 2007; Moratto 1984). Following Milliken et al. (2007), the prehistoric cultural chronology for the Bay Area can be generally divided into five periods: the Early Holocene (8,000-3,500 B.C.), Early (3,500-500 B.C.), Lower Middle (500 B.C. to A.D. 430), the Upper Middle (A.D. 430-1050), and the Late Period (A.D. 1050-contact).

It is presumed that early Paleoindian groups lived in the area prior to 8,000 B.C. However, no evidence for that period has been discovered in the Bay Area to date (Milliken et al. 2007). For this reason, the terminal Pleistocene Period (ca. 11,700-8,000 B.C.) is not discussed here.

The earliest intensive study of the archaeology of the San Francisco Bay Area began with N. C. Nelson of the University of California, Berkeley, between 1906 and 1908. He documented over 100 shell mounds along the shores of Alameda and Contra Costa counties. Nelson was the first to identify the Bay Area as a discrete archaeological region (Moratto 1984).

3.1.1 Early Holocene (8,000-3,500 B.C.)

The Early Holocene in the San Francisco Bay Area is characterized by a mobile forager pattern and the presence of millingslabs, handstones, and a variety of leaf-shaped projectile points, though evidence for this period is limited. It is likely that Holocene alluvial deposits buried many prehistoric sites in the area (Moratto 1984; Ragir 1972). Sites such as CA-CCO-696 and CA-CCO-637 in Contra Costa County are two of just a few sites dating to this period. The earliest date for the Early Holocene comes from the CA-CCO-696 at Los Vaqueros Reservoir (Milliken et al. 2007).

3.1.2 Early Period (3,500-600 B.C.)

The Early Period saw increased sedentism from the Early Holocene as indicated by new ground stone technologies (introduction of the mortar and pestle), an increase in regional trade, and the earliest cut-bead horizon. The first documentation of the mortar and pestle, dating to 3,800 B.C., comes from CA-CCO-637 in the Los Vaqueros Reservoir area. By 1,500 B.C., mortars and pestles had almost completely replaced millingslabs and handstones. A shift to a sedentary or semi-sedentary lifestyle is marked by the prevalence of mortars and pestles, ornamental grave associations, and shell mounds. The earliest cut bead horizon, dating to this period, is represented by rectangular *Haliotis* (abalone) and *Olivella* (snail) beads from several sites, including CA-CCO-637, CA-SCL-832 in Sunnyvale, and CA-ALA-307 in Berkeley (Milliken et al. 2007). The advent of the mortar and pestle indicate a greater reliance on processing nuts such as acorns. Faunal evidence from various sites indicates a diverse diet based on mussel and other shellfish, marine mammals, terrestrial mammals, and birds (D'Oro 2009).

3.1.3 Lower Middle Period (500 B.C.-A.D. 430)

The Lower Middle Period saw numerous changes from the previous period. Rectangular shell beads, common during the Early Period, disappear completely and are replaced by split-beveled and saucer *Olivella* beads. In addition to the changes in beads, *Haliotis* ornaments, bone tools and ornaments, and basketry awls indicating coiled basketry manufacture appeared. Mortars and pestles continued to be the dominant grinding tool (Milliken et al. 2007). Evidence for the Lower Middle Period in the Bay Area comes from sites such as the Emeryville shell mound (CA-ALA-309) and Ellis Landing (CA-CCO-295). CA-ALA-309 is one of the largest shell mounds in the Bay Area and contains multiple cultural sequences. The lower levels of the site, dating to the Middle Period, contain flexed burials with bone implements, chert bifaces, charmstones, and oyster shells (Moratto 1984).

3.1.4 Upper Middle Period (A.D. 430-1050)

Around A.D. 430, *Olivella* saucer bead trade networks established during earlier periods collapsed and over half of known sites occupied during the Lower Middle Period were abandoned. *Olivella* saucer beads were replaced with *Olivella* saddle beads. New items appear at sites, including elaborate, decorative blades, fishtail charmstones, new *Haliotis* ornament forms, and mica ornaments. Sea otter bones became more frequent from earlier periods (Milliken et al. 2007). Excavations at CA-ALA-309 have indicated a shift from oysters to clams at that site. Subsistence analysis at various sites dating to this period indicate a diverse diet that included various species of fish, mammal species, bird species, shellfish, and plant resources that varied by location within the Bay Area (Hylkema 2002).

3.1.5 Late Period (A.D. 1050-contact)

The Late Period saw an increase in social complexity, indicated by differences in burials, and an increased level of sedentism relative to preceding periods. Small, finely worked projectile points associated with bow and arrow technology appear around A.D. 1250. *Olivella* shell beads disappeared and were replaced with clamshell disk beads. The toggle harpoon, hopper mortar, and magnesite tube beads also appeared during this period (Milliken et al. 2007). This period saw an increase in the intensity of resource exploitation that correlates with an increase in population (Moratto 1984). Many of the well-known sites of earlier periods, such as the Emeryville shell mound (CA-ALA-309) and the West Berkeley site (CA-ALA-307) were abandoned, possibly due to fluctuating climates and drought that occurred throughout the Late Period (Lightfoot and Luby 2002).

3.2 ETHNOGRAPHIC OVERVIEW

The project APE lies within an area traditionally occupied by the Ohlone (or Costanoan) people. Ohlone territory extends from the point where the San Joaquin and Sacramento Rivers issue into the San Francisco Bay to Point Sur, with the inland boundary most likely constituted by the interior Coast Ranges (Kroeber 1925:462). The Ohlone language belongs to the Penutian family, with several distinct dialects throughout the region (Kroeber 1925:462).

The pre-contact Ohlone were semi-sedentary, with a settlement system characterized by base camps of tule reed houses and seasonal specialized camps (Skowronek 1998). Villages were divided into small polities, each of which was governed by a chief responsible for settling disputes, acting as a war leader (general) during times of conflict, and supervising economic and ceremonial activities (Kroeber 1925:468; Skowronek 1998). Social organization appeared flexible to ethnographers and any sort of social hierarchy was not apparent to mission priests (Skowronek 1998).

Ohlone subsistence was based on hunting, gathering, and fishing (Kroeber 1925:467; Skowronek 1998). Mussels were a particularly important food resource (Kroeber 1925:467). Marine mammals were also important; sea lions and seals were hunted and beached whales were exploited (Kroeber 1925:467). Like the rest of California, the acorn was an important staple and was prepared by leaching acorn meal both in openwork baskets and in holes dug into the sand (Kroeber 1925:467). The Ohlone also practiced controlled burning to facilitate plant growth (Kroeber 1925:467; Skowronek 1998).

Seven Franciscan missions were built within Ohlone territory in the late 1700s, and all members of the Ohlone group were eventually brought into the mission system (Kroeber 1925:462; Skowronek 1998). After the establishment of the missions, Ohlone population dwindled from roughly 10,000 people in 1770 to 1,300 in 1814 (Skowronek 1998). In 1973, the population of people with Ohlone descent was estimated at fewer than 300 (Levy 1978:487). The descendants of the Ohlone united in 1971 and have since arranged political and cultural organizations to revitalize aspects of their culture (Skowronek 1998).

3.3 HISTORIC OVERVIEW

Post-European contact history for the state of California is generally divided into three periods: the Spanish Period (1769–1822), the Mexican Period (1822–1848), and the American Period (1848–present).

3.3.1 Spanish Period (1769-1822)

For more than 200 years, Cabrillo and other Spanish, Portuguese, British, and Russian explorers sailed the Alta (upper) California coast and made limited inland expeditions, but they did not establish permanent settlements (Bean 1968; Rolle 2003). In 1579, Francis Drake landed in what was most likely San Francisco Bay. In 1595, Sebastian Cermeño landed in Drake's Bay before returning south (Bean 1968).

Gaspar de Portolá and Franciscan Father Junípero Serra established the first Spanish settlement in Alta California at Mission San Diego de Alcalá in 1769. This was the first of 21 missions erected by the Spanish between 1769 and 1823. Portolá continued north, reaching the San Francisco Bay and project vicinity in 1769. Short on food and supplies, the expedition turned back to San Diego. In 1770, Pedro Fages began his expedition, reaching the San Francisco Bay Area and exploring the region in 1772 (Cook 1957).

In 1770, the mission and presidio at Monterey were founded and three years later Juan Bautista de Anza proposed to open a land route from Sonora to Monterey. The viceroy at the time, Antonio de Bucareli, sanctioned Anza's expedition and proposed he extend it to form a settlement at the bay of San Francisco. Anza's first expedition traveled from Mexico City to Monterey. During this time, various sea expeditions from Monterey discovered Nootka Sound, the Columbia River, and the Golden Gate. Anza's second expedition began in 1775 leading to the establishment of the presidio and mission at San Francisco, Mission Dolores, approximately 25 miles northwest of the project APE across San Francisco Bay (Bean 1968). Spanish colonial activity in the Bay Area concentrated on Mission Dolores and the presidio. Several land grants were also made during this period; though not near as many as in the following Mexican Period. Rancho de las Pulgas, which included the project APE, was granted to Don Jose Dario Arguello, a presidio comandante, in 1795 by Governor Diego de Borica (Menlo Park Chamber of Commerce 2014).

3.3.2 Mexican Period (1822-1848)

The Mexican Period commenced when news of the success of the Mexican Revolution (1810-1821) against the Spanish crown reached California in 1822. This period saw the federalization of mission lands in California with the passage of the Secularization Act of 1833. This Act enabled Mexican governors in California to distribute former mission lands to individuals in the form land grants. Successive Mexican governors made more than 700 land grants between 1822 and 1846, putting most of the state's lands into private ownership for the first time (Shumway 2006). Rancho Las Pulgas remained in the hands of the Arguello family (Shumway 2006; Alley 1883).

The Mexican Period saw an increased importance of sea trade and an influx of American settlers which motivated the United States to expand their territory into California. The United States supported a small group of insurgents from Sonoma during the Bear Flag Revolt. The Bear Flaggers captured Sonoma in June of 1846. The next month, Commodore John Drake Sloat landed in Monterey and proceeded to take Yerba Buena, Sutter's Fort, Bodega Bay, and Sonoma. Fighting between American and Mexican forces continued until Mexico surrendered in 1847 (Rolle 2003).

3.3.3 American Period (1848-Present)

The American Period began with the signing of the Treaty of Guadalupe Hidalgo in 1848, in which the United States agreed to pay Mexico $15 million for the conquered territory, including California, Nevada, Utah, and parts of Colorado, Arizona, New Mexico, and Wyoming. Settlement of California continued to increase during the early American Period. Many ranchos were sold or otherwise acquired by Americans, and most were subdivided into agricultural parcels or towns. Rancho las Pulgas was confirmed to the Arguello family in 1857 (Alley 1883; Menlo Park Chamber of Commerce 2014).

Thanks to the discovery of gold in 1848, California's population grew exponentially. San Francisco grew from a population of 812 to 25,000 in only a few years and became California's first true city (Rolle 2003). San Mateo County was created in 1856 from the southern part of San

Francisco County. Portions of Rancho de las Pulgas were purchased by many wealthy San Franciscans after railroad service in San Mateo County developed.

3.3.3.1 City of Menlo Park

In 1854, Dennis J. Oliver and D. C. McGlynn purchased a 1,700-acre area and began to develop what would become Menlo Park (Menlo Park Chamber of Commerce 2014). Oliver and McGlynn built two homes with a shared entrance; across the driveway they erected a gate with tall arches and placed the name Menlo Park and the date August 1854 on it. The name Menlo likely originated from the name of the Menlough region in Ireland, where the two men had immigrated from. The name Menlo was not officially adopted however until the railroad extended to the area in 1868 and the station had no name and was in need of formal designation. A railroad official chose the name Menlo Park for the station and today this station is a California State Landmark No. 955 and the oldest California station in continuous operation.

After San Mateo County became independent from San Francisco County in 1856, a road was laid between the two counties that opened the area to settlement. Several large tracts in the area were sold to the Athertons, Hopkins, Floods, Millses, Donohoes, and Felton, who built large estates that were mostly self-sufficient (Menlo Park Chamber of Commerce 2014). The Hopkins' estate extended into Menlo Park and several structures were built including a general merchandise store, saloons, and working-man hotels. In 1874, Menlo Park became the second incorporated city in San Mateo County. The purpose for the incorporation was to quickly raise money for drainage repairs and railroad maintenance. However, Menlo Park was unincorporated two years later as a result of slow population growth (Menlo Park Chamber of Commerce 2014). Until World War I, Menlo Park was comprised of several agricultural fields. The town was a center for strawberry farms as well as violets which were sold frequently in San Francisco. Much of these fields were located on the Hopkins' estate.

The area remained mostly agrarian until World War I, when almost overnight 43,000 soldiers began training at Camp Fremont located in Palo Alto and Menlo Park. Construction on the camp began in July 1917 in preparation for possible entry into World War I. The camp however was only functional until 1919 and was completely abandoned in 1920 with several buildings being sold at auction. During this boom in population, the first roads were constructed in Menlo Park by the 8th Division engineers and several new business and gas stations developed as a result of Camp Fremont (Kazak n.d.). Growth during this time prompted officials to reincorporate Menlo Park in 1927.

Since the initial boom during the World War I era, Menlo Park has continued to grow. Today, the area is well known as a hub for several technical industries including Facebook. The company recently opened a new facility in Menlo Park and is the largest employer in the area.

4.0 BACKGROUND RESEARCH

4.1 CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM

Rincon archaeologist Kyle Brudvik conducted a search of the cultural resource records housed at the California Historical Resources Information System (CHRIS), Northwestern Information Center (NWIC) located at Sonoma State University, Rohnert Park on April 28 and September 3, 2015. The search was conducted to identify all previous cultural resources work and previously recorded cultural resources within a 0.5-mile radius of the APE. The CHRIS search included a review of the CRHR, the NRHP, the California Points of Historical Interest list, the California Historical Landmarks list, the Archaeological Determinations of Eligibility list, and the California State Historic Resources Inventory list. The records search also included a review of all available historic USGS 7.5- and 15-minute quadrangle maps.

The NWIC did not list any historic addresses near the project APE.

4.1.1 Previous Studies

The NWIC records search identified 47 previous studies within a 0.5-mile radius of the APE (Table 1, sorted by report number). One previous study includes the Project APE (S-026913) and three previous studies are directly adjacent to the Project APE (S-015806, S-036900, S-038703). These four studies are summarized in greater detail below Table 1. The National Archaeological Database listings for these studies are presented in Appendix A.

Table 1
Previous Studies Within a 0.5-Mile Radius of the APE

Report No.	Author	Year	Study	Proximity to APE
S-003021	Dietz, Stephen A.	1976	An Archaeological Reconnaissance of the 100.6 Acre Raychem Corporation Properties in Menlo Park, California	Outside
S-003022	Dietz, Stephen A.	1976	An Archaeological Reconnaissance of the 19.9 Acre Saga Corporation property at 1 Saga Lane, Menlo Park, California (letter report)	Outside
S-004509	Archaeological Resource Management	1978	Archaeological Evaluation of the Sand Hill Road Site	Outside
S-006278	Garaventa, Donna M. and Rebecca Loveland Anastasio	1983	Cultural Resources Survey Report, San Francisquito Creek Bridge Replacement Project Located on Junipero Serra Boulevard, Santa Clara County-San Mateo County, California	Outside
S-006498	Clark, Matthew R., Miley Paul Holman, and Randy S. Wiberg	1983	Archaeological Investigation at CA-SMA-242, the Johnson & Johnson "Bandaid Site", Menlo Park, San Mateo County, California	Outside
S-006508	Holman, Miley Paul	1984	A Report of Further Auguring at the Johnson & Johnson Project Area, Menlo Park, California	Outside
S-007346	Offerman, Jains K.	1985	Archaeological Survey Report, Landscaping Project Along Routes 84 and 101 in San Mateo and Alameda Counties, 04-SM/Ala-1010, 84, 04253-033231	Outside

Table 1
Previous Studies Within a 0.5-Mile Radius of the APE

Report No.	Author	Year	Study	Proximity to APE
S-014405	Cultural Resource Planning	1992	Cultural Resources Assessment, Whiskey Hill Estates, Woodside, California	Outside
S-014973	Hammett, Julia	1993	PG&E Archaeology, 5 Limited Scale Tests Along the Proposed Pipeline Trench Crossing of Matadero Creek (letter report)	Outside
S-015806	Holman, Miley Paul	1993	Archaeological Field Inspection of the Menlo Court/2160 Santa Cruz Avenue Property, Menlo Park, San Mateo County, California	Adjacent
S-017518	Jackson, Thomas L.	1975	An Archaeological Reconnaissance of the Junipero Serra Boulevard Study (letter report)	Outside
S-017740	Reese, Elena	1995	Location of the Buelna-Rodrigues Adobes and Subsequent 1850s Houselots	Outside
S-017840	Baker, Suzanne	1995	Archaeological Reconnaissance of the Sand Hill Bike Lane Project, Menlo Park, California	Outside
S-018749	Bocek, Barbara	1990	Archaeology at the Sand Hill Road Site (CA-SCL-287)	Outside
S-018765	Jones, Laura	1995	Summary of Testing at CA-SCL-287, CA-SCL-586 and CA-SMA-263, Proposed Site for Widening of Sand Hill Road at the Bridge Over San Francisquito Creek	Outside
S-020558	Price, Barry A.	1998	Cultural Resources Assessment, Pacific Bell Mobile Services Facility SF-631-02, Menlo Park, San Mateo County, California	Outside
S-021056	Archaeological Resource Management	1998	Cultural Resource Evaluation of the Phillips Brooks School Site Property in the City of Woodside, California	Outside
S-021393	Archaeological Resource Management	1999	Cultural Resource Evaluation for the Property at 807 Ocean View Boulevard in the City of Pacific Grover, County of Monterey	Outside
S-021795	Jones, Laura	1999	Cultural Resource Evaluation of the Sprint PCS Sand Hill Road and Hwy 280 Project in the County of San Mateo	Outside
S-022178	Archaeological Resource Management	1999	Cultural Resource Evaluation for 1.5 Acres of Land at 260 Van Buren Avenue in the City of Menlo Park, County of San Mateo	Outside
S-022606	Archaeological Resource Management	1999	Cultural Resource Evaluation of the Sprint PCS Sand Hill Road and Hwy 280 Project in the County of San Mateo	Outside
S-024987	Busby, Colin	2001	Archaeological Literature Search- HOV Lanes	Outside
S-026912	Jones, Laura and John Holson	2003	File #8605-82-5-03G Sand Hill Road (letter report)	Outside
S-026913	Holson, John, Ellie Reese, and Deborah Sterling	2003	Addendum Research Design and Inadvertent Discovery Plan for the Proposed Sand Hill Roadway Extension and Stanford Golf Course Improvements, Santa Clara and San Mateo Counties, California	**Within**

Table 1
Previous Studies Within a 0.5-Mile Radius of the APE

Report No.	Author	Year	Study	Proximity to APE
S-026914	Billat, Scott	2004	Sharon Heights CC/SF- 1094 (resubmittal), FCC 040702E, 2900 Sand Hill Road, Menlo Park, CA	Outside
S-027747	Billat, Lorna	2000	Nextel Communications Wireless Telecommunications Facility- San Mateo County, Nextel Site No. CA-0761D/ Accelerator	Outside
S-029424	Billat, Scott	2004	Sharon Heights CC/SF-1094 (resubmittal), FCC 040702E, 2900 Sand Hill Road, Menlo Park, CA	Outside
S-032106	Billat, Scott	2006	New Tower ("NT") Submission Packet, FCC Form 620, Flood Park Flagpole, SF-15880A	Outside
S-033507	Jones, Laura	2007	PLN2007-00101/APN 074480010 at 3673 Sand Hill Road/ Mark Bonino, File NO. 06-1632 (letter report)	Outside
S-034229	Basin Research Associates, Inc.	2006	Historic Properties Survey Report/ Finding of Effect (Historic Properties Affected), Steelhead Habitat Enhancement Project (SHEP), Stanford University, Santa Clara and San Mateo Counties, California	Outside
S-035461	Breschini, Gary S.	1998	An Examination of a Burial Discovered in Los Altos	Outside
S-036900	Leventhal, Alan, Diane Digiuseppe, Melynda Atwood, David Grant, Susan Morley, Rosemary Cambra, Les Field, Charlene Nijmeh, Monica V. Arellano, Susanne Rodriguez, Sheila Guzman-Schmidt, Gloria E. Gomez, and Norma Sanchez	2010	Final Report on the Burial and Archaeological Data Recovery Program Conducted on a Portion of a Middle Period Ohlone Indian Cemetery Yuki Kutsuimi Saatos Inux (Sand Hill Road) Sites: CA-SCL-287 and CA-SMA-263, Stanford University, California (Volume I)	Adjacent
S-037241	Harris, Benjamin J., Maureen Zogg, and Christopher Caputo	2010	Historic Property Survey Report, Proposed Replacement of Metal Beam Guardrails (MBGR) at Various Locations in San Mateo County, California, 04-SMA-VarVar, EA-04-0A8721	Outside
S-037241a	U.S. Coast Guard	1996	Request for Determination of Eligibility for Inclusion in the National Register of Historic Places, Southern Pacific Railroad Dumbarton Cutoff, Southern Pacific Railroad Dumbarton Bridge, Southern Pacific Railroad Newark Slough Bridge, Alameda and San Mateo Counties, California	Outside
S-037241b	Harris, Benjamin J., and Maureen Zogg	2010	Archaeological Survey Report for the Proposed Metalbeam Guardrail Upgrade Project at Various Locations across San Mateo County, California, 04-SMA-VarVar, EA 04-0A8721	Outside

Table 1
Previous Studies Within a 0.5-Mile Radius of the APE

Report No.	Author	Year	Study	Proximity to APE
S-037241c	Harris, Benjamin J.	2010	Environmentally Sensitive Area (ESA) and Archaeological Monitoring Area (AMA) Action Plan for Two Locations Along State Route 1, San Mateo County, California, 04-SMA-01, PM 0.7 and 1.2, EA 04-0A8721; for the Proposed Metalbeam Guardrail Project at Various Locations Across San Mateo County, California, 04-SMA-VarVar, EA 04-0A8721	Outside
S-037241d	Harris, Benjamin J., and Maureen Zogg	2010	Extended Phase I Testing at CA-SMA-97 for the Proposed Metalbeam Guardrail 1-5 Upgrade Project, San Mateo County, California, 04-SMA-01, PM 1.20, EA: 04-0A8721	Outside
S-037260	Harris, Benjamin J., and Maureen Zogg	2010	Archaeological Survey Report for the Proposed Metalbeam Guardrail Upgrade Project at Various Locations across San Mateo County, California, 04-SMA-VarVar, EA 04-0A8721	Outside
S-037269	Billat, Lorna	2010	Collocation ("CO") Submission Packet, FCC Form 621, Lawler Ranch Road, SF-43376A	Outside
S-037464	Willis, Carrie D.	2010	Cultural Resources Records Search and Site Visit for AT&T Mobility, LLC Candidate CN5707 (Sharon Heights) Lawler Ranch Road, Menlo Park, San Mateo County, California (letter report)	Outside
S-038034	Cohen, David	2011	Cultural Resources Records Search and site Visit for T-MOBILE WEST CORPORATION a Delaware Corporation Candidate SF14994-D (Quadrus), 2400 Sand Hill Road, Menlo Park, San Mateo County, California	Outside
S-038703	Jones, Laura, Julie Cain, David Daly, Sam Levy, Koji Ozawa, Max Rose Figura, Katie Turner, and Tim Wilcox	2012	Archaeological and Geophysical Survey for SLAC National Laboratory, San Mateo County, California	Adjacent
S-039604	Whitaker, Adrian, Phillip Kaijankoski, Jack Meyer, Brian Byrd, and Sharon Waechter	2012	Archaeological Survey Report for the Dumbarton Rail Corridor Project, San Mateo and Alameda Counties, California	Outside
S-039719	Tudor, Jessica, and Kathleen A. Crawford	2012	Cultural Resources Records Search and Site Visit Results for T-Mobile West, LLC, Candidate SF13189Z (WB189 Sand Hill Commons), 2882 Sand Hill Road, Menlo Park, San Mateo County, California	Outside
S-039719a	Bonner, Wayne H. and Kathleen A. Crawford	2012	Direct APE Historic Architectural Assessment for T-Mobile West, LLC Candidate SF13189Z (WB189 Sand Hill Commons),2882 Sand Hill Road, Menlo Park, San Mateo County, California	Outside

Table 1
Previous Studies Within a 0.5-Mile Radius of the APE

Report No.	Author	Year	Study	Proximity to APE
S-040623	Thompson, Ian	2002	Confidential Archaeological Addendum For Timber Operations on Non-Federal Lands in CA, Crannell 2270 (STCo #37-0201), THP 1-02-093	Outside
S-040929	Basin Research Associates, Inc.	2013	Archaeological Data Recovery Report (SMA-83) (ADRR) and Final Archaeological Resources Report (FARR), San Francisco Public Utilities Commission, Water System Improvement Program, Bay Division Pipeline Reliability Upgrade Project, East Bay and Peninsula Bay Division Pipeline No. 5, Alameda and San Mateo Counties, California	Outside

Source: Northwestern Information Center, April 2015 and September 2015.

4.1.1.1 S-015806

Study S-015806, an *Archeological Field Inspection of the Menlo Court/ 2160 Santa Cruz Avenue Property, Menlo Park, San Mateo County, California,* was prepared by Holman & Associates in 1993. The study area is adjacent to the APE and was negative for cultural resources.

4.1.1.2 S-026913

Study S-026913, an *Addendum Research Design and Inadvertent Discovery Plan for the Proposed Sand Hill Roadway Extension and Stanford Golf Course Improvements, Santa Clara and San Mateo Counties, California,* was prepared by Pacific Legacy, Incorporated in March 2003. The project surveyed approximately 11.5-acres and included a portion of the current project APE. Three archaeological resources were identified during the survey (P-43-000272, P-43-000295, P-43-000581).

4.1.1.3 S-036900

Study S-036900, a *Final Report on the Burial and Archaeological Data Recovery Program Conducted on a Portion of a Middle Period Ohlone Indian Cemetery Yuki Kutsuimi Saatos Inux (Sand Hill Road) Sites: CA-SCL-287 and CA-SMA-263, Stanford University, California (Volume I)*, was prepared by Leventhal et al. (2010). The data recovery took place to the west of the eastern most extension of the current APE. Two prehistoric resources were evaluated as part of this study and were positive for human remains and associated cultural material. The recovery plan for this project involved the excavation of disturbed burials discovered during road widening activities for Sand Hill Road. According to Map 2-2 (Levental et al. 2010), Burial 04-24 was discovered within approximately 10 feet of the project APE just outside of the proposed Pump Station location (Leventhal et al. 2010:2-33). The location is along the western margins of Sand Hill Road. The remaining burials were found to the east and north of the current APE. The extent of intact deposits beneath the surface of Sand Hill Road is unknown; additional testing outside of the identified burials did not occur during this project. Sand Hill road appears on Topographic maps dating to 1961. The surrounding houses were constructed between the 1950s and 2006 according to the county assessor parcel records. This indicates that much of the area surrounding the APE has been previously disturbed.

4.1.1.4 S-038703

Study S-038703, an *Archaeological and Geophysical Survey for SLAC National Laboratory, San Mateo County, California,* was prepared by Jones et al. in February 2012. The project area surveyed is directly adjacent to the current APE. The survey identified eight cultural resources, none of which extend into the current APE.

4.1.2 Previously Recorded Sites

The NWIC records search identified 19 previously recorded cultural resources within a 0.5-mile radius of the project APE, four (P-41-000259, P-43-002239; P-41-002297; P-41-002300) of which are directly adjacent to the project APE (Table 2, sorted by resource designation).These four resources are discussed in greater detail below.

4.1.2.1 P-41-000259/P-43-002239

Resource P-41-000259/P-43-002239 was recorded by Bocek and Rutherford in August 1985. The site is a prehistoric habitation site with associated burials. Bocek and Rutherford noted that the site was largely destroyed by the construction of Sand Hill Road which cuts though the site. The site extends from San Mateo County to Santa Clara County. Several areas of the site were excavated between 1987 and 2004; at least 24 burials with 29 individuals were recovered (Leventhal et al. 2010). One of these burials (Burial 04-24) is located approximately 10 feet outside of the current APE adjacent to the proposed Pump Station. Associated artifacts recovered during the excavation include faunal remains, *olivella* shell beads, mortars, and projectile points. The recovery plan for this project involved the excavation of burials discovered during earth moving activities for the widening of Sand Hill Road. The extent of site and the possibility for intact deposits to remain is unknown. Bocek and Rutherford suggested that the extension of the site beneath the Sand Hill Road was destroyed during construction.

4.1.2.2 P-41-002297

Resource P-41-002297 was recorded by Daly, Turner, and Cook in March 2011. The site is the location of the Camp Fremont Dugouts which were constructed between 1917 and 1919 to train U.S. troops in trench warfare during World War I. The site is located in the northwest corner of the SLAC leasehold, west of the main entrance from Sand Hill Road in San Mateo County. The resource is located adjacent to the current project APE and was determined not eligible by Jones et al. because it was "not the site of any significant event in the U.S. war effort" (2012:43).

4.1.2.3 P-41-002300

Resource P-41-002300 was recorded by Daly et al. in September 2011. The site is a prehistoric lithic scatter located on the eastern part of a gentle slope between SLAC Guest House and Sand Hill Road. The site is adjacent to the project APE and was determined not eligible under the evaluation criterion because it lacked the potential to yield significant information regarding prehistoric land use (Jones et al. 2012:22).

Table 2
Previously Recorded Cultural Resources Within a 0.5-Mile Radius of the APE

Resource Designation	Description	CRHR Eligibility Status	Recorded By and Year	Proximity to APE
P-41-000257	Lithic Scatter	Insufficient information	B. Bocek and T. Bara 1985; D. Daly and K. Turner 2011	Outside
P-41-000259	Habitation site	Presumed eligible	B. Bocek and J. Rutherford 1985	Adjacent
P-41-000270	Lithic scatter and habitation debris	Insufficient information	B. Bocek 1987; C. Canzonieri 2013	Outside
P-41-000282	Habitation site	Insufficient information	R.S. Wiberg and M. R. Clark 1983; A. Whitaker 2008	Outside
P-41-002297	Camp Fremont Dugouts	Not eligible	D. Daly, K. Turner, and N. Crook 2011	Adjacent
P-41-002298	Lithic scatter	Insufficient information	D. Daly, S. Levy, K. Ozawa, and M. RoseFigura 2011	Outside
P-41-002299	Lithic scatter	Insufficient information	D. Daly and K. Turner 2010	Outside
P-41-002300	Lithic scatter	Insufficient information	D. Daly, S. Levy, K. Ozawa, and M. RoseFigura 2011	Adjacent
P-41-002301	Historical Cemetery	Presumed eligible	D. Daly, K. Turner, and S. Weber 2011	Outside
P-41-002302	Lithic scatter and quarry	Not eligible	D. Daly, K. Ozawa, and M. RoseFigura 2011	Outside
P-41-002351	Ravenswood Salt Works District	Presumed eligible	L. Speulda-Drews, N. Valentine, E. J. Johnek 2007	Outside
P-41-002383	Engineering structure	Insufficient information	C. Dikas 2010	Outside
P-41-002387	Commercial building	Insufficient information	K. A. Crawford 2012	Outside
P-41-002389	Government building	Insufficient information	C. Dikas 2011	Outside
P-43-000295	Lithic scatter	Insufficient information	B. Bakin and B. A. Gerow 1977; B. Bocek 1986	Outside
P-43-000579	Lithic scatter	Insufficient information	Bocek and Rutherford 1985; B. Bocek 1986	Outside
P-43-000581	Habitation site	Presumed eligible	B. Bocek 1985, 1986, 1987	Outside
P-43-000616	Habitation site	Insufficient information	B. Bocek 1987	Outside
P-43-002239	Habitation site	Presumed eligible	B. Bocek, J. Rutherford 1985	Adjacent

Source: Northwestern Information Center, April and September 2015.

4.2 NATIVE AMERICAN HERITAGE COMMISSION

Rincon Consultants contacted the Native American Heritage Commission (NAHC) to request a review of the Sacred Lands File (SLF) on April 10, 2015. The NAHC responded via facsimile on June 8, 2015, stating that the search of the SLF "failed to indicate the presence of Native American cultural resources in the immediate project area"(Appendix B). The NAHC provided a contact list of 9 Native American individuals or tribal organizations that may have knowledge of cultural resources in or near the project APE. Rincon prepared and mailed letters (Appendix B) to each of the NAHC-listed contacts on June 10, 2015 requesting information regarding any Native American cultural resources within or immediately adjacent to the project APE. Rincon conducted additional consultation with follow-up phone calls to each group or individual on September 8, 2015 (Appendix B).

On September 8, 2015, Irene Zwierlein, Chairperson of the Amah Mutsun Tribal Band of Mission San Juan Bautista, was contacted via telephone. Chairperson Zwierlein had no comment regarding the project.

On September 8, 2015, Tony Cerda, Chairperson for the Castanoan Rumsen Carmel Tribe, was contacted via telephone. Chairperson Cerda did not have any knowledge of cultural resources in the area but requested to be notified of any new discoveries made as a result of this project.

On September 8, 2015, Ann Marie Sayers, Chairperson of the Indian Canyon Mutsun Band of Costanoan was contacted via telephone. Chairperson Sayers identified the project APE as sensitive and recommended archaeological and Native American monitors be present for any ground disturbance activities. She also requested to be notified of any new discoveries made as a result of this project.

On September 8, 2012, Andrew Galvan of the Ohlone Indian Tribe was contacted via telephone. Mr. Galvan recommends the presence of a Native American monitor when a suspected discovery is made that predates historical contact in the region. He also recommends that the Native American monitor be able to prove a geographic relationship to the project APE.

As of September 15, 2015, no additional responses have been received.

4.3 INTERESTED PARTY/ LOCAL CONSULTATION

Rincon Consultants mailed a letter to the Menlo Park Historical Association (NAHC) to request information regarding historical resources within the project APE. Rincon prepared and mailed a letter (Appendix C) September 3, 2015 requesting information regarding any historical cultural resources within or immediately adjacent to the project APE. Rincon conducted follow-up consultation by telephone on September 8, 2015 and left a voicemail. The Menlo Park Historical Association responded via telephone on September 8, 2015. They were unaware of any historically significant resources within the project APE.

4.4 HISTORIC MAP AND AERIAL REVIEW

Rincon reviewed historic aerials and topographic maps from internet sources to better understand the land use history of the project site. The 1964 Palo Alto, CA 15-minute topographic quadrangle, accessed using USGS *TopoView,* depicts the project site as undeveloped terrain.

5.0 FIELDWORK

5.1 SURVEY METHODS

Rincon archaeologist Kyle Brudvik conducted a cultural resources survey of the West Bay Sanitary District Recycled Water Project – Sharon Heights APE on April 20, 2015. The survey consisted of walking and driving transects oriented west to east along Sand Hill Road and south to north along the north-western portion of the alignment. The golf course was also cursorily inspected, but bare ground visibility was poor because of extensive grass and pavement cover.

During the survey, Mr. Brudvik examined all areas of exposed ground surface for prehistoric artifacts (e.g., chipped stone tools and production debris, stone milling tools, ceramics, fire-affected rock), historic debris (e.g., metal, glass, ceramics), or soil discoloration that might indicate the presence of a cultural midden. Mr. Brudvik recorded project site characteristics and survey conditions using a field notebook and a digital camera. Copies of the field notes and digital photographs are on file with Rincon's Oakland office.

5.2 FINDINGS

During the pedestrian survey one possible cultural constituent was identified. A single clam shell fragment (*cf.* Tellinidae) shell was noted at the western end of the project APE adjacent to the existing tennis courts. This shell was not *in situ* and therefore cannot be positively identified as a cultural artifact. The soils along the west end where the shell was encountered may represent fill material. Photograph 1 displays a close-up of the soils along the west end of the APE. Although no additional shell or artifacts were found on the surface during the pedestrian survey, the eastern end of the alignment is within 10 feet of a previously identified burial (see Leventhal et al. 2010:3-91). Photograph 2 displays the existing conditions of the east end of the APE.

6.0 RECOMMENDATIONS

No cultural resources were identified within the West Bay Sanitary District Recycled Water Project – Sharon Heights APE during this study. Therefore, Rincon recommends a finding of no impact to historical resources under CEQA and no effect to historic properties under the NHPA for the current project/undertaking. However, based on the high level of prehistoric sites located adjacent to and surrounding the project APE, the APE is sensitive for buried archaeological resources. Previous construction activities associated with the expansion of Sand Hill Road, adjacent hospital construction, and golf course construction yielded numerous cultural resources including human burials associated with resource P-41-000259/P-43-002239. Bocek and Rutherford (1987) suggest that the extension of P-41-000259/P-43-002239 beneath Sand Hill Road was destroyed during construction, but this cannot be confirmed given the existing condition of the APE (capped by existing roads and structures). Additionally, the area in and around the APE has been disturbed by previous construction activities including housing and infrastructure (e.g., roads and sewage pipelines). Nevertheless,

Photograph 1. Close up of existing fill/overburden in pond area, at western end of APE. The clam shell fragment presumably came from this overburden.

Photograph 2. View of eastern end of APE, at end of cul-de-sac off Sand Hill Road, facing Oak Avenue (northeast).

the area remains sensitive for cultural resources. Based on this sensitivity, Rincon recommends archaeological and Native American monitoring for all ground-disturbance activities and measures for the unanticipated discovery of human remains. These measures are discussed here.

6.1 ARCHAEOLOGICAL AND NATIVE AMERICAN MONITORING

Rincon recommends archaeological and Native American monitoring of all project-related ground-disturbance activities for the West Bay Sanitary District Recycled Water Project – Sharon Heights under the direction of an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (National Park Service 1983). If archaeological resources are encountered during ground-disturbing activities, all earth disturbing work within the vicinity of the find shall be temporarily suspended or redirected until an archaeologist has evaluated the nature and significance of the find. Evaluation of significance for the find may include the determination of whether or not the find qualifies as an archaeological site. Isolated finds typically do not qualify as historical resources under CEQA or historic properties under the NHPA and require no management consideration under either regulation. Should any resource(s) be identified, an evaluation of eligibility for the CRHR and NRHP may be required through the development of a treatment plan including a research design and subsurface testing through the excavation of test units and shovel test pits. After effects to the find have been appropriately mitigated, work in the area may resume. Mitigation of effects to the find may include a damage assessment of the find, archival research, and/or data recovery to remove any identified archaeological deposits, as determined by a qualified archaeologist.

6.2 UNANTICIPATED DISCOVERY OF HUMAN REMAINS

The discovery of human remains is always a possibility during ground disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the San Mateo County coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

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2004 Enviornmental Review Process Guidelines for State Revolving Fund Loan Applicants. http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/docs/policy/appendix_e.pdf

Appendix A

Records Search Summary

CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM

ALAMEDA
COLUSA
CONTRA COSTA
DEL NORTE
HUMBOLDT
LAKE
MARIN
MENDOCINO
MONTEREY
NAPA
SAN BENITO
SAN FRANCISCO
SAN MATEO
SANTA CLATA
SANTA CRUZ
SOLANO
SONOMA
YOLO

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

NWIC Billing Worksheet

IC File Number: 14-1390

Client Name: Kevin Hunt
Phone: (760) 918-9444
Affiliation: Rincon Consultants, Inc
Email: khunt@rinconconsultants.com
Proj Name/Number: 15-01334: Sharon Heights Satellite Treatment Center
Date Request Rec'd: 4/10/2015
Date of Response: 4/28/2015
Check In: 9:56:00 AM
Check Out: 11:15:00 AM
Check In: 11:35:00 AM
Check Out: 11:45:00 AM

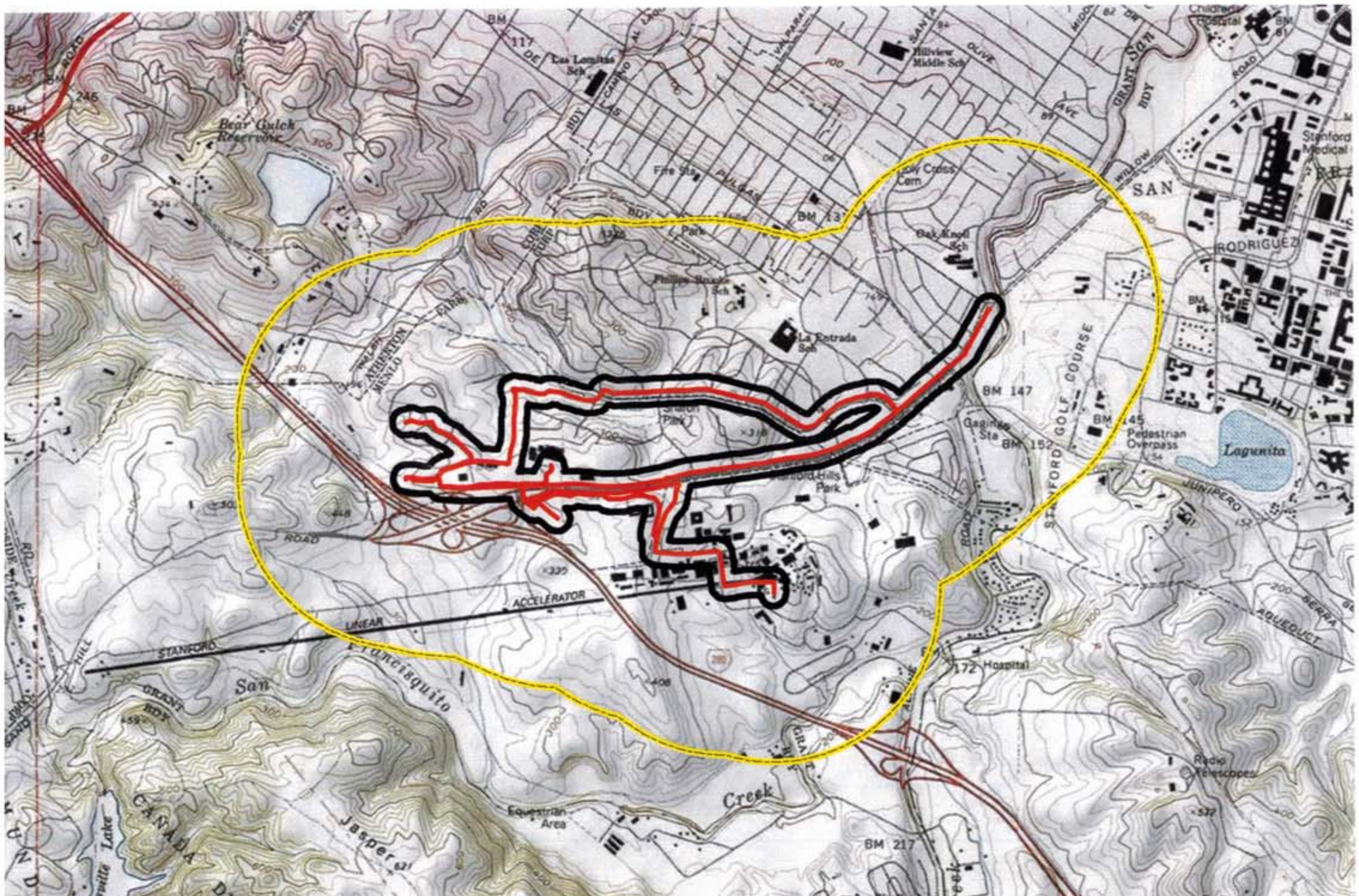
Item	Unit	Quantity	$
In-person Time:	Hour(s):	1.48	150.00
Staff Time:	Hour(s):		0.00
Shape Files:	Number:		0.00
Custom Map Features:	Number:		0.00
Digital Database Record:	Number of Row(s):		0.00
Quads:	Number:		0.00
Address-mapped Flat Fee:			0.00
Hard Copy (Xerox/Computer) Pages:	Page(s):	161	24.15
Labor Charge:	Hour(s):	1	40.00
PDF Pages:	Page(s):		0.00
PDF Flat Fee:			0.00
Other: CRC Search			0.00
		Subtotal	**214.15**

Multi-Day Start:
Multi-Day End:
$ 0.00

Rapid response surcharge of 50% of total cost: $ 0.00
Emergency Response surcharge of 100% of total cost: $ 0.00
Total: $ **214.15**

Information Center Staff: Charles Mikulik
Sonoma State University Customer ID: 0001001642
Sonoma State University Invoice No.:
CHRIS Access and Use Agreement No.: 56

This is not an invoice. Sonoma State University will send separate invoice.



ciety, ESRI and its licensors © 2015.
17. The topographic representation
e features currently found in the
map may have changed since the

Area of Direct Effect

Area of Indirect Effect

Half-Mile Buffer

N

0 1,000

0 250 5

1:24,000

File No.: 14-1390

RECORD SEARCH DOCUMENT LIST

Referenced Document Number or Name	No. of Copies Made
S-038703	74
S-029424	2
S-022606	12
S-037269	1
S-037464	1
S-038703	1
S-033507	1
S-018765	1
S-036900	37
S-003022	1
S-026912	1
S-017518	1
S-021795	1
S-014973	5
S-026914	10
S-041536	1
P-43-000579	1
P-41-002299	2
P-41-002298	1
P-41-002297	1
P-43-000616	1
3 diff. plats of Ranchos	3

Name of Researcher: Kyle Brudvik

TOTAL: ~~[illegible]~~ 159

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
S-003022	Voided - E-20 SMA	1976	Stephen A. Dietz	An archaeological reconnaissance of the 19.9 acre Saga Corporation property at 1 Saga Lane, Menlo Park, California (letter report)	Archaeological Consulting and Research Services, Inc.	
S-014973		1993	Julia Hammett	PG&E Archaeology, 5 limited scale tests along the proposed pipeline trench crossing of Matadero Creek (letter report)	Stanford University	43-000023, 43-000581, 43-000616, 43-000662
S-017518		1975	Thomas L. Jackson	An archaeological reconnaissance of the Junipero Serra Boulevard Study (letter report)	Archaeological Consulting and Research Services, Inc.	43-000413
S-018765		1995	Laura Jones	Summary of Testing at CA-SCL-287, CA-SCL-586 and CA-SMA-263, Proposed Site for Widening of Sand Hill Road at the Bridge Over San Francisquito Creek	Stanford University	41-000259, 43-000295, 43-000581, 43-002239
S-021795		1999	Laura Jones	Cultural and historic resources on the Meyer-Buck Estate Property at 2111 Sand Hill Road (letter report)	Stanford University	
S-022606		1999		Cultural Resource Evaluation of the Sprint PCS Sand Hill Road and Hwy 280 Project in the County of San Mateo	Archaeological Resource Management	
S-026912		2003	Laura Jones and John Holson	File #8605-82-5-03G Sand Hill Road (letter report).	Stanford University, Pacific Legacy, Inc.	41-000259, 43-000581, 43-002239
S-026914	Other - 360-001	1999	John Holson, Thomas L. Jackson, Elena Reese, Julia Hammett, and Heather Price	Archaeological Monitoring, Testing and Data Recovery Plan for the Sand Hill Corridor Project, Stanford, California.	Pacific Legacy, Inc.	43-000272, 43-000295, 43-000465, 43-000579, 43-000581, 43-000586, 43-000587, 43-000604, 43-000608, 43-000618
S-029424		2004	Scott Billat	Sharon Heights CC/SF-1094 (resubmittal), FCC 040702E, 2900 Sand Hill Road, Menlo Park, CA	Earth Touch, Inc.	
S-033507		2007	Laura Jones	PLN2007-00101/APN 074480010 at 3673 Sand Hill Road/Mark Bonino, File No. 06-1632 (letter report)	Stanford University	41-000257, 41-000304

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
S-036900		2010	Alan Leventhal, Diane DiGiuseppe, Melynda Atwood, David Grant, Susan Morley, Rosemary Cambra, Les Field, Charlene Nijmeh, Monica V. Arellano, Susanne Rodriguez, Sheila Guzman-Schmidt, Gloria E. Gomez, and Norma Sanchez	Final Report on the Burial and Archaeological Data Recovery Program Conducted on a Portion of a Middle Period Ohlone Indian Cemetery, Yuki Kutsuimi Saatos Inux [Sand Hill Road] Sites: CA-SCL-287 and CA-SMA-263, Stanford University, California (Volume I)	Muwekma Ohlone Tribe of the San Francisco Bay Area; Ohlone Families Consulting Services	41-000259, 43-000295, 43-002239
S-037269		2010	Lorna Billat	Collocation ("CO") Submission Packet, FCC Form 621, Lawler Ranch Road, SF-43376A	Earth Touch, Inc.	
S-037464		2010	Carrie D. Wills	Cultural Resources Records Search and Site Visit for AT& T Mobility, LLC Candidate CN5707 (Sharon Heights), Lawler Ranch Road, Menlo Park, San Mateo County, California. (letter report)	Michael Brandman Associates	
S-038703		2012	Laura Jones, Julie Cain, David Daly, Sam Levy, Koji Ozawa, Max RoseFigura, Katie Turner, and Tim Wilcox	Archaeological and Geophysical Survey for SLAC National Laboratory, San Mateo County, California	Heritage Services - Stanford University	41-000204, 41-000249, 41-000250, 41-000251, 41-000252, 41-000253, 41-000254, 41-000289
S-041536		2001	Michael Corbett and Denise Bradley	Final Survey Report, Palo Alto Historical Survey Update, August 1997- August 2000	Dames & Moore	43-000551

Resource Detail: P-43-000616

Identifying information

Primary No.: P-43-000616
Trinomial: CA-SCL-000621
Name: Upper Golf Course
Other IDs:

Type	*Name*
Resource Name	Upper Golf Course

Cross-refs:

Attributes

Resource type: Site
Age: Prehistoric
Information base: Survey
Attribute codes: AP04 (Bedrock milling feature); AP15 (Habitation debris)
Disclosure: Not for publication
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
6/26/1987	Barbara Bocek	Stanford University	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
S-014973	1993	PG&E Archaeology, 5 limited scale tests along the proposed pipeline trench crossing of Matadero Creek (letter report)	Stanford University
S-016394	1994	Recorded Archaeological Resources in Santa Clara County, California	Basin Research Associates, Inc.
S-034229	2006	Historic Properties Survey Report/Finding of Effect (Historic Properties Affected), Steelhead Habitat Enhancement Project (SHEP), Stanford University, Santa Clara and San Mateo Counties, California	Basin Research Associates, Inc.

Location information

County: Santa Clara
USGS quad(s): Palo Alto
Address:
PLSS: T6S R3W Sec. MDBM
UTMs: Zone 10 571805mE 4142024mN NAD27

Management status

Database record metadata

	Date	*User*
Entered:	4/1/2005	icrds
Last modified:	7/29/2014	cabrala

IC actions:

Date	*User*	*Action taken*
4/1/2005	jay	Appended records from discontinued ICRDS.

Record status:

Resource Detail: P-41-002297

Identifying information

Primary No.: P-41-002297
Trinomial: CA-SMA-000403H
Name: Camp Fremont Dugouts
Other IDs:

Type	Name
Resource Name	Camp Fremont Dugouts

Cross-refs:

Attributes

Resource type: Structure, Site
Age: Historic
Information base: Other
Attribute codes: HP34 (Military property)
Disclosure: Not for publication
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	Recorder(s)	Affiliation	Notes
3/17/2011	D. Daly, K. Turner, N. Crook	Stanford University	

Associated reports

Location information

County: San Mateo
USGS quad(s): San Mateo
Address:
PLSS:
UTMs: Zone 10 570121mE 4141735mN NAD83

Management status

Database record metadata

	Date	User
Entered:	5/15/2012	neala
Last modified:	3/27/2014	neala

IC actions:
Record status: Database Complete

Resource Detail: P-41-002298

Identifying information

Primary No.: P-41-002298
Trinomial: CA-SMA-000404
Name: Coherent Light
Other IDs:

Type	*Name*
Resource Name	Coherent Light

Cross-refs:

Attributes

Resource type: Site
Age: Prehistoric
Information base: Survey
Attribute codes: AP02 (Lithic scatter); AP12 (Quarry)
Disclosure: Not for publication
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
9/22/2011	D.Daly, S.Levy, K.Ozawa, M.RoseFigura	Stanford University	

Associated reports

Location information

County: San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:
UTMs: Zone 10 571206mE 4141437mN NAD83

Management status

Database record metadata

	Date	*User*
Entered:	5/15/2012	neala
Last modified:	3/27/2014	neala

IC actions:
Record status: Database Complete

Resource Detail: P-41-002299

Identifying information

Primary No.:	P-41-002299	
Trinomial:	CA-SMA-000399	
Name:	SLAC Hillside	
Other IDs:	*Type*	*Name*
	Resource Name	SLAC Hillside
Cross-refs:		

Attributes

Resource type:	Site
Age:	Prehistoric
Information base:	Survey
Attribute codes:	AP02 (Lithic scatter)
Disclosure:	Not for publication
Collections:	No
Accession no(s):	
Facility:	

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
11/23/2010	D.Daly, K.Turner	Stanford University	

Associated reports

Location information

County:	San Mateo
USGS quad(s):	Palo Alto
Address:	
PLSS:	
UTMs:	Zone 10 570731mE 4141141mN NAD83 (11/2010) Zone 10 570941mE 4141233mN NAD83 (secondary deposit; 11/2010)

Management status

Database record metadata

	Date	*User*
Entered:	5/16/2012	neala
Last modified:	3/27/2014	neala
IC actions:		
Record status:	Database Complete	

Resource Detail: P-41-002299

Identifying information

Primary No.:	P-41-002299	
Trinomial:	CA-SMA-000399	
Name:	SLAC Hillside	
Other IDs:	*Type*	*Name*
	Resource Name	SLAC Hillside
Cross-refs:		

Attributes

Resource type:	Site
Age:	Prehistoric
Information base:	Survey
Attribute codes:	AP02 (Lithic scatter)
Disclosure:	Not for publication
Collections:	No
Accession no(s):	
Facility:	

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
11/23/2010	D.Daly, K.Turner	Stanford University	

Associated reports

Location information

County:	San Mateo
USGS quad(s):	Palo Alto
Address:	
PLSS:	
UTMs:	Zone 10 570731mE 4141141mN NAD83 (11/2010) Zone 10 570941mE 4141233mN NAD83 (secondary deposit; 11/2010)

Management status

Database record metadata

	Date	*User*
Entered:	5/16/2012	neala
Last modified:	3/27/2014	neala
IC actions:		
Record status:	Database Complete	

Resource Detail: P-43-000579

Identifying information

Primary No.: P-43-000579
Trinomial: CA-SCL-000584
Name: Creekbank Site
Other IDs:

Type	Name
Resource Name	Creekbank Site

Cross-refs:

Attributes

Resource type: Site
Age: Prehistoric
Information base: Survey
Attribute codes: AP02 (Lithic scatter); AP16 (Other)
Disclosure: Not for publication
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	Recorder(s)	Affiliation	Notes
8/1/1985	Bocek, Rutherford	Stanford University	
2/17/1986	B. Bocek	Stanford University	

Associated reports

Report No.	Year	Title	Affiliation
S-016394	1994	Recorded Archaeological Resources in Santa Clara County, California	Basin Research Associates, Inc.
S-026914	1999	Archaeological Monitoring, Testing and Data Recovery Plan for the Sand Hill Corridor Project, Stanford, California.	Pacific Legacy, Inc.

Location information

County: Santa Clara
USGS quad(s): Palo Alto
Address:
PLSS: T6S R3W Sec. MDBM
UTMs: Zone 10 571760mE 4142800mN NAD27
Zone 10 572350mE 4143280mN NAD27
Zone 10 572380mE 4143410mN NAD27
Zone 10 572550mE 4143720mN NAD27

Management status

Database record metadata

	Date	User
Entered:	4/1/2005	icrds
Last modified:	7/29/2014	cabrala

IC actions:

Date	User	Action taken
4/1/2005	jay	Appended records from discontinued ICRDS.

Record status:

Report Detail: S-041536

Identifiers

Report No.:	S-041536
Other IDs:	
Cross-refs:	

Citation information

Author(s):	Michael Corbett and Denise Bradley
Year:	2001 (Feb)
Title:	Final Survey Report, Palo Alto Historical Survey Update, August 1997- August 2000
Affiliation:	Dames & Moore
No. pages:	213
No. maps:	0
Attributes:	Architectural/historical, Evaluation, Field study
Inventory size:	
Disclosure:	Not for publication
Collections:	No

General notes

291 houses & 12 historic districts

Associated resources

	Primary No.	*Trinomial*	*Name*
	P-43-000551	CA-SCL-000556H	Professorville Historic District
No. resources:	1		
Has informals:	Yes		

Location information

County(ies):	Santa Clara
USGS quad(s):	Mountain View, Palo Alto
Address:	
PLSS:	

Database record metadata

	Date	*User*
Entered:	8/12/2013	grahams
Last modified:	2/11/2015	hagell
IC actions:		
Record status:	Database Complete	

Report Detail: S-026914

Identifiers

Report No.: S-026914

Other IDs:

Type	*Name*
Other	360-001

Cross-refs:

Citation information

Author(s): John Holson, Thomas L. Jackson, Elena Reese, Julia Hammett, and Heather Price

Year: 1999 (Feb)

Title: Archaeological Monitoring, Testing and Data Recovery Plan for the Sand Hill Corridor Project, Stanford, California.

Affiliation: Pacific Legacy, Inc.

No. pages: 67

No. maps:

Attributes: Other research

Inventory size:

Disclosure: Not for publication

Collections:

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-43-000272	CA-SCL-000263	CVR-5
P-43-000295	CA-SCL-000287	Sand Hill Road Site
P-43-000465	CA-SCL-000464	Stanford-EIP
P-43-000579	CA-SCL-000584	Creekbank Site
P-43-000581	CA-SCL-000586	Golf Course Site
P-43-000586	CA-SCL-000591	Downstream Site
P-43-000587	CA-SCL-000592/H	Area A
P-43-000604	CA-SCL-000609	Ronald McDonald House
P-43-000608	CA-SCL-000613	Stanford Man II
P-43-000618	CA-SCL-000623	Children's Hospital

No. resources: 10

Has informals: No

Location information

County(ies): Santa Clara

USGS quad(s): Palo Alto

Address:

PLSS:

Database record metadata

	Date	*User*
Entered:	4/7/2005	nwic-main
Last modified:	2/11/2015	hagell

IC actions:

Date	*User*	*Action taken*
4/7/2005	jay	Appended records from NWICmain bibliographic database.

Record status:

Report Detail: S-014973

Identifiers

Report No.: S-014973
Other IDs:
Cross-refs:

Citation information

Author(s): Julia Hammett
Year: 1993
Title: PG&E Archaeology, 5 limited scale tests along the proposed pipeline trench crossing of Matadero Creek (letter report)
Affiliation: Stanford University
No. pages: 2
No. maps: 0
Attributes: Architectural/historical, Evaluation, Field study
Inventory size:
Disclosure: Not for publication
Collections:

General notes

Associated resources

Primary No.	Trinomial	Name
P-43-000023	CA-SCL-000003	Farnsworth #1
P-43-000581	CA-SCL-000586	Golf Course Site
P-43-000616	CA-SCL-000621	Upper Golf Course
P-43-000662	CA-SCL-000628	Lockhead Site

No. resources: 4
Has informals: No

Location information

County(ies): Santa Clara
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	User
Entered:	4/7/2005	nwic-main
Last modified:	9/6/2007	hagell

IC actions: Date	User	Action taken
4/7/2005	jay	Appended records from NWICmain bibliographic database.

Record status:

Report Detail: S-021795

Identifiers

Report No.: S-021795
Other IDs:
Cross-refs:

Citation information

Author(s): Laura Jones
Year: 1999 (May)
Title: Cultural and historic resources on the Meyer-Buck Estate Property at 2111 Sand Hill Road (letter report)
Affiliation: Stanford University
No. pages: 2
No. maps: 2
Attributes: Archaeological, Field study
Inventory size: c 7 ac
Disclosure: Not for publication
Collections:

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:

Address	*City*	*Assessor's parcel no.*	*Zip code*
211 Sand Hill Road		074-450-040	

PLSS:

Database record metadata

	Date	*User*
Entered:	4/7/2005	nwic-main
Last modified:	3/22/2010	blacke

IC actions:	*Date*	*User*	*Action taken*
	4/7/2005	jay	Appended records from NWICmain bibliographic database.

Record status:

Report Detail: S-017518

Identifiers

Report No.: S-017518
Other IDs:
Cross-refs:

Citation information

Author(s): Thomas L. Jackson
Year: 1975
Title: An archaeological reconnaissance of the Junipero Serra Boulevard Study (letter report)
Affiliation: Archaeological Consulting and Research Services, Inc.
No. pages: 2
No. maps: 1
Attributes: Archaeological, Field study
Inventory size:
Disclosure: Not for publication
Collections:

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-43-000413	CA-SCL-000407	Stanford Petroglyph

No. resources: 1
Has informals: No

Location information

County(ies): Santa Clara
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	4/7/2005	nwic-main
Last modified:	5/7/2007	hagell

IC actions:	*Date*	*User*	*Action taken*
	4/7/2005	jay	Appended records from NWICmain bibliographic database.

Record status:

Report Detail: S-026912

Identifiers

Report No.: S-026912
Other IDs:
Cross-refs:

Citation information

Author(s): Laura Jones and John Holson
Year: 2003 (Mar)
Title: File #8605-82-5-03G Sand Hill Road (letter report).
Affiliation: Stanford University, Pacific Legacy, Inc.
No. pages: 4
No. maps: 0
Attributes: Management/planning
Inventory size:
Disclosure: Not for publication
Collections:

General notes

Associated resources

Primary No.	Trinomial	Name
P-41-000259	CA-SMA-000263	Oak Knoll
P-43-000581	CA-SCL-000586	Golf Course Site
P-43-002239	CA-SCL-000878	Oak Knoll

No. resources: 3
Has informals: No

Location information

County(ies): San Mateo, Santa Clara
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	User
Entered:	4/21/2005	leigh
Last modified:	6/29/2010	hagell

IC actions:
Record status:

Report Detail: S-003022

Identifiers

Report No.:	S-003022	
Other IDs:	*Type*	*Name*
	Voided	E-20 SMA
Cross-refs:		

Citation information

Author(s): Stephen A. Dietz
Year: 1976
Title: An archaeological reconnaissance of the 19.9 acre Saga Corporation property at 1 Saga Lane, Menlo Park, California (letter report)
Affiliation: Archaeological Consulting and Research Services, Inc.
No. pages: 0
No. maps: 0
Attributes: Archaeological, Field study
Inventory size: 20 ac
Disclosure: Not for publication
Collections:

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	*User*	
Entered:	4/7/2005	nwic-main	
Last modified:	5/7/2007	hagell	
IC actions:	*Date*	*User*	*Action taken*
	4/7/2005	jay	Appended records from NWICmain bibliographic database.
Record status:			

Report Detail: S-036900

Identifiers

Report No.: S-036900
Other IDs:
Cross-refs: See also S-038087

Citation information

Author(s): Alan Leventhal, Diane DiGiuseppe, Melynda Atwood, David Grant, Susan Morley, Rosemary Cambra, Les Field, Charlene Nijmeh, Monica V. Arellano, Susanne Rodriguez, Sheila Guzman-Schmidt, Gloria E. Gomez, and Norma Sanchez
Year: 2010 (Jan)
Title: Final Report on the Burial and Archaeological Data Recovery Program Conducted on a Portion of a Middle Period Ohlone Indian Cemetery, Yuki Kutsuimi Saatos Inux [Sand Hill Road] Sites: CA-SCL-287 and CA-SMA-263, Stanford University, California (Volume I)
Affiliation: Muwekma Ohlone Tribe of the San Francisco Bay Area; Ohlone Families Consulting Services
No. pages: 717
No. maps:
Attributes: Archaeological, Evaluation, Excavation, Field study
Inventory size:
Disclosure: Not for publication
Collections: Yes

General notes

Associated resources

Primary No.	Trinomial	Name
P-41-000259	CA-SMA-000263	Oak Knoll
P-43-000295	CA-SCL-000287	Sand Hill Road Site
P-43-002239	CA-SCL-000878	Oak Knoll

No. resources: 3
Has informals: No

Location information

County(ies): Santa Clara
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	User
Entered:	7/30/2010	guldenj
Last modified:	2/27/2015	mikulikc

IC actions:
Record status: Database Complete

Report Detail: S-018765

Identifiers

Report No.:	S-018765
Other IDs:	
Cross-refs:	

Citation information

Author(s):	Laura Jones
Year:	1995
Title:	Summary of Testing at CA-SCL-287, CA-SCL-586 and CA-SMA-263, Proposed Site for Widening of Sand Hill Road at the Bridge Over San Francisquito Creek
Affiliation:	Stanford University
No. pages:	2
No. maps:	0
Attributes:	Archaeological, Excavation
Inventory size:	
Disclosure:	Not for publication
Collections:	No

General notes

Associated resources

	Primary No.	*Trinomial*	*Name*
	P-41-000259	CA-SMA-000263	Oak Knoll
	P-43-000295	CA-SCL-000287	Sand Hill Road Site
	P-43-000581	CA-SCL-000586	Golf Course Site
	P-43-002239	CA-SCL-000878	Oak Knoll
No. resources:	4		
Has informals:	No		

Location information

County(ies):	San Mateo, Santa Clara
USGS quad(s):	Palo Alto
Address:	
PLSS:	

Database record metadata

	Date	*User*	
Entered:	4/7/2005	nwic-main	
Last modified:	3/9/2012	grahams	
IC actions:	*Date*	*User*	*Action taken*
	4/7/2005	jay	Appended records from NWICmain bibliographic database.
Record status:			

Report Detail: S-033507

Identifiers

Report No.: S-033507
Other IDs:
Cross-refs:

Citation information

Author(s): Laura Jones
Year: 2007 (May)
Title: PLN2007-00101/APN 074480010 at 3673 Sand Hill Road/Mark Bonino, File No. 06-1632 (letter report)
Affiliation: Stanford University
No. pages: 3
No. maps: 1
Attributes: Archaeological, Field study, Other research
Inventory size: c 143 ac
Disclosure: Not for publication
Collections:

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-41-000257	CA-SMA-000261	Tree Farm
P-41-000304	CA-SMA-000308	Tree Farm #2

No. resources: 2
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	9/20/2007	guldenj
Last modified:	2/23/2015	muchb

IC actions:
Record status: Database Complete

Report Detail: S-038703

Identifiers

Report No.: S-038703
Other IDs:
Cross-refs: See also S-044022

Citation information

Author(s): Laura Jones, Julie Cain, David Daly, Sam Levy, Koji Ozawa, Max RoseFigura, Katie Turner, and Tim Wilcox
Year: 2012 (Feb)
Title: Archaeological and Geophysical Survey for SLAC National Laboratory, San Mateo County, California
Affiliation: Heritage Services - Stanford University
No. pages: 63
No. maps:
Attributes: Archaeological, Excavation, Field study
Inventory size:
Disclosure: Not for publication
Collections: Yes

General notes

Associated resources

Primary No.	Trinomial	Name
P-41-000204	CA-SMA-000204	Jasper Ridge Site
P-41-000249	CA-SMA-000253	Rattlesnake Rocks
P-41-000250	CA-SMA-000254/H	Bear Creek Site
P-41-000251	CA-SMA-000255/H	SLAC-1
P-41-000252	CA-SMA-000256	SLAC-2
P-41-000253	CA-SMA-000257	SLAC-3
P-41-000254	CA-SMA-000258	Big Biface Site
P-41-000289	CA-SMA-000283	SLAC Arroyo

No. resources: 8
Has informals: Yes

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	User
Entered:	3/8/2012	jordanl
Last modified:	2/11/2014	hagell

IC actions:
Record status: Database Complete

Report Detail: S-037464

Identifiers

Report No.: S-037464
Other IDs:
Cross-refs:

Citation information

Author(s): Carrie D. Wills
Year: 2010 (Aug)
Title: Cultural Resources Records Search and Site Visit for AT& T Mobility, LLC Candidate CN5707 (Sharon Heights), Lawler Ranch Road, Menlo Park, San Mateo County, California. (letter report)
Affiliation: Michael Brandman Associates
No. pages: 14
No. maps:
Attributes: Archaeological, Architectural/historical, Field study
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:

Address	*City*	*Assessor's parcel no.*	*Zip code*
Lawler Ranch Road	Menlo Park		

PLSS:

Database record metadata

	Date	*User*
Entered:	10/22/201	guldenj
Last modified:	11/30/201	georger

IC actions:
Record status:

Report Detail: S-037269

Identifiers

Report No.: S-037269
Other IDs:
Cross-refs:

Citation information

Author(s): Lorna Billat
Year: 2010 (Mar)
Title: Collocation ("CO") Submission Packet, FCC Form 621, Lawler Ranch Road, SF-43376A
Affiliation: Earth Touch, Inc.
No. pages: 42
No. maps:
Attributes: Archaeological, Field study
Inventory size: c 0.25 ac
Disclosure: Not for publication
Collections:

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:

Address	City	Assessor's parcel no.	Zip code
10 Lawler Ranch Road	Menlo Park		

PLSS:

Database record metadata

	Date	User
Entered:	9/14/2010	guldenj
Last modified:	9/23/2010	hagell

IC actions:
Record status:

Report Detail: S-029424

Identifiers

Report No.: S-029424
Other IDs:
Cross-refs:

Citation information

Author(s): Scott Billat
Year: 2004 (Dec)
Title: Sharon Heights CC/SF-1094 (resubmittal), FCC 040702E, 2900 Sand Hill Road, Menlo Park, CA
Affiliation: Earth Touch, Inc.
No. pages: 20
No. maps: 5
Attributes: Archaeological, Field study
Inventory size: c 0.25 ac
Disclosure: Not for publication
Collections:

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	4/25/2005	leigh
Last modified:	10/5/2007	hagell

IC actions:
Record status:

Report Detail: S-029424

Identifiers

Report No.: S-029424
Other IDs:
Cross-refs:

Citation information

Author(s): Scott Billat
Year: 2004 (Dec)
Title: Sharon Heights CC/SF-1094 (resubmittal), FCC 040702E, 2900 Sand Hill Road, Menlo Park, CA
Affiliation: Earth Touch, Inc.
No. pages: 20
No. maps: 5
Attributes: Archaeological, Field study
Inventory size: c 0.25 ac
Disclosure: Not for publication
Collections:

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	4/25/2005	leigh
Last modified:	10/5/2007	hagell

IC actions:
Record status:

Report Detail: S-038703

Identifiers

Report No.: S-038703
Other IDs:
Cross-refs: See also S-044022

Citation information

Author(s): Laura Jones, Julie Cain, David Daly, Sam Levy, Koji Ozawa, Max RoseFigura, Katie Turner, and Tim Wilcox
Year: 2012 (Feb)
Title: Archaeological and Geophysical Survey for SLAC National Laboratory, San Mateo County, California
Affiliation: Heritage Services - Stanford University
No. pages: 63
No. maps:
Attributes: Archaeological, Excavation, Field study
Inventory size:
Disclosure: Not for publication
Collections: Yes

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-41-000204	CA-SMA-000204	Jasper Ridge Site
P-41-000249	CA-SMA-000253	Rattlesnake Rocks
P-41-000250	CA-SMA-000254/H	Bear Creek Site
P-41-000251	CA-SMA-000255/H	SLAC-1
P-41-000252	CA-SMA-000256	SLAC-2
P-41-000253	CA-SMA-000257	SLAC-3
P-41-000254	CA-SMA-000258	Big Biface Site
P-41-000289	CA-SMA-000283	SLAC Arroyo

No. resources: 8
Has informals: Yes

Location information

County(ies): San Mateo
USGS quad(s): Palo Alto
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	3/8/2012	jordanl
Last modified:	2/11/2014	hagell

IC actions:
Record status: Database Complete

Appendix B

Native American Correspondence

STATE OF CALIFORNIA Edmund G. Brown, Jr., *Governor*

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd.
West Sacramento, CA 95691
(916) 373-3710
Fax (916) 373-5471

June 8, 2015

Kevin Hunt
RINCON CONSULTANTS
5135 Avenida Encinas, Ste A
Carlsbad, CA 92008

FAX: 760-918-9449

2 Pages
Sharon Heights Satelite Treatment Facility project, San Mateo County

Mr. Hunt;

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3713.

Sincerely,

Layta Winston for

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
San Mateo County
June 8, 2015

Jakki Kehl
720 North 2nd Street — Ohlone/Costanoan
Patterson , CA 95363
jakkikehl@gmail.com
510-701-3975

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28 — Ohlone/Costanoan
Hollister , CA 95024
ams@indiancanyon.org
(831) 637-4238

Linda G. Yamane
1585 Mira Mar Ave — Ohlone/Costanaon
Seaside , CA 93955
rumsien123@yahoo.com
(831) 394-5915

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
P.O. Box 360791 — Ohlone / Costanoan
Milpitas , CA 95036
muwekma@muwekma.org
(408) 205-9714
(510) 581-5194

Amah MutsunTribal Band of Mission San Juan Bautista
Irenne Zwierlein, Chairperson
789 Canada Road — Ohlone/Costanoan
Woodside , CA 94062
amahmutsuntribal@gmail.com
(650) 400-4806 Cell
(650) 332-1526 Fax

The Ohlone Indian Tribe
Andrew Galvan
P.O. Box 3152 — Ohlone/Costanoan, Bay Miwok, Plains Miwok, Patwin
Fremont , CA 94539
chochenyo@AOL.com
(510) 882-0527 Cell
(510) 687-9393 Fax

Amah MutsunTribal Band of Mission San Juan Bautista
Michelle Zimmer
789 Canada Road — Ohlone/Costanoan
Woodside , CA 94062
amahmutsuntribal@gmail.com
(650) 851-7747 Home
(650) 332-1526 Fax

Trina Marine Ruano Family
Ramona Garibay, Representative
30940 Watkins Street — Ohlone/Costanoan, Bay Miwok, Plains Miwok, Patwin
Union City , CA 94587
soaprootmo@comcast.net
(510) 972-0645

Coastanoan Rumsen Carmel Tribe
Tony Cerda, Chairperson
240 E. 1st Street — Ohlone/Costanoan
Pomona , CA 91766
rumsen@aol.com
(909) 524-8041 Cell
(909) 629-6081

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Sharon Heights Satellite Treatment Facility project, San Mateo County.

Rincon Consultants, Inc.
180 Grand Avenue, Suite 400
Oakland, California 94612
510 834 4455
FAX 834 4433
info@rinconconsultants.com
www.rinconconsultants.com

June 10, 2015

Jakki Kehl
720 North 2nd Street
Patterson, CA 95363

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Ms. Kehl:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Golf Course and along Sand Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

As part of the process of identifying cultural resources issues for this project, Rincon contacted the Native American Heritage Commission and requested a Sacred Lands File (SLF) search and a list of Native American tribal organizations and individuals who may have knowledge of sensitive cultural resources in or near the project area. The SLF search results stated that "Native American cultural resources were not identified" within the project area but recommended that we consult with you directly regarding your knowledge of the presence of cultural resources that may be impacted by this project.

If you have knowledge of cultural resources that may exist within or near the project area, please contact me in writing at the above address or kbrudvik@rinconconsultants.com, or by telephone at (510) 808-7034. Thank you for your assistance.

Sincerely,

Kyle Brudvik, M.A., RPA
Archaeologist, Geoarchaeologist, Paleontologist

Enclosure: Project Location Map

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180 Grand Avenue, Suite 400
Oakland, California 94612
510 834 4455
FAX 834 4433
info@rinconconsultants.com
www.rinconconsultants.com

June 10, 2015

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28
Hollister, CA 95024

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Chairperson Sayers:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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Sincerely,

Kyle Brudvik
Archaeologist, Geoarchaeologist, Paleontologist

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June 10, 2015

Linda G. Yamane
1585 Mira Mar Avenue
Seaside, CA 93955

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Ms. Yamane:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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June 10, 2015

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
P.O. Box 360791
Milpitas, CA 95036

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Chairperson Cambra:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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Sincerely,

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Archaeologist, Geoarchaeologist, Paleontologist

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FAX 834 4433
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June 10, 2015

Amah Mutsun Tribal Band of Mission San Juan Bautista
Irenne Zwierlein, Chairperson
789 Canada Road
Woodside, CA 94062

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Chairperson Zwierlein:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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Archaeologist, Geoarchaeologist, Paleontologist

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June 10, 2015

The Ohlone Indian Tribe
Andrew Galvan
P.O. Box 3152
Fremont, CA 94539

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Mr. Galvan:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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Sincerely,

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Archaeologist, Geoarchaeologist, Paleontologist

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June 10, 2015

Amah Mutsun Tribal Band of Mission San Juan Bautista
Michelle Zimmer
789 Canada Road
Woodside, CA 94062

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Ms. Zimmer:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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Sincerely,

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Archaeologist, Geoarchaeologist, Paleontologist

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June 10, 2015

Trina Marine Ruano Family
Ramona Garibay, Representative
30940 Watkins Street
Union City, CA 94587

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Representative Garibay:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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If you have knowledge of cultural resources that may exist within or near the project area, please contact me in writing at the above address or kbrudvik@rinconconsultants.com, or by telephone at (510) 808-7034. Thank you for your assistance.

Sincerely,

Kyle Brudvik
Archaeologist, Geoarchaeologist, Paleontologist

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June 10, 2015

Coastanoan Rumsen Carmel Tribe
Tony Cerda, Chairperson
244 E. 1st Street
Pomona, CA 91766

RE: Cultural Resources Study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

Dear Chairperson Cerda:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along San Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act.

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Sincerely,

Kyle Brudvik
Archaeologist, Geoarchaeologist, Paleontologist

Enclosure: Project Location Map

Table 3
Coordination with Local Native American Groups

Native American Contact	Letter Sent	Follow-Up	Results
Jakki Kehl 720 North 2nd Street Patterson, CA 95363	June 10, 2015 via US mail	September 8, 2015, 9:05 AM, B. Campbell via telephone: no answer, left voicemail	
Linda G. Yamane 1585 Mira Mar Avenue Seaside, CA 93955	June 10, 2015 via US mail	September 8, 2015, 9:07 AM, B. Campbell via telephone: no answer, left voicemail	
Amah Mutsun Tribal Band of Mission San Juan Bautista Irene Zwierlein, Chairperson 789 Canada Road Woodside, CA 94062	June 10, 2015 via US mail	September 8, 2015, 9:10 AM, B. Campbell via telephone	Chairperson Zwierlein had no comment on the project due to the level of disturbance in the project APE.
Amah Mutsun Tribal Band of Mission San Juan Bautista Michelle Zimmer 789 Canada Road Woodside, CA 94062	June 10, 2015 via US mail	September 8, 2015, 9:12 AM, B. Campbell via telephone: no answer, left voicemail	
Coastanoan Rumsen Carmel Tribe Tony Cerda, Chairperson 240 E. 1st Street Pomona, CA 91766	June 10, 2015 via US mail	September 8, 2015, 9:17 AM, B. Campbell via telephone	Chairperson Cerda had no comment on the project, but would like to be informed of any new discoveries made during the project.
Indian Canyon Mutsun Band of Costanoan Ann Marie Sayers, Chairperson P.O. Box 28 Hollister, CA 95024	June 10, 2015 via US mail	September 8, 2015, 9:20 AM, B. Campbell via telephone	Chairperson Sayers expressed concern over the sensitivity of the project APE, including the density of archaeological sites with associated burials near and adjacent to the project APE. She recommended that an archaeological and Native American monitor be present for all ground disturbance activities.
Muwekma Ohlone Indian Tribe of the SF Bay Area Rosemary Cambra, Chairperson P.O. Box 360791 Milpitas, CA 95036	June 10, 2015 via US mail	September 8, 2015, 9:27 AM, B. Campbell via telephone: unable to leave voicemail (full mailbox)	
The Ohlone Indian Tribe Andrew Galvan P.O. Box 3152 Fremont, CA 94539	June 10, 2015 via US mail	September 8, 2015, 9:30 AM, B. Campbell via telephone: no answer, left voicemail	Mr. Galvan recommended that if an archaeological monitor is present, a Native American monitor with a geographic relationship to the project APE should be present if the potential for pre-contact period cultural materials is high. Mr. Galvan would like to be kept informed as the project moves forward.
Trina Marine Ruano Family Ramona Garibay, Representative 30940 Watkins Street Union City, CA 94587	June 10, 2015 via US mail	September 8, 2015, 9:38 AM, B. Campbell via telephone: no answer, left voicemail	

Appendix C

Interested Parties/Local Consultation

Rincon Consultants, Inc.
180 Grand Avenue, Suite 400
Oakland, California 94612
510 834 4455
FAX 834 4433

info@rinconconsultants.com
www.rinconconsultants.com

September 3, 2015

Menlo Park Historical Association
800 Alma Street
Menlo Park, CA 94025-3445

RE: Initiation of the CEQA Plus Consultation Process for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California

To whom it may concern:

Rincon Consultants has been retained to conduct a cultural resources study for the Sharon Heights Satellite Treatment Facility Project, San Mateo County, California. The project proposes a one-acre pump station site and 12,400 linear feet of pipeline installation generally within the Sharon Heights Gold Course and along Sand Hill Road between Santa Cruz Avenue on the east and the western terminus of Sand Hill Road. The project is subject to the California Environmental Quality Act Plus.

Rincon is currently working in the study area to identify any cultural resource issues for the proposed project. If you or your organization has any concerns regarding specific historic resources within the project area, please respond in writing at the above address or kbrudvik@rinconconsultants.com, or by telephone at (510) 808-7034. Thank you for your assistance.

Sincerely,

Kyle Brudvik
Paleontologist, Geoarchaeologist, Archaeologist

Enclosure: *Project Location Map*

Table 4

Coordination with Interested Party/ Local Consultation

Interested Party Contact	Letter Sent	Follow-Up	Results
Menlo Park Historical Association 800 Alma Street Menlo Park, CA 94025-3445	September 3, 2015 via US mail	September 8, 2015, 9:00 AM, B. Campbell via telephone: no answer, left voicemail	Menlo Park Historical Association responded via telephone on September 8, 2015. They expressed no knowledge of any historically significant resources within the project APE.

Rincon Consultants, Inc.
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Oakland, California 94612
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October 15, 2015

Rincon Project No. 15-01334

Rosalyn Prickett, AICP
Principal/Senior Water Resources Planner
RMC Water and Environment
10509 Vista Sorrento Pkwy, Suite 205
San Diego, California 92121
VIA E-MAIL: *rprickett@rmcwater.com*

Subject: Paleontological Resources Assessment for the West Bay Sanitary District Recycled Water Project - Sharon Heights, San Mateo County, California

Dear Ms. Prickett:

Rincon conducted a paleontological resources assessment of the West Bay Sanitary District Recycled Water Project - Sharon Heights (project). The goal of the assessment was to identify the geologic units that may be impacted by project development, determine the paleontological sensitivity of geologic units within the project area of potential effect (APE), assess potential for impacts to paleontological resources from development of the proposed project, and recommend mitigation measures to avoid or mitigate impacts to scientifically significant paleontological resources.

This paleontological resource assessment consisted of a fossil locality record search, review of existing geologic maps, site survey, and a review of primary literature regarding fossiliferous geologic units within the project vicinity and region.

Project Background

The proposed project is located in the City of Menlo Park, generally within the Sharon Heights Golf & Country Club (SHG&CC) and along Sand Hill Road between its intersection with Oak Avenue on the east and Highway 280 on the west. The APE includes the area of direct impact (ADI), consisting of all areas where work related to the project will occur, and the area of indirect effects, consisting of all parcels located immediately adjacent to the ADI. The ADI includes a 1-acre pump station site and 12,400 linear feet of pipeline installation. The site is depicted on the United States Geological Survey (USGS) Palo Alto, 7.5-minute topographic quadrangle within Township 6 South, Range 3 West, Section 8, 9, 16, and 17. Land use immediately adjacent to the project site includes land developed for residential and commercial purposes.

The Sharon Heights Satellite Treatment Facility Project proposes to provide recycled water to the SHG&CC. Components of the project would include wastewater supply conveyance, treatment, discharge pipelines, and pump stations. The pump station and forcemain would convey raw wastewater from the collection system main at the intersection of Sand Hill Road and Oak Avenue to the SHG&CC, including approximately 9,400-feet of pipeline installation within the existing roadway. The treatment plant would be constructed immediately adjacent to an existing storage pond on the southern edge of the SHG&CC. Solid wastes from the treatment plant would be discharged through 1,600-feet of pipeline to be constructed from the plant to an existing sewer on the far side of the golf course.

The first phase of recycled water distribution pipelines would require approximately 5,300 LF of 6-inch PVC pipe to deliver recycled water from the treatment facility site to SLAC. The second phase of recycled water distribution pipelines would require approximately 6,340 LF of 6-inch PVC pipe to deliver recycled water from the treatment facilities to the Rosewood Sand Hill, Sand Hill Commons, and Sharon Land Co.

This paleontological assessment has been prepared to support environmental review under the California Environmental Quality Act (CEQA) and potentially under the National Environmental Policy Act (NEPA) if a Federal nexus for the project is established.

Regulatory Setting

Federal Laws and Regulations

A variety of federal statutes specifically address paleontological resources. They generally become applicable to specific projects if the project involves: 1) a federal agency license, permit, approval, or funding, and/or 2) crosses federal lands.

Archaeological and Paleontological Salvage (23 USC 305)

Statute 23 USC 305 amends the Antiquities Act of 1906. Specifically, it states:

> *Funds authorized to be appropriated to carry out this title to the extent approved as necessary, by the highway department of any State, may be used for archaeological and paleontological salvage in that state in compliance with the Act entitled "An Act for the preservation of American Antiquities," approved June 8, 1906 (PL 59-209; 16 USC 431-433), and State laws where applicable.*

This statute allows funding for mitigation of paleontological resources recovered pursuant to federal aid highway projects, provided that "excavated objects and information are to be used for public purposes without private gain to any individual or organization" (Federal Register [FR] 46(19):9570).

National Environmental Policy Act (NEPA) of 1969

NEPA (United States Code, section 4321 et seq.; 40 Code of Federal Regulations, section 1502.25), as amended, directs Federal agencies to "Preserve important historic, cultural, and natural aspects of our national heritage (Section 101(b) (4))."

Paleontological Resources Preservation Act of 2009

The Paleontological Resources Preservation Act (PRPA) is part of the Omnibus Public Land Management Act of 2009 (Public Law 111-011 Subtitle D). This act directs the Secretary of the Interior or the Secretary of Agriculture to manage and protect paleontological resources on federal land, and develop plans for inventorying, monitoring, and deriving the scientific and educational use of such resources. It prohibits the removal of paleontological resources from federal land without a permit issued under this Act, establishes penalties for violation of this act and establishes a program to increase public awareness about such resources. As of May 18, 2015, the U.S. Department of Agriculture has implemented a new rule that "provides for the preservation, management, and protection of paleontological resources on National Forest System Lands (NFS), and insures that these resources are available for current and future generations to enjoy as part of America's national heritage. The rule addresses the management, collection, and curation of paleontological resources from NFS lands including management using scientific principles and expertise, collecting of resources with and without a permit, curation in an approved repository, maintaining confidentiality of specific locality data, and authorizing penalties for illegal collecting, sale, damaging, or otherwise altering or defacing paleontological resources."

State Laws and Regulations

The following are California state regulations with respect to paleontological resources.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) (Chapter 1, Section 21002) states that:

> *It is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.*

The CEQA Guidelines (Article 1, Section 15002(a)(3)) state that CEQA is intended to prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible. If paleontological resources are identified during the Preliminary Environmental Analysis Report, or other initial project scoping studies (e.g., Preliminary Environmental Study), as being within the proposed project area, the sponsoring local agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

Public Resources Code Section 5097.5

Section 5097.5 of the California Public Code Section states:

> *No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological*

> *or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.*

As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, project proponents, are required to comply with PRC 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

Geologic Setting

The Sharon Heights project area is located in the foothills of the Santa Cruz Mountains. These mountains are part of the California Coast Ranges, a tectonic province dominated by active strike-slip and compressional tectonics. The foothills are separated from the main mass of the mountains by the San Andreas fault, located west of the project area (ES&H 2006; Pampeyan 1993). The project area itself overlies marine and non-marine sedimentary rocks, comprising sandstones, siltstones, and shales that are up to 1.2 miles thick east of the San Andreas Fault (Brabb and Pampeyan 1983; Brabb et al. 1998; Brabb et al. 2000; Dibblee 1966; 2007). These rocks range in age from Eocene to Recent (ca. 55 million to present).

The project site includes three mapped geologic units (Figure 1): Whiskey Hill Formation (Tw); Ladera Sanstone (Tl); and Pleistocene stream terraces (Qst) (Brabb et al. 1998; Brabb et al. 2000; Pampeyan 1993). The Ladera Sandstone and Whiskey Hill Formation are equivalent to Dibblee's (1966; 2007) Matadero Sandstone (Tma) and Butano Formation (Tbu), respectively. Though there is no explanation for this discrepancy, Dibblee's 2007 map appears to be based on his older (1966) map and so retains unit definitions originally established by Branner et al. (1909). We have elected to use the revised unit nomenclature defined by Pampeyan (1993) with regards to the Ladera Sandstone and Whiskey Hill Formation, which are more commonly used in later publications (see e.g., Brabb et al. 1998; 2000; ES&H 2006).

Most of the project area overlies the middle Miocene-aged (ca. 15 million years old) Ladera Sandstone (in the western portion, along Sand Hill Road and under portions of SHG&CC) and the Eocene-aged (ca. 55 million years old) Whiskey Hill Formation (in the middle reaches of Sand Hill Road) (Pampeyan 1993). The eastern end of the project area is underlain by Pleistocene-aged alluvium and stream terraces (ca. 1.5 million to 10,000 years old). Small pockets of Late Holocene alluvium (ca. <5,000 years old), and artificial fill are also present.

Paleontological Sensitivity

Only qualified, trained paleontologists with specific expertise in the type of fossils being evaluated can determine the exact scientific significance of paleontological resources. However, any qualified paleontologist can evaluate the potential significance of fossil specimens. The Society for Vertebrate Paleontology (SVP), which is a body of experts that professional paleontologists rely on for guidance, broadly defines significant paleontological resources as follows (SVP 2010, page 11):

> *"Fossils and fossiliferous deposits consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years)."*

Significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, diagnostically important, or are common but have the potential to provide valuable scientific information for evaluating evolutionary patterns and processes, or which could improve our understanding of paleochronology, paleoecology, paleophylogeography or depositional histories. New or unique specimens can provide new insights into evolutionary history; however, additional specimens of even well represented lineages can be equally important for studying evolutionary pattern and process, evolutionary rates and paleophylogeography. Even unidentifiable material can provide useful data for dating geologic units if radiocarbon dating is possible. As such, common fossils (especially vertebrates) may be scientifically important, and therefore considered highly significant.

The SVP (2010) describes sedimentary rock units as having a high, low, undetermined, or no potential for containing significant nonrenewable paleontological resources. This criterion is based on rock units within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. Significant paleontologic resources are fossils or assemblages of fossils, which are unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and those which add to an existing body of knowledge in specific areas, stratigraphically, taxonomically, or regionally (Reynolds 1990). While these standards were specifically written to protect vertebrate paleontological resources, all fields of paleontology have adopted these guidelines. Rincon has evaluated the paleontological sensitivity of the proposed project site according to the following SVP (2010) categories:

I. **High Potential (sensitivity) -** Rock units from which significant vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a high potential for containing significant non-renewable fossiliferous resources. These units include but are not limited to, sedimentary formations and some volcanic formations which contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas which contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas which may contain new vertebrate deposits, traces, or trackways are also classified as significant.

II. **Low Potential (sensitivity)** – Sedimentary rock units that are potentially fossiliferous, but have not yielded fossils in the past or contain common and/or widespread invertebrate fossils of well documented and understood taphonomic, phylogenetic species and habitat ecology. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils prior to the start of construction. Generally, these units will be poorly represented by specimens in institutional collections and will not require protection or salvage operations. However, as excavation for construction gets underway it is possible that significant and unanticipated paleontological resources might be encountered and require a change of classification from Low to High Potential and, thus, require monitoring and mitigation if the resources are found to be significant.

III. **Undetermined Potential (sensitivity)** - Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.

IV. **No Potential** – Rock units of metamorphic or igneous origin are commonly classified as having no potential for containing significant paleontological resources.

Paleontological Sensitivities of Mapped Units

Artificial fill (af)
These Holocene age sediments are mapped within the project ADI and have been deposited for construction of highways, roads, and buildings. These deposits are typically not more than 1 to 2 meters thick, and are probably much thinner in most areas. Artificial fill has low to no potential to yield significant fossil resources.

Late Holocene alluvium (Qya)
Late Holocene alluvium consists of unconsolidated sand, silt, clay, and gravel horizons derived from upslope erosion. These sediments are generally too young to contain significant paleontological resources and so have low to no potential to yield significant fossil resources.

Pleistocene stream terraces (Qst)
The Pleistocene sediments are non-marine stream terraces and consist primarily of moderately consolidated, poorly sorted clay, silt, pebbly sand, sandstone, and conglomerate. Because of the age and terrestrial depositional setting of some of the fine-grained material within these Pleistocene sediments, a relatively high potential of uncovering fossil resources exists for this

unit, especially large vertebrate mammals. Pleistocene stream terraces are considered to have high paleontological sensitivity.

Ladera Sandstone (Tl)
The Ladera Sandstone is predominantly sandstone, but contains some siltstone and porcellaneous shale (Pampeyan 1993). The Ladera has yielded numerous marine invertebrates and vertebrates including shark teeth and the holotypes of *Paleoparadoxia repenningi* (a desmostylian; Panofsky 1998) and *Brachyallodesmus packardi* (a pinniped; Barnes 1972; Packard 1962). The desmostylian was a nearly complete skeleton recovered immediately adjacent to the project area (during construction of the Stanford Linear Accelerator; Panofsky 1998). Because of these verified occurrences of scientifically significant marine vertebrate fossils within the Ladera, a high potential of uncovering fossil resources exists, especially large marine vertebrates, during project construction activities. Ladera Sandstone is considered to have high paleontological sensitivity.

Whiskey Hill Formation (Tw)
The Whiskey Hill Formation consists of interlayered sandstone, siltstone, and claystone with minor conglomerate, glauconitic sandstone, and tuffaceous siltstone (Pampeyan 1993). An Eocene age of the unit is based on marine microfossil (foraminiferan) biostratigraphy. Though the Whisky Hill does contain microfossils, these fossils are so numerous and occur elsewhere in such high numbers, that representative sediments within the project area have low potential to yield significant paleontological resources during project construction activities. Whiskey Hill Formation is considered to have low paleontological sensitivity.

Impacts Analysis and Recommended Mitigation
The project area contains two mapped units that have a high paleontological sensitivity, and could yield scientifically significant paleontological resources; Pleistocene stream terraces (Qst) and Ladera Sandstone (Tl). Ladera Sandstone deposits occur extensively within the western portion of the project area and along Sand Hill Road and thus represent a high potential for ground-disturbing construction activity to impact scientifically significant paleontological resources. In addition, Pleistocene alluvium occurs within the eastern portion of the project site and in pockets along Sand Hill Road. Pleistocene alluvium has a record of abundant and diverse vertebrate fauna throughout California (Agenbroad 2003; Macias et al. 2014; Springer et al. 2009) and is generally considered to have high paleontological sensitivity wherever it occurs.

The proposed project is likely to impact geologic units with high paleontological sensitivity, both at the surface and at depth. As such, and because of the high paleontological sensitivity of two mapped units within the project area, we recommend the development of a Paleontological Mitigation Plan (PMP) to cover the entire project site. This PMP should be specifically crafted to the fossil-bearing units known to exist within the project area, and may distinguish between areas that do, and do not require paleontological monitoring. The PMP should include the following components:

a. The PMP should be prepared by a qualified principal paleontologist (M.S. or Ph.D. in paleontology) once adequate project design information regarding subsurface disturbance location, depth and lateral extent is available.

b. The qualified principal paleontologist should be present at pre-construction meetings to confer with contractors who will be performing ground disturbing activities.

c. Paleontological monitors, under the direction of the qualified principal paleontologist, should be on site to inspect cuts for fossils at all times during original ground disturbance involving sensitive geologic formations.

d. When fossils are discovered, the paleontologist (or paleontological monitor) should recover them. Construction work in these areas may be halted by the Resident Engineer or diverted to allow the prompt recovery of fossils.

e. Fossils collected during the monitoring and salvage portion of the mitigation program should be prepared to the point of identification, sorted, and cataloged.

f. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, should be deposited in a scientific institution with paleontological collections.

g. A Paleontological Mitigation Report should be completed that outlines the results of the mitigation program.

h. Where feasible, selected road cuts or large finished slopes in areas with critically interesting paleontological features may be left exposed so they can serve as important educational and scientific features. This may be possible if no substantial adverse visual or safety impacts result.

Following the implementation of the PMP, the results of paleontological field work during project construction should be reported in a Paleontological Mitigation Report (PMR). This report must be prepared by, or under the direction of, the Principal Paleontologist and must thoroughly detail all paleontological mitigation work done and the results of that work. In addition, curation of any and all fossils collected from the project site, though the property of the landowner, must be documented at an approved facility and preserved for future researchers. As a final step, a Paleontological Stewardship Summary (PSS) should be supplied to maintenance and operations staff. The PSS should include the location of the resources, descriptions of the resources, the types of use restrictions, and the duration of those restrictions.

Sincerely,
RINCON CONSULTANTS, INC.

Kyle Brudvik, M.A.
Paleontologist

David Daitch, Ph.D.
Professional Paleontologist/Program Manager

Duane Vander Pluym, D.Env.
Sr. Principal

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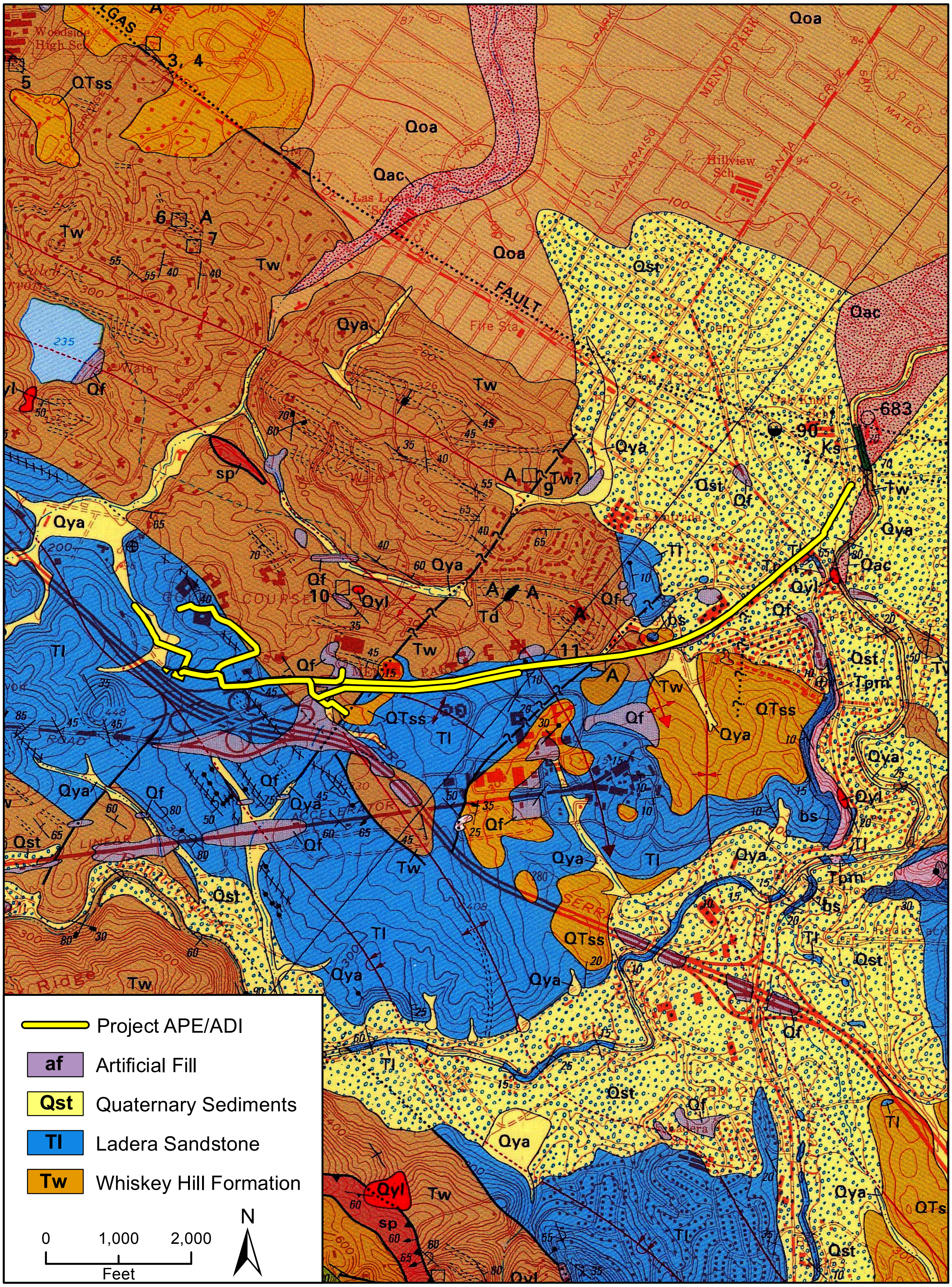

Basemap Source: Pampeyan, E.H. 1993. Geologic Map of the Palo Alto 7-1/2' Quadrangle, San Mateo and Santa Clara Counties, California, U.S. Geological Survey Miscellaneous Investigations Series, Map I-2371, scale 1:24,000.

Geologic Map

Figure 1

Appendix E - Hazardous Sites Mapping

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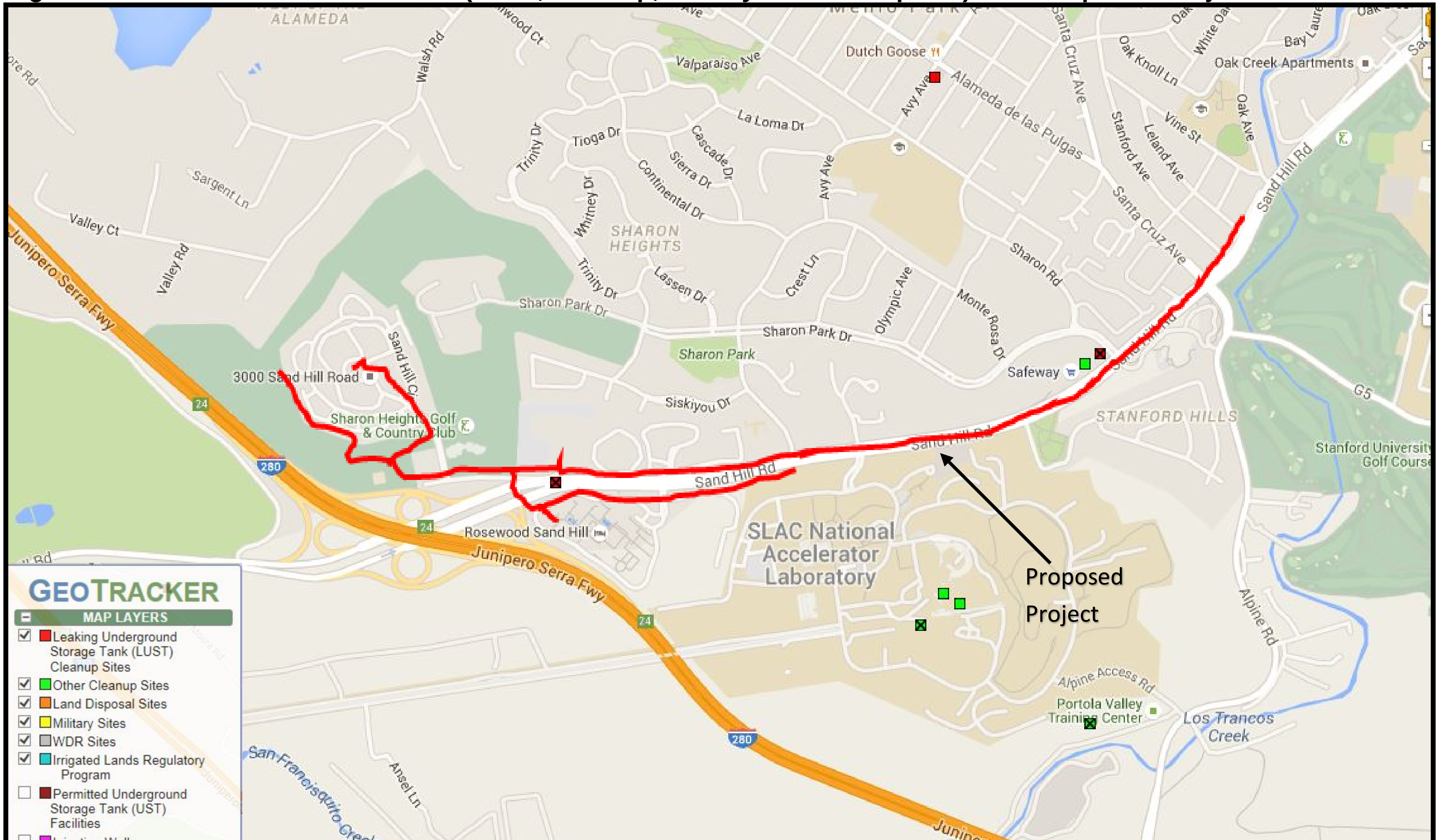
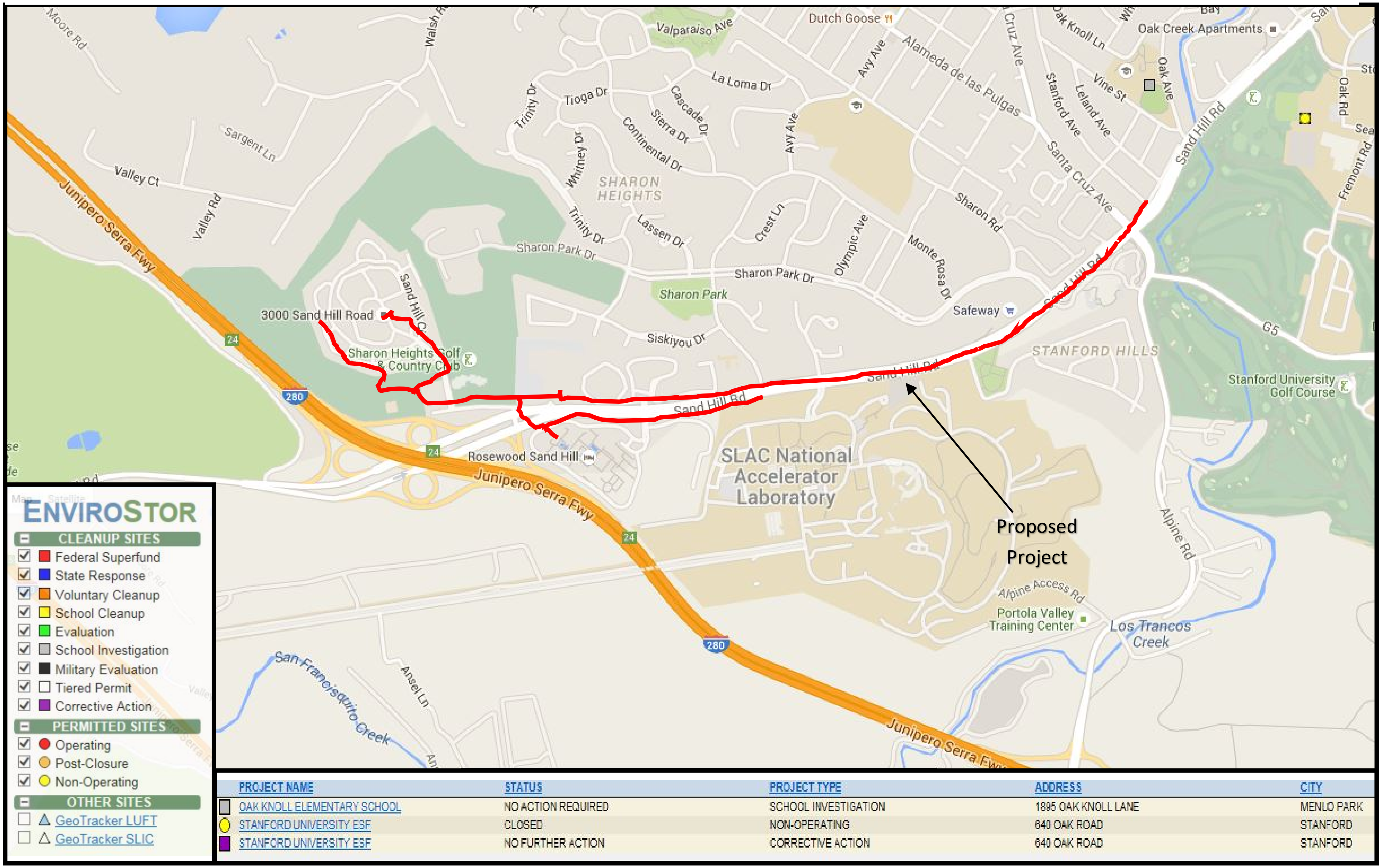
Figure 1. Environmental Hazard Sites (LUFT, Cleanup, Military & Land Disposal) near Proposed Project



SITE NAME	GLOBAL ID	STATUS	ADDRESS	CITY
PORTOLA VALLEY TRAINING CENTER	SL0608151381	COMPLETED - CASE CLOSED	100 ANSEL LANE	MENLO PARK
SHARON HEIGHTS CLEANERS	SL0608148913	OPEN - SITE ASSESSMENT	325 SHARON PARK DRIVE	MENLO PARK
SHARON HEIGHTS COUNTRY CLUB	T0608100459	COMPLETED - CASE CLOSED	2900 SAND HILL	MENLO PARK
SHELL	T0608100462	COMPLETED - CASE CLOSED	125 SHARON PARK	MENLO PARK
SHELL	T0608198726	COMPLETED - CASE CLOSED	125 SHARON PARK	MENLO PARK
SLAC - FORMER SUBSTATION 406	T10000003054	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	2575 SAND HILL ROAD	MENLO PARK
SLAC GROUP 1 REMOVAL ACTION SITES	T10000003057	COMPLETED - CASE CLOSED	2575 SAND HILL RD.	MENLO PARK
SLAC NATIONAL ACCELERATOR LABORATORY	SL0608125065	OPEN - REMEDIATION	2575 SAND HILL ROAD	MENLO PARK

Figure 2. Cleanup Sites and Hazardous Waste Facilities near Proposed Project



	PROJECT NAME	STATUS	PROJECT TYPE	ADDRESS	CITY
	OAK KNOLL ELEMENTARY SCHOOL	NO ACTION REQUIRED	SCHOOL INVESTIGATION	1895 OAK KNOLL LANE	MENLO PARK
	STANFORD UNIVERSITY ESF	CLOSED	NON-OPERATING	640 OAK ROAD	STANFORD
	STANFORD UNIVERSITY ESF	NO FURTHER ACTION	CORRECTIVE ACTION	640 OAK ROAD	STANFORD