San José-Santa Clara Regional Wastewater Facility

2021 Annual Self-Monitoring Report

San José-Santa Clara
Regional Wastewater Facility
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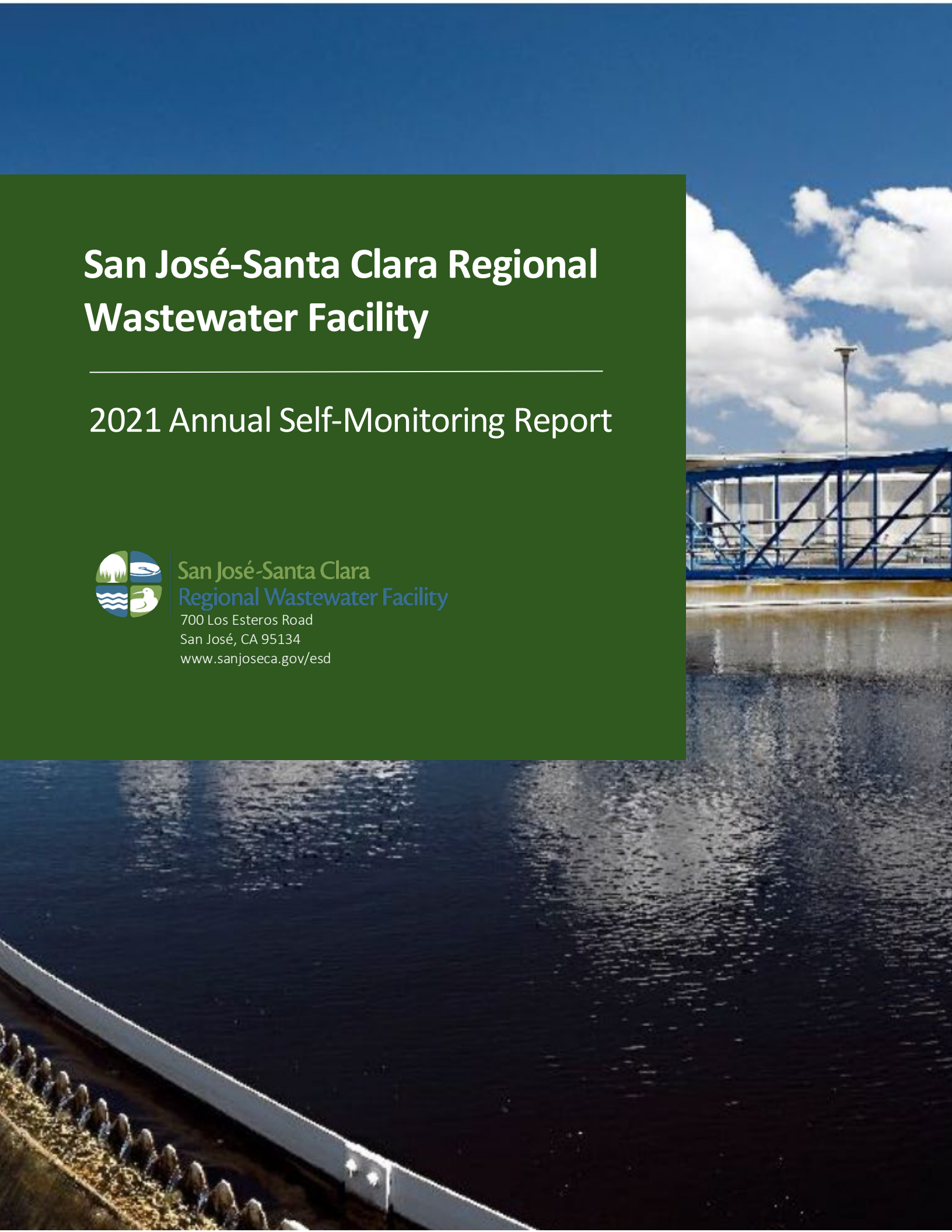

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2021 Self-Monitoring Annual Report

San José-Santa Clara Regional Wastewater Facility Annual Reports are posted on the City of San José website at:

http://www.sanjoseca.gov/regulatoryreports

This annual report summarizes the past year of facility effluent monitoring and provides summary data for the previous two years for comparison. Graphical charts also show flow and selected pollutant data back to January 2006 to capture trends for the past 15 years. Subsequent sections of this report summarize significant or interesting events impacting facility operations, maintenance, personnel, and finance. The final section discusses ongoing receiving water monitoring and special projects.

Reporting for the San José-Santa Clara Regional Wastewater Facility is managed by the Wastewater Compliance Team:

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On the Cover: A secondary clarifier at the San José-Santa Clara Regional Wastewater Facility. Upgrade and rehabilitation of the clarifiers is one of the many projects undertaken by the Capital Improvement Program.

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Annual Self-Monitoring Report Background

NPDES Requirements

The Annual Self-Monitoring Report for the San José-Santa Clara Regional Wastewater Facility is required by NPDES Permit Number CA-0037842, Water Board Order Number R2-2020-0001.

In 2021, the Facility maintained 100% compliance with all NPDES effluent limitations.

The facility continues to meet NPDES provision E-VI (permit page E-9) by participating in the San Francisco Bay Regional Monitoring Program (RMP) in collaboration with other BACWA agencies.

Annual status reports for various NPDES related programs and plans are summarized below:

General Annual Reporting for the NPDES Permit: Permit Provisions VI.C.2 - 5 require that the facility provide the following routine status reports:

a. Effluent Characterization Study – this analytical monitoring is reported via monthly & annual Facility Self-Monitoring Reports (SMRs)
b. Pollutant Minimization Program – annual Pollution Prevention (P2) program is reported to Regional Water Board by 28 February each year & posted on the City of San José website.
c. Pretreatment Program – annual & semi-annual pretreatment reports, submitted to Water Board by 28 February and 31 July respectively, are governed by NPDES Permit Attachment H, "Requirements for Pretreatment Annual Reports."
d. Sludge and Biosolids Management – Biosolids hauled off-site are reported to EPA, Region 9, in February each year in accordance with NPDES permit & 40 CFR part 503.
e. Collection System Management – Collection systems for Cities of San José & Santa Clara are managed & reported in accordance with NPDES Permit Attachment D & State Water Board Order No. WQ 2006-0003 DWQ, "General Collection System WDRs."
f. Avian Botulism Control Program – Provision VI.C.5.a: An Avian Botulism Control Program annual report is required by February 28 each year.

This SMR report, satisfying items "a." & "d." above, along with reports "b.", "c." & "f.", are posted on City of San José "Regulatory Reports" website:

https://www.sanjoseca.gov/your-government/environment/regulatory-reports

The Collection System Management Annual Report (aka "Sewer System Management Plan," item "e.") is posted at this site:

https://www.sanjoseca.gov/your-government/departments/transportation/roads/sewers-storm-drains

Additional Annual SMR Report Requirements: Permit Attachment G, page G-11 outline required Facility Annual SMR reporting. In addition, Attachment G calls for the following plans and reports be reviewed annually and updated as necessary so as to remain useful and relevant to current practices:

a. Contingency Plan for Operations Under Emergency Conditions
b. Wastewater Facilities Status Report
c. O&M Manual

Facility Information

Facility Process Areas and Sampling Points

The wastewater treatment process consists of screening, grit removal, primary sedimentation, secondary (biological nutrient removal) treatment, secondary clarification, filtration, disinfection, and dechlorination. Figure 1, below, illustrates the facility treatment areas, flow routing, as well as the influent and effluent sample points.

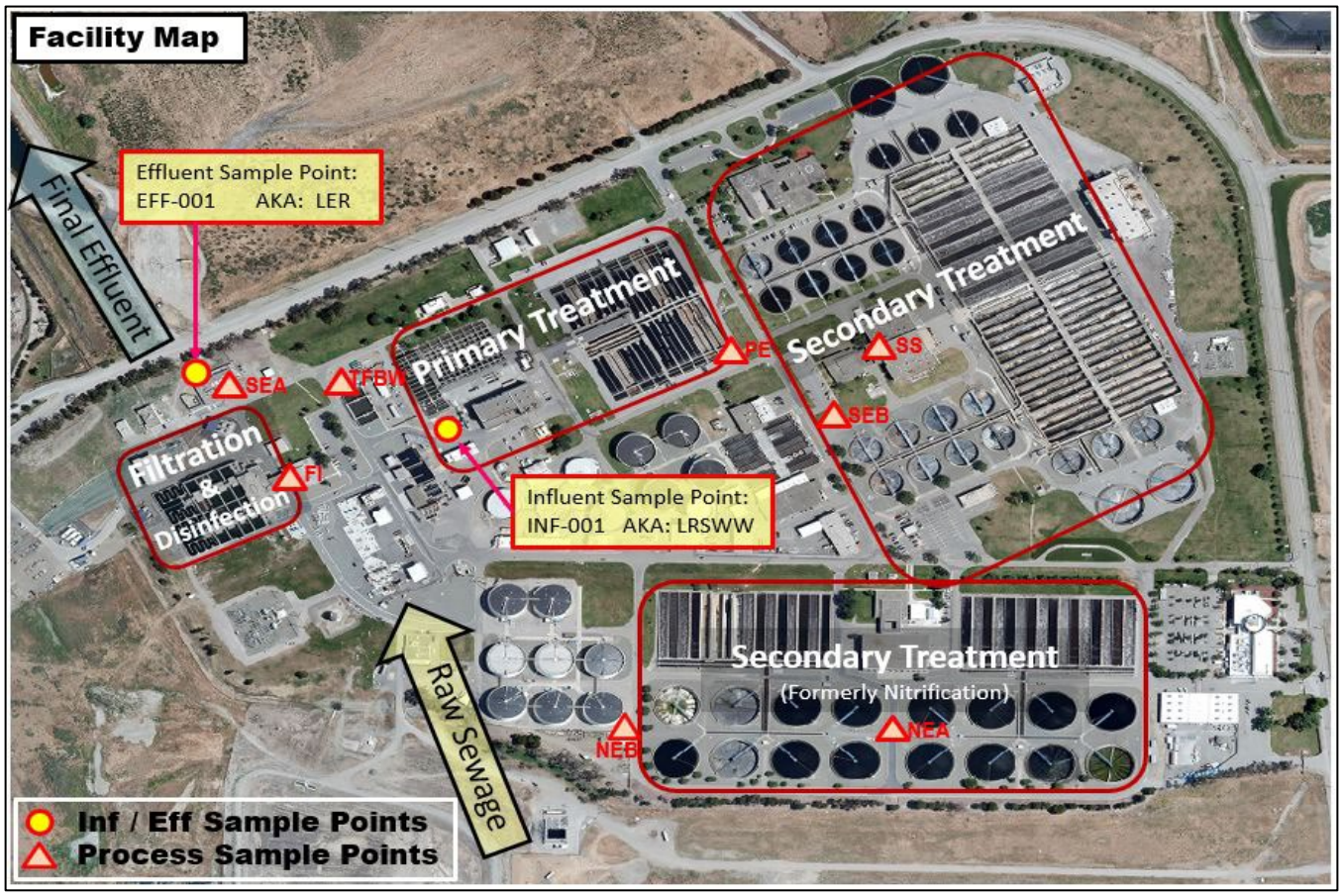


FIGURE 1 WATER POLLUTION CONTROL PLANT: STANDARD FLOW ROUTING AND INFLUENT AND EFFLUENT SAMPLING STATIONS

Facility Stormwater Conveyance System

The treatment facility is designed to capture all spills and stormwater on site. 20 stormwater collection systems convey flows to 6 pump stations (Figure 2). Stormwater pump stations direct all captured water back to facility headworks for treatment. The stormwater catch basin system has capacity to contain at least several hundred thousand gallons of spilled process waters if such an event occurs.

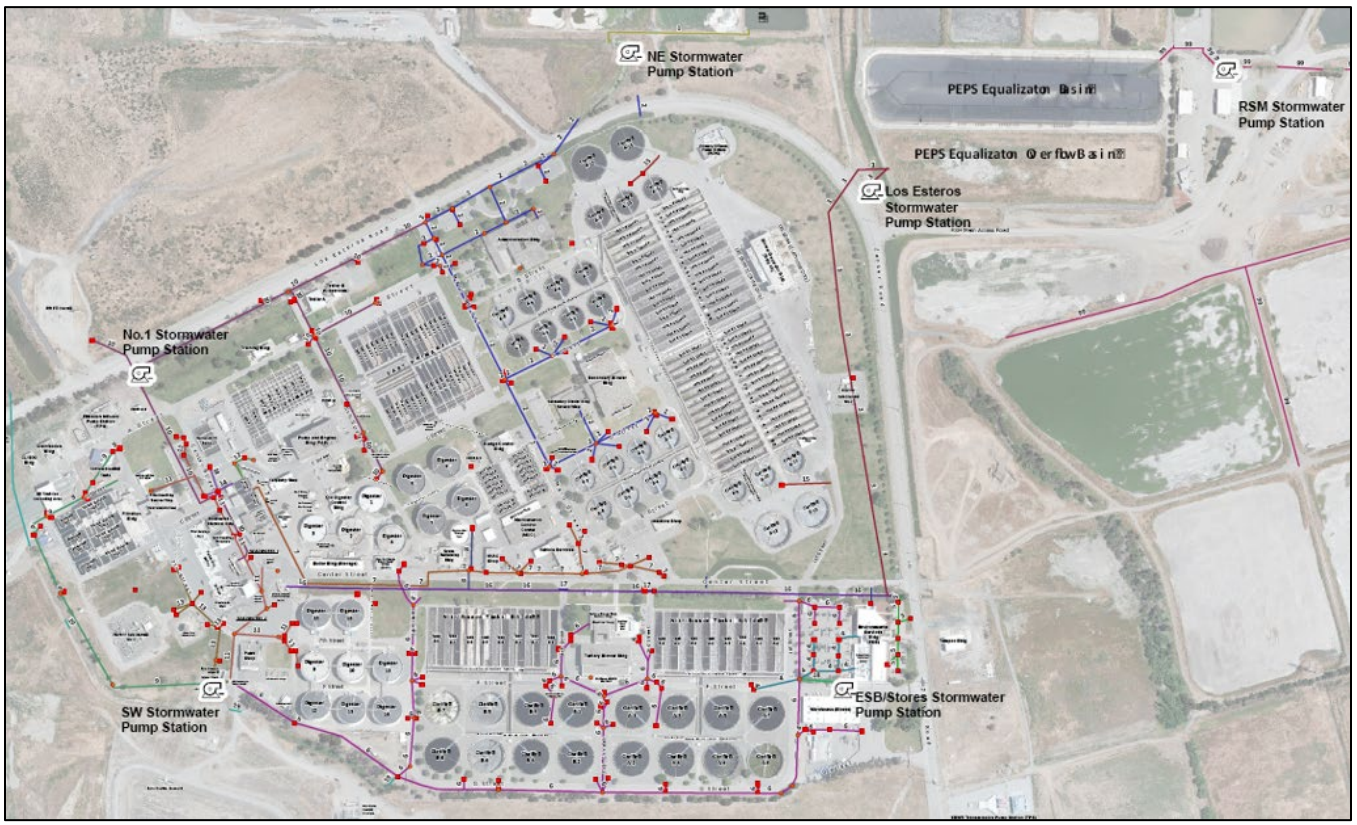


FIGURE 2 FACILITY STORMWATER CONVEYANCE SYSTEM MAP

Facility Service Area

The Facility receives wastewater from roughly 1.5 million residents and more than 17,000 commercial and industrial facilities. The City of San José manages the San José -Santa Clara Regional Wastewater Facility for the following Cities or agencies (Figure 3):

- San José,
- Santa Clara,
- Milpitas,
- Cupertino Sanitary District,
- County Sanitation Districts 2-3,
- Burbank Sanitary District, and
- West Valley Sanitation District (Campbell, Los Gatos, Monte Sereno, and Saratoga)

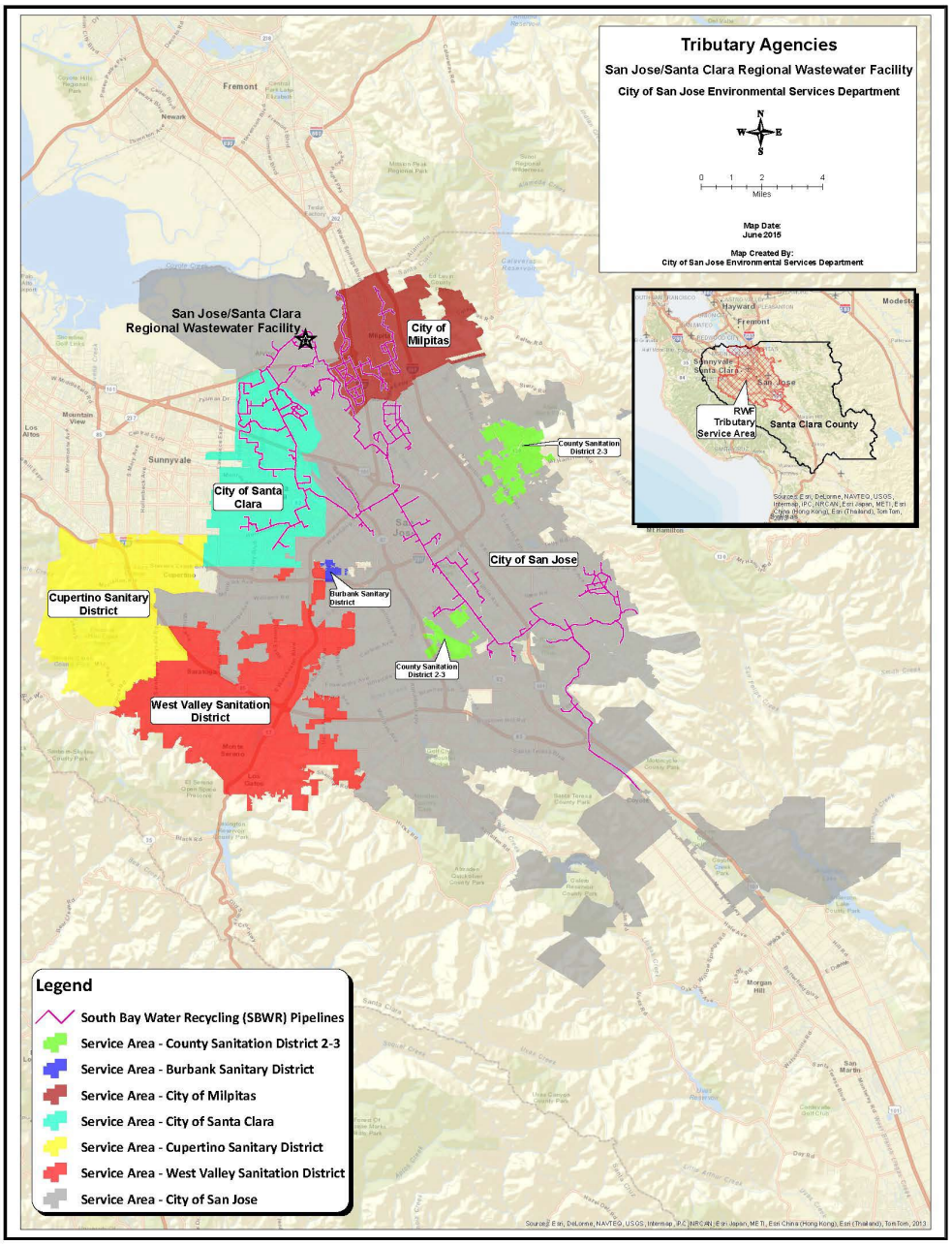


FIGURE 3 FACILITY LOCATION AND SERVICE AREA

1. Annual Reporting Requirements

Facility Flows

The peak average monthly effluent flow of 87.9 MGD occurred in December 2021. The peak daily flow for the year was 125.5 MGD on January 28. Table 1, below, summarizes influent and effluent flows for the last three years and Figure 4, below, illustrates daily average flows from 2006 through 2021.

Average Dry Weather Influent Flow (ADWIF) is the highest five-weekday period from June through October. The 2021 ADWIF was 102.4 MGD and occurred between October 25 and October 29.

Average Dry Weather Effluent Flow (ADWEF) is the lowest average Effluent flow for any three consecutive months between the months of May and October. For 2021, ADWEF was 66.4 MGD and occurred during the months of June to August.

TABLE 1 SUMMARY OF INFLUENT AND EFFLUENT FLOWS 2019-2021

Year	Influent Flow	Effluent Flow			ADWIF Limit = 167 MGD ADWEF Trigger = 120 MGD	
	Average	Low	High	Average	ADWIF	ADWEF
2019	108.6	69.6	164.0	93.2	109.6	79.3
2020	101.1	68.4	112.9	82.7	102.0	75.4
2021	**92.7**	**55.9**	**125.5**	**76.4**	**102.4**	**66.4**

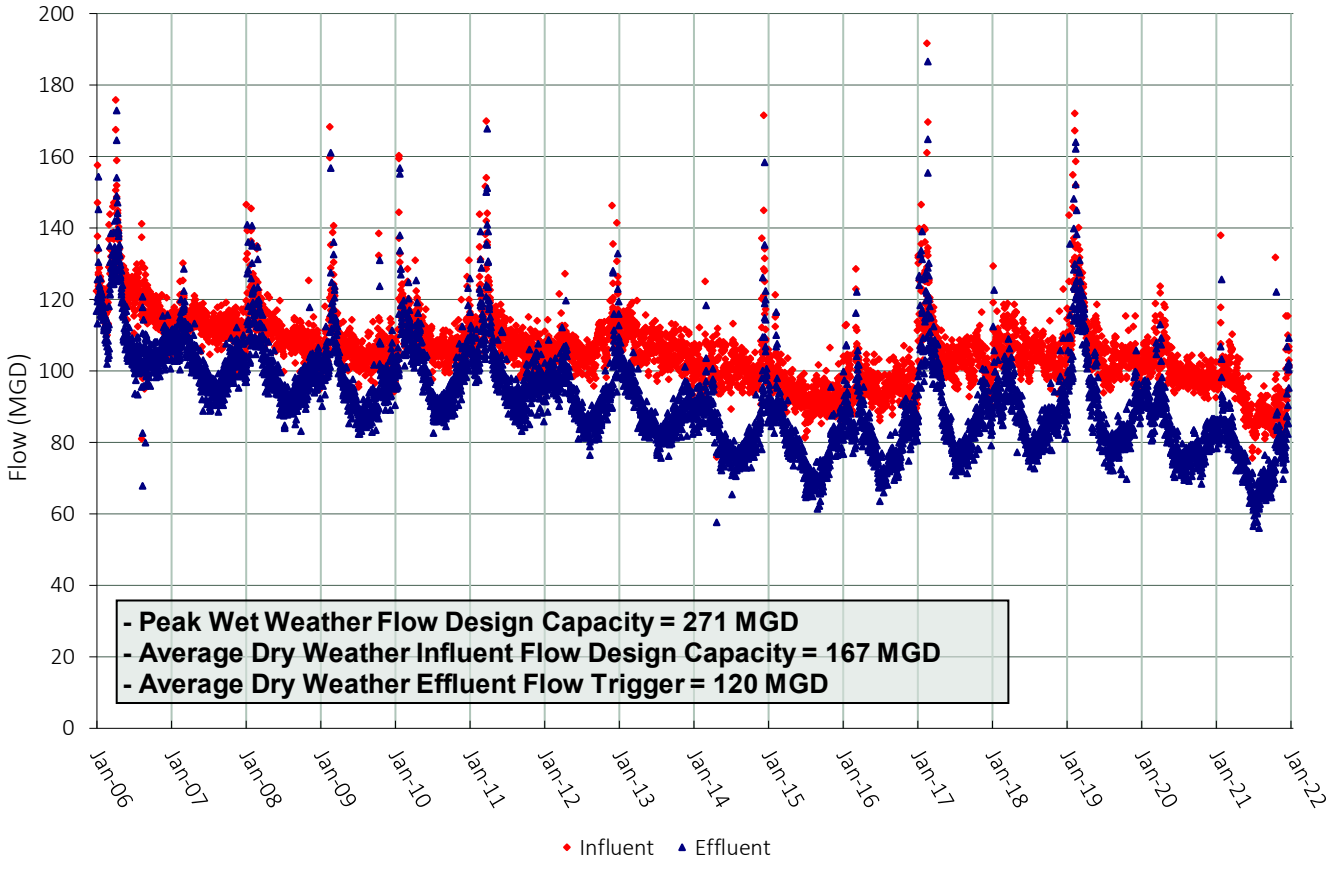


FIGURE 4 GRAPH OF DAILY AVERAGE FLOWS (MGD) 2006-2021

Biosolids and Material

Biosolids

Roughly one million gallons per day (1 MGD) of digester effluent is pumped to Residual Sludge Management (RSM) area sludge lagoons where the material stabilizes for 3 to 4 years. Floating dredges then pump biosolids to solar drying beds for one summer drying season. The facility has 4 Liquid Waste Technologies (LWT) dredges in inventory. Dredges typically have a 10-year operating life.

While drying, biosolids are churned using FECON FTX-600 Mulching Tractors and Caterpillar (CAT) bulldozers. FECON mulchers are most effective churning wet biosolids. Once biosolids have dried to a firmer consistency, the extra horsepower of a CAT D6 or D7 bulldozer is needed. Dried material is trucked to adjacent Newby Island Landfill where biosolids are used as Alternate Daily Cover (Figure 5).

FIGURE 5 BIOSOLIDS SOLAR-DRIED, PILED, AND READY FOR HAULING FOR USE AS ALTERNATE DAILY COVER

A project to replace open-air solar drying beds and lagoons with a new facility that will mechanically dewater all digested biosolids was scoped in 2018. Design began in October 2019 with 100% design projected for early 2022 and construction starting before the end of 2022.

TABLE 2 CONCENTRATIONS IN BIOSOLIDS (mg/kg)

	2019	2020	2021
Antimony	ND	ND	**ND**
Arsenic	6.7	4.2	**4.7**
Barium	210	220	**190**
Beryllium	0.57	0.33	**0.26**
Cadmium	1.8	0.9	**0.7**
Chromium	76	54	**38**
(Cr STLC)	1.0	1.0	**0.94**
Cobalt	12	8.5	**6.8**
Copper	370	180	**150**
(Cu STLC)	0.2	NR	**NR**
Lead	36	15	**13**
Mercury	0.9	0.6	**0.38**
Molybdenum	8.5	2.1	**2.1**
Nickel	66	46	**38**
Selenium	3.6	2.0	**1.0**
Silver	5.8	2.8	**1.7**
Thallium	ND	ND	**ND**
Vanadium	48	36	**28**
Zinc	600	270	**210**
Cyanide	ND	1.9	**1.5**
DR organics	510	20	**29**
OR organics	1000	98	**94**

TABLE 3 BIOSOLIDS SUMMARY

Year	Truck Loads	Wet Tons	Total Solids	Volatile Solids	Dry Metric Tons-DMT
2019	3,287	53,872	81%	20%	39,521
2020	3,467	59,972	79%	15%	43,126
2021	**2,547**	**45,086**	**87%**	**17%**	**35,598**

Grit, Grease, and Screenings

Grit and screenings are collected near the headworks facility. Grease is floating material that accumulates in primary and secondary clarifiers. These materials are partially dewatered prior to being hauled to the local landfill. Table 4

TABLE 4 GRIT, GREASE, AND SCREENINGS (TONS) HAULED 2019-2021

Year	Grit	Grease	Screenings
2019	528	395	522
2020	474	370	450
2021	**637**	**369**	**540**

Effluent Monitoring

Facility NPDES Permit

Monitoring requirements from NPDES Permit Table 4 and monitoring frequency specified in Table E-3 of attachment E (Monitoring and Reporting Program) are summarized below in Table 5.

TABLE 5 EFFLUENT LIMITATIONS

	Average Monthly Effluent Limit (AMEL)	Maximum Daily Effluent Limit (MDEL)	Frequency
CBOD5 (BOD may be substituted)	10 mg/L	20 mg/L	Weekly
Total Suspended Solids (TSS)	10 mg/L	20 mg/L	Weekly
Oil and Grease	5 mg/L	10 mg/L	Quarterly
Total Ammonia, as N	3 mg/L	8 mg/L	Monthly
Copper	11 µg/L	16 µg/L	Monthly
Nickel	25 µg/L	33 µg/L	Monthly
Cyanide, Total	5.7 µg/L	11 µg/L	Monthly
Dioxin – TEQ	1.7 X 10^{-8} µg/L	2.8 x 10^{-8} µg/L	2 x year
	Instantaneous Minimum	**Instantaneous Maximum**	**Frequency**
pH	6.5	8.5	Daily
Total Chlorine Residual	N/A	0.0 mg/L	Hourly
Turbidity	N/A	10 NTU	Weekly
Dissolved Oxygen	5.0 mg/L	N/A	Daily
	6-week rolling Geometric Mean	**Monthly 90th Percentile**	**Frequency**
Enterococcus Bacteria	30 MPN/100 mL	110 MPN/100 mL	5x/week

Mercury & PCBs Watershed Permit

Effluent limits below in Table 6 are established in the Mercury and PCBs Watershed Permit, Permit Number CA0038849, Order No. R2-2017-0041.

TABLE 6 EFFLUENT LIMITATIONS FOR MERCURY & PCBS

	AMEL µg/L	MDEL µg/L	Annual Mass	Frequency
Mercury	0.025	0.027	0.8 kg/yr	Monthly
PCBs	0.00039	0.00049	N/A	Quarterly

Nutrient Watershed Permit

Permit Number CA0038873, Order No. R2-2019-0017 requires influent and effluent (Table 7) monitoring as detailed below – no limits are established.

TABLE 7 NUTRIENT WATERSHED PERMIT INFLUENT AND EFFLUENT MONITORING REQUIREMENTS

Parameter	Units	Influent Frequency	Effluent Frequency
Ammonia, Total	mg/L and kg/day as N	1x per quarter	2x per month
Total Kjeldahl Nitrogen	mg/L and kg/day as N	1x per quarter	Not required
Nitrate-Nitrite	mg/L and kg/day as N	1x per quarter	2x per month
Inorganic Nitrogen, Total (calculated)	mg/L and kg/day as N	Not required	2x per month
Phosphorus, Total	mg/L and kg/day as P	1x per quarter	2x per month

Annual average calculations for water quality constituents are determined from monthly average results except for constituents measured daily or multiple times per week

Non-detected values are substituted with corresponding Method Detection Level (MDL) values. Tables and Graphs also substitute the MDL for non-detected results.

a. Conventional Pollutants

The NPDES Permit establishes effluent limitations for Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), BOD & TSS Percent Removal, Oil & Grease, pH, Total Chlorine Residual, Turbidity, Total Ammonia, and Enterococcus bacteria. Dissolved oxygen (DO) in the receiving water cannot fall below 5.0 mg/L due to effluent discharges. Loads for BOD, Ammonia, and TSS are calculated by multiplying each daily concentration by corresponding daily average flow.

Conventional pollutants with effluent limitations

pH

Effluent pH ranged from 7.2 to 8.2 standard units (S.U.) in 2021. Effluent Limits are 6.5 & 8.5 S.U.

Temperature

Effluent temperatures for 2021 ranged from 16.9 to 25.8^{o} C, averaging 21.6^{o} C.

Total Chlorine Residual

The Facility uses both continuous monitoring equipment and wet chemical analysis to monitor residual chlorine. In 2021, residual chlorine was not detected in final effluent at the outfall.

Enterococcus Bacteria

Facility effluent limit for Enterococcus is 30 colonies per 100 mL as a 6-week rolling geometric mean. The 6-week rolling geometric mean concentrations ranged from 2.2 to 5.6 Most Probably Number (MPN) per 100 mL during 2021. In addition, the monthly 90th percentile value for enterococcus cannot exceed 110 MPN per 100 mL. The maximum monthly 90th percentile value in 2021 was 9 MPN/100 mL.

Oil & Grease

In 2021, Oil and Grease was not detected any of the four quarterly monitoring events. The ESD Lab Method Detection Limit (MDL) for Oil and Grease using Standard Method EPA 1664A was 1.3 – 1.7 mg/L in 2021 and the MDL is used as the reported value when all results are Non-Detect (ND). Facility effluent limits are 5 mg/L (AMEL) and 10 mg/L (MDEL).

Dissolved Oxygen

Dissolved oxygen (DO) concentrations in effluent were above Bay Water Quality Objective of 5 mg/L throughout 2021 (TABLE 8).

TABLE 8 DO CONCENTRATIONS 2021

	Low	High	Average	2020 Averages
Effluent (mg/l)	6.6	8.1	7.3	7.5
Saturation (%)	72.1	92.9	83.3	85.5

Conventional pollutants with effluent limits and load calculations

Biochemical Oxygen Demand (BOD)

As defined by American Heritage Science Dictionary, Biochemical Oxygen Demand is: "The amount of oxygen required by aerobic microorganisms to decompose organic matter in a sample of water, such as one polluted by sewage. It is used as a measure of the degree of water pollution."

The secondary aeration process (aka: Biological Nutrient Removal, BNR, Process) cultivates microbes that consume oxygen and organic material.

TABLE 9 BOD (mg/L) AMEL = 10 mg/L, MDEL = 20 mg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	141	450	284	2	6	3	99%
2020	140	380	297	2	7	3	99%
2021	**240**	**380**	**300**	**2**	**9**	**4**	**99%**

TABLE 10 BOD LOADINGS 2021 (kg/d)

	Annual Total	Low	High	Average	2020 Averages
Influent	37,855,946 (kg)	77,780	140,973	103,715	112,827
Effluent	382,461 (kg)	583	2,421	1,048	884

Total Suspended Solids (TSS)

TSS is a measure of solid material suspended in water. Suspended solids settle out of the water column throughout the Facility treatment train: roughly half is removed in Primary settling tanks and another 40 to 45 percent is removed secondary/BNR clarifiers. Tertiary filtration removes up to an addition 10 mg/L.

TABLE 11 TSS (mg/L) AMEL = 10 mg/L MDEL = 20 mg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	123	506	314	1.0	3.0	1.0	99.6%
2020	248	378	306	0.5	1.9	1.1	99.6%
2021	**225**	**405**	**286**	**0.6**	**4.0**	**1.4**	**99.5%**

TABLE 12 TSS LOADINGS 2021 (kg/d)

	Annual Total	Low	High	Average	2020 Averages
Influent	36,686,729 (kg)	71,802	176,999	100,512	117,901
Effluent	154,118 (kg)	192	1,617	422	368

Turbidity

TABLE 13 TURBIDITY 2021 (NTU) HIGH LIMIT = 10 NTU

	Low	High	Average	2020 Average
Effluent	0.5	3.0	1.0	0.8

Total Ammonia

Practically all ammonia is removed. Chloramination process adds some back.

TABLE 14 AMMONIA N (mg/L) IN EFFLUENT AMEL = 3 mg/L MDEL = 8 mg/L

Year	Low	High	Average
2019	0.4	1.1	0.6
2020	0.3	1.9	0.6
2021	**0.3**	**0.8**	**0.5**

TABLE 15 AMMONIA LOADINGS 2021 (kg/d)

	Annual Total	Low	High	Average	2020 Averages
Influent	4,880,622 kg	10,573	15,859	13,372	14,096
Effluent	50,390 kg	85	213	138	185

b. Priority Pollutants

The Facility is required to perform periodic monitoring of 126 priority pollutants listed in NPDES permit Table B of Attachment G. Most of these are organic compounds that are never detected in effluent. The Facility has specific effluent limitations for 5 priority pollutants: Copper, Nickel, Cyanide, Dioxin, and Mercury. Additional metals from the priority pollutant list are typically detected at concentrations below applicable Water Quality Objectives.

Priority Pollutants with Effluent Limitations

The following tables summarize the past three years of influent and effluent water quality for the six priority pollutants for which the Facility has effluent limits. The charts represent the past 15 years of influent and effluent monitoring to display longer-term trends.

Cyanide

The Facility produces a small amount of cyanide from chloramination disinfection. Table 16 summarizes influent and effluent concentrations.

TABLE 16 CYANIDE (µg/L) AMEL = 5.7 µg/L MDEL 11 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	0.9(ND)	2.0(DNQ)	1.1	0.9(ND)	2.0(DNQ)	1.0	N/A
2020	0.9(ND)	2.0(DNQ)	1.3	0.9(ND)	2.0(DNQ)	1.0	N/A
2021	**0.9(ND)**	**3.5**	**1.6**	**0.9(ND)**	**2.0(DNQ)**	**1.0**	**N/A**

Copper

TABLE 17 COPPER (µg/L) AMEL = 11 µg/L MDEL 16 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	58	94	80	2.11	2.82	2.36	97%
2020	82	137	101	1.75	3.10	2.54	97%
2021	**85**	**123**	**104**	**1.77**	**3.71**	**2.86**	**97%**

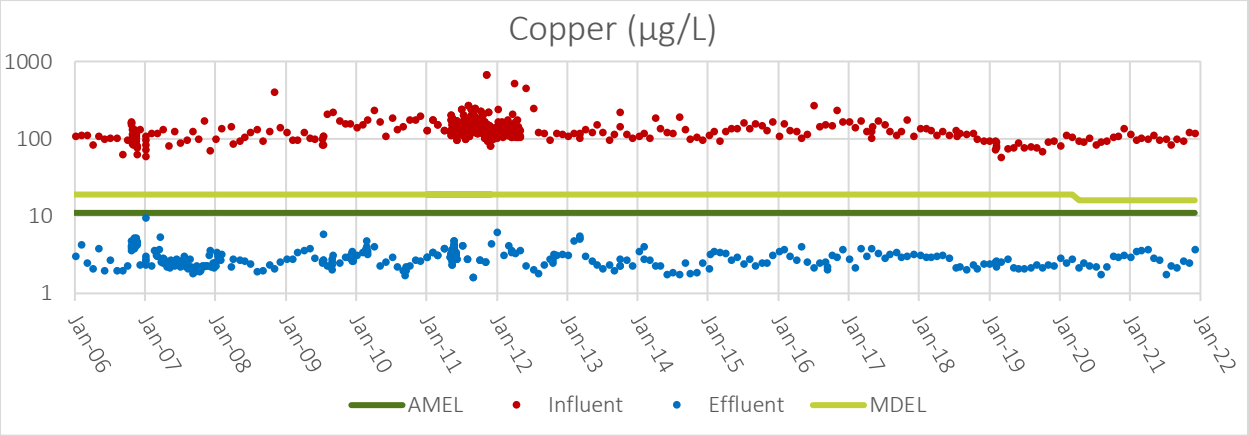


FIGURE 6 TOTAL COPPER (µg/L) REMOVAL PERFORMANCE - 2006 THRU 2021

Nickel

TABLE 18 NICKEL (µg/L) AMEL = 25 µg/L MDEL 33 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	6.37	14.80	8.62	3.55	5.26	4.16	52%
2020	6.71	11.80	8.69	3.34	6.40	4.34	50%
2021	**7.83**	**12.70**	**9.60**	**4.37**	**5.91**	**4.82**	**50%**

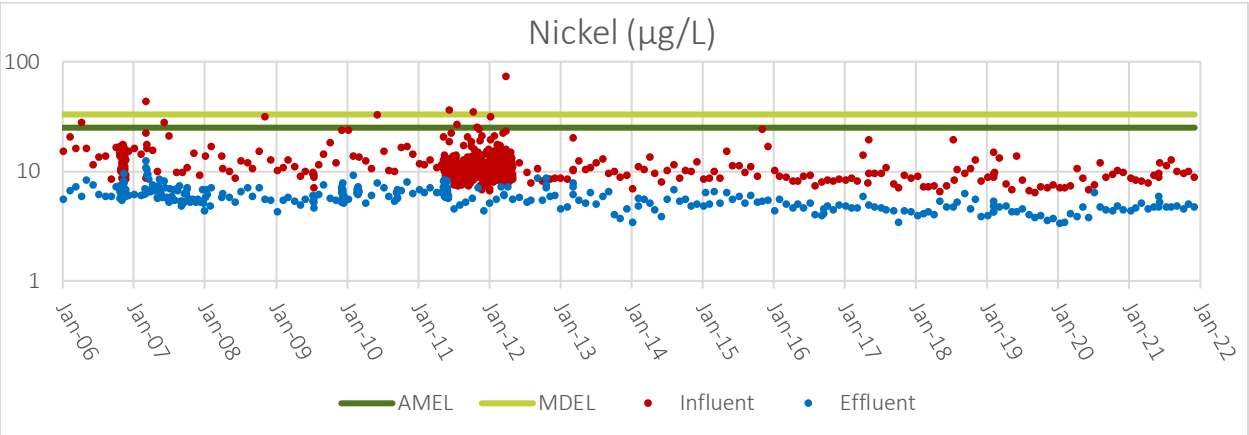


FIGURE 7 TOTAL NICKEL (µg/L) REMOVAL PERFORMANCE - 2006 THRU 2021

Mercury

TABLE 19 MERCURY (µg/L) AMEL = 0.025 µg/L

Year	Influent			Effluent			Annual Load
	Low	High	Average	Low	High	Average	kg/year
2019	0.061	0.140	0.083	0.00094	0.00234	0.00128	0.170
2020	0.030	0.236	0.076	0.00058	0.00196	0.00104	0.120
2021	**0.057**	**0.106**	**0.078**	**0.00085**	**0.00187**	**0.00120**	**0.126**

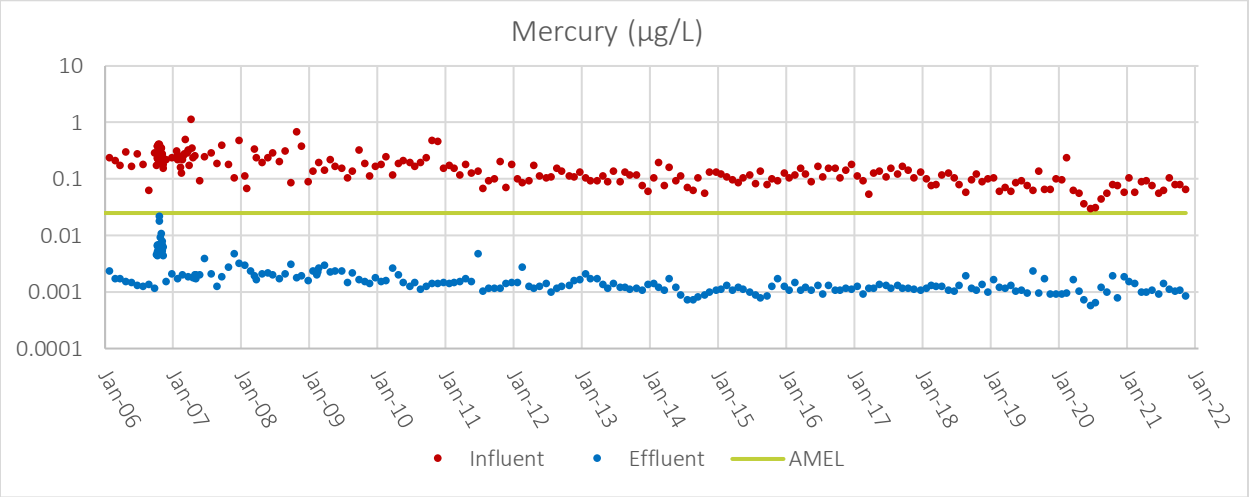


FIGURE 8 TOTAL MERCURY (µg/L) REMOVAL PERFORMANCE - 2006 THRU 2021

TABLE 20 MONTHLY MERCURY CONCENTRATIONS, FLOWS AND LOADS IN 2021

Sample Date	Mercury Concentration (µg/L)	Effluent Flow (MGD)	Mercury Load (kg/day)
1/6/2021	0.00187	85.02	0.000603
2/2/2021	0.00156	92.72	0.000548
3/2/2021	0.00142	82.01	0.000441
4/6/2021	0.00099	80.68	0.000303
5/5/2021	0.00101	75.02	0.000287
6/2/2021	0.00109	69.43	0.000287
7/8/2021	0.00093	63.49	0.000224
8/3/2021	0.00140	61.18	0.000325
9/2/2021	0.00114	69.31	0.000300
10/5/2021	0.00104	67.95	0.000268
11/2/2021	0.00106	77.83	0.000313
12/2/2021	0.00085	72.34	0.000233

Dioxin-TEQ

The 2020 NPDES Permit established effluent concentration limits for Dioxin-TEQ (toxic equivalence) of 1.4 x 10^{-8} µg/L as an Average Monthly Limit (AMEL) and 2.8 x 10^{-8} as a Maximum Daily Limit (MDEL), with a monitoring frequency of twice per year. In 2016, an Alternate Monitoring and Reporting Permit (Order R2-2016-0008) revised monitoring frequency to once every five years. Dioxin has not been detected in final effluent.

Other priority pollutants

The following tables summarize the past three years of influent and effluent water quality and percent removal for the priority pollutants for which the Facility does not have effluent limits.

Arsenic

TABLE 21 ARSENIC (µg/L) WQO = 36 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	1.60	2.40	1.88	0.79	1.31	0.97	48%
2020	1.46	2.33	1.74	0.65	1.40	0.95	45%
2021	**1.61**	**2.73**	**2.08**	**0.98**	**1.25**	**1.11**	**46%**

Cadmium

TABLE 22 CADMIUM (µg/L) WQO =7.3 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	0.08(ND)	0.27	0.20	0.02(ND)	0.05(ND)	0.04(ND)	81%
2020	0.08(ND)	0.38	0.17	0.02(ND)	0.04(ND)	0.02(ND)	88%
2021	**0.18**	**0.29**	**0.20**	**0.05(ND)**	**0.05(ND)**	**0.05(ND)**	**77%**

Chromium

The 2020 NPDES Permit allows measurement of total chromium instead of hexavalent chromium in Facility Effluent.

TABLE 23 CHROMIUM (µg/L) WQO = 180 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	5.31	7.10	6.25	0.30(DNQ)	0.52	0.43	93%
2020	5.30	8.40	6.58	0.30(DNQ)	0.51	0.43	93%
2021	**5.80**	**8.80**	**6.76**	**0.36(DNQ)**	**0.70**	**0.52**	**92%**

Selenium

TABLE 24 SELENIUM (µg/L) WQO = 5 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	1.73	4.41	2.25	0.35	1.17	0.61	73%
2020	1.73	3.16	2.13	0.26	0.79	0.43	80%
2021	**1.56**	**2.55**	**1.95**	**0.22**	**0.55**	**0.35**	**82%**

Silver

TABLE 25 SILVER (µg/L) WQO = 2.2 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	0.28	0.61	0.39	0.0037(ND)	0.042(ND)	0.026	93%
2020	0.27	0.58	0.39	0.0037(ND)	0.0140(DNQ)	0.006	99%
2021	**0.28**	**0.51**	**0.35**	**0.0080(ND)**	**0.0110(DNQ)**	**0.008**	**98%**

Zinc

TABLE 26 ZINC (µg/L) WQO = 161 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	114	181	150	14.0	20.2	17.3	88%
2020	140	201	163	16.2	22.9	19.7	88%
2021	**138**	**185**	**162**	**17.7**	**31.1**	**21.9**	**86%**

Lead

TABLE 27 LEAD (µg/L) WQO = 135 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2019	1.55	2.92	2.17	0.041(DNQ)	0.24	0.11	95%
2020	1.20	2.69	1.94	0.030(DNQ)	0.71	0.23	88%
2021	**1.39**	**2.61**	**1.92**	**0.038(DNQ)**	**0.80**	**0.20**	**90%**

Other metals

Concentrations for antimony, beryllium, and thallium for the last three years are presented below in Table 28, Table 29, and Table 30, respectively.

TABLE 28 ANTIMONY (µg/L) WQO = 4300

Year	Effluent			
	Low	High	Average	Removal
2019	0.35	0.47	0.42	N/A
2020	0.33	0.50	0.40	N/A
2021	**0.37**	**0.54**	**0.44**	**N/A**

TABLE 29 BERYLLIUM (µg/L) WQO = N/A

Year	Effluent			
	Low	High	Average	Removal
2019	0.0064(ND)	0.0120(ND)	0.0065(ND)	N/A
2020	0.0064(ND)	0.0900(DNQ)	0.0134(ND)	N/A
2021	**0.019(ND)**	**0.01(ND)**	**0.019(ND)**	**N/A**

TABLE 30 THALLIUM (µg/L) WQO = 6.3 (CTR)

Year	Effluent			
	Low	High	Average	Removal
2019	0.023(ND)	0.34	0.094	N/A
2020	0.005(ND)	1.54	0.267	N/A
2021	**0.051(ND)**	**0.59**	**0.12**	**N/A**

Organic Priority Pollutants

The Facility's NPDES permit requires semi-annual monitoring of organic priority pollutants in effluent. This monitoring frequency was modified by Order R2-2016-0008, the *"Alternative Monitoring and Reporting Requirements (AMR) for Municipal Wastewater Dischargers for the Purposes of Adding Support to the San Francisco Bay Regional Monitoring Program (RMP),"* effective April 1, 2016. The AMR reduces monitoring frequency from twice-per-year to once every five years if discharger pays an additional RMP fee.

The Facility opted to reduce monitoring frequency and pay the AMR fee, so organic priority pollutants were last measured in February of 2021 (Table 31). Of 113 compounds analyzed, only two Volatile Organic Compounds (VOCs) were detected in Facility Effluent in 2021. The two detected VOCs were well below the most stringent water quality criteria (WQC) available.

TABLE 31 VOC CONCENTRATIONS IN 2021 ANALYSIS

Volatile Organic Compounds (µg/L)	February 2021	WQC
Chloroform	2.3	N/A
Dichlorobromomethane	1.4	46*

Polychlorinated biphenyls (PCBs)

The Mercury and PCBs Watershed Permit, Permit #CA0038849, Order No. R2-2017-0041, requires twice per year monitoring of PCBs aroclors using USEPA method 608. Like organics monitoring requirements, frequency of aroclor monitoring was reduced to once every five years by the AMR. PCBs aroclors were analyzed in effluent in February 2021 and none were detected.

The Facility is also required to measure total PCBs by congener quarterly, using USEPA Proposed Method 1668c, for information only. Method 1668c data were collected in four times in 2021. PCBs congeners are reported as the sum of a subset of 40 congeners (SFEI 40) plus co-elutes. Since April 2011, only four of 45 sampling events have quantified any PCBs congeners (Figure 9).

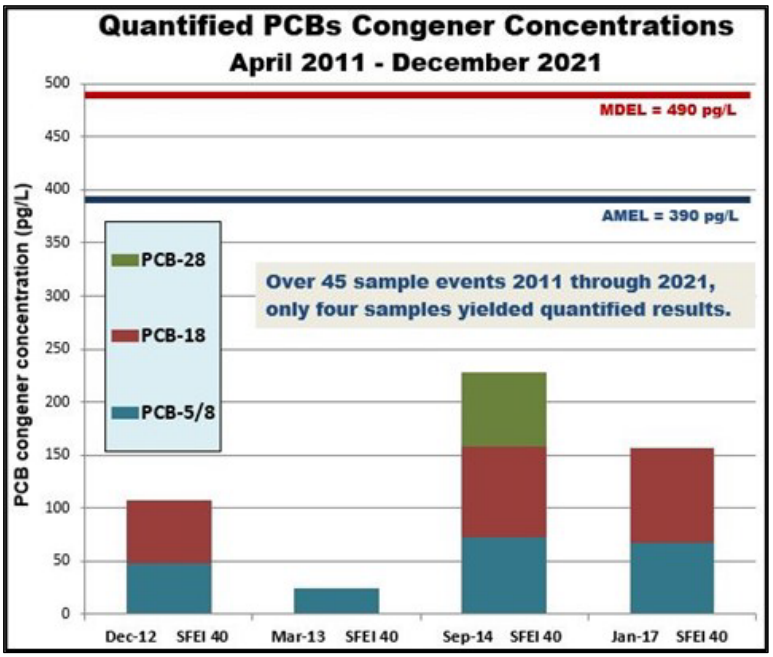


FIGURE 9 QUANTIFIED PCBS CONGENER CONCENTRATIONS 2011-2021

c. Nutrients

Effluent and Influent Nutrient Loadings in 2021

The Facility measures forms of nitrogen and phosphorus in effluent twice per month and in influent quarterly as required by the Nutrients Watershed Permit (NPDES No. CA 0038873, Order No. R2-2019-0017).

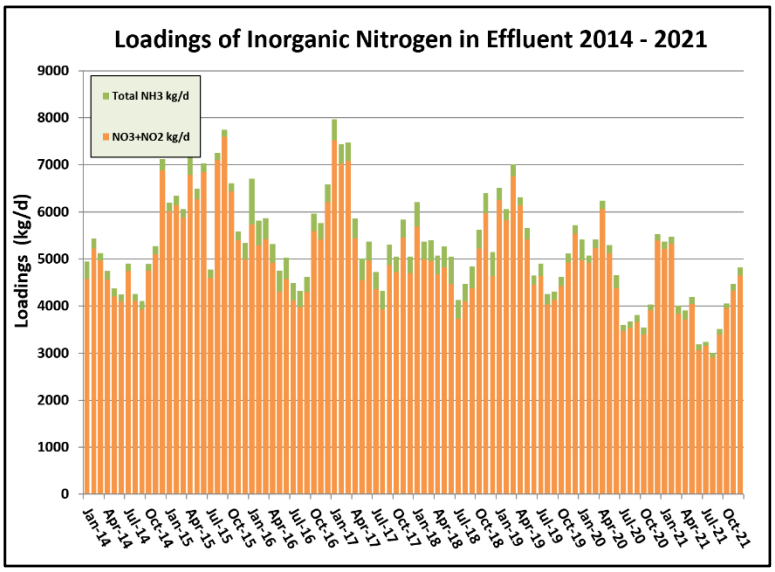


FIGURE 10 LOADINGS OF INORGANIC NITROGEN 2014-2021

Nitrogen

Total Nitrogen (TN) is the sum of total ammonia (NH3), nitrate (NO3), nitrite (NO2), and organic nitrogen. Total Inorganic Nitrogen (TIN) is the sum of NH3, NO3, and NO2. The 2019 Nutrient Permit emphasizes Total Inorganic Nitrogen (TIN), which is more biologically available, for effluent monitoring while also requiring quarterly TN measurements for influent. The reissued Permit also prioritizes dry season loadings of nitrogen and encourages dry season load reductions.

Dry season discharged load of TIN averaged 4,105 kg/day in 2021, with an average dry season effluent load of 3,431 kg/day, which is the lowest dry season TIN effluent load since routine monitoring began in 2014. The low nitrogen load in 2021 is attributed to operational optimizations that are described in the operational status update section of this report. Discharged nitrogen is mostly nitrate (NO3). Figure 10 illustrates loadings of inorganic nitrogen from 2014 through 2021.

Based on measured influent loads of 20,245 kg/day in 2021, roughly 80% of total nitrogen was removed over the past year through a combination of treatment (76%) and recycled water diversions (5%) in the past year. The dry season load reduction achieved was 82%

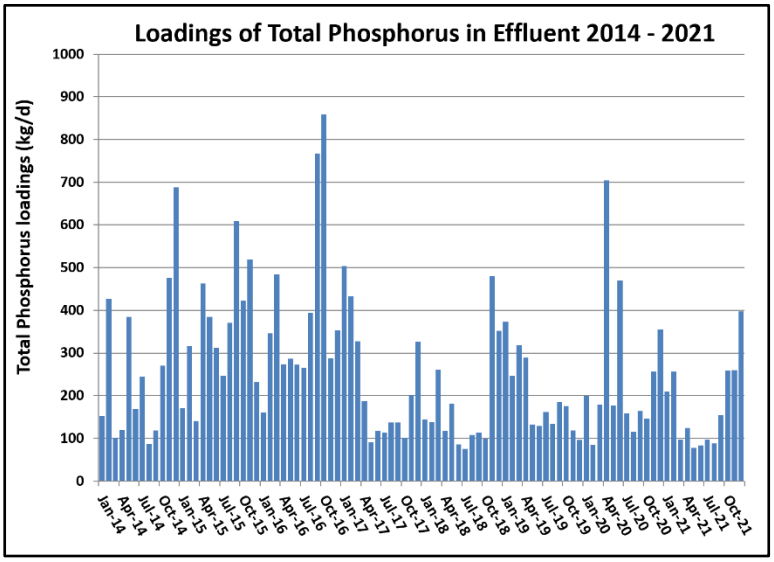


FIGURE 11 TOTAL PHOSPHORUS LOADINGS 2014-2021

Phosphorus

Discharged load of Total Phosphorus (TP) averaged 176 kg/day in 2021. Compared to measured influent loads of 2567 kg/day entering the RWF in raw sewage, the Facility removed approximately 93% of TP through treatment in 2021.

d. Whole Effluent Toxicity

The Facility is required to measure for acute (lethality) and chronic (non-lethal) toxicity in its effluent using Whole Effluent Toxicity (WET) methods. Seven tests in 2021 were conducted by in-house Laboratory staff, with the remaining five tests conducted by Pacific EcoRisk Laboratory in Fairfield, CA. The RWF laboratory acquired certification for the field of accreditation (FOA 113.030 001 Fathead Minnow (*P.promelas*)) from California ELAP (Environmental Laboratory Accreditation Program) in February 2021 after successfully passing an ELAP on-site assessment in January 2021.

Acute Toxicity

Acute toxicity of facility effluent is evaluated quarterly in accordance with EPA method 1000.0. In 2021, four tests using 96-hour survival data extracted from the chronic fathead minnow (*Pimephales promelas*) were performed. All quarterly acute toxicity tests met test acceptability criteria and passed with no indication of acute toxicity (Table 32). SJ-SC RWF has not failed an acute toxicity effluent test since its inception in 1987. The acute toxicity test requires: a 3-sample median result of not less than 90% survival and a single-sample maximum of not less than 70% survival.

TABLE 32 ACUTE TOXICITY TEST RESULTS 2016 THROUGH 2021

ACUTE TOXICITY TEST LARVAL TROUT and FATHEAD MINNOW		
ENDING DATE	EFFLUENT SURVIVAL	CONTROL SURVIVAL
02/12/16	100	100
04/22/16	100	100
09/20/16	100	100
10/11/16	100	100
01/28/17	100	100
04/28/17	100	100
08/20/17	100	100
10/06/17	100	100
01/26/18	100	100
05/25/18	100	100
07/23/18	100	100
11/09/18	100	100
02/17/19	100	100
05/24/19	100	100
09/01/19	100	100
12/06/19	100	100
01/31/20	100	100
04/17/20	100	100
07/13/20	100	100
10/18/20	97.5	100
01/18/21	100	100
04/06/21	92.5	95
07/19/21	92.5	97.5
11/16/21	100	100

Chronic Toxicity

Upon renewal of the NPDES permit in April 2020, the RWF laboratory performed in-house method development and optimization with fathead minnow according to EPA Method 1000.0 to demonstrate capability. The method was successfully validated and staff were trained to maintain and perform the chronic test in-house.

The RWF laboratory has successfully conducted seven monthly compliance tests along with proficiency sample testing in 2021. Five tests were conducted by Pacific EcoRisk Laboratory (PERL). In 2021, no toxicity was detected in the Facility's effluent (Table 33) when evaluated using the NOEC, LOEC, IC25, or TST methods.

TABLE 33 CHRONIC TOXICITY TEST RESULTS FOR 2021

Start Date	Survival		Reproduction			TUc	TST
	NOEC	LOEC	NOEC	LOEC	IC25		
1/8/2021*	100	>100	100	>100	>100	<1	PASS
2/5/2021*	100	>100	100	>100	>100	<1	PASS
3/11/2021	100	>100	100	>100	>100	<1	PASS
4/2/2021	100	>100	100	>100	>100	<1	PASS
5/18/2021	100	>100	100	>100	>100	<1	PASS
6/11/2021*	100	>100	100	>100	>100	<1	PASS
7/15/2021*	100	>100	100	>100	>100	<1	PASS
8/5/2021	100	>100	100	>100	>100	<1	PASS
9/9/2021	100	>100	100	>100	>100	<1	PASS
10/14/2021	100	>100	100	>100	>100	<1	PASS
11/12/2021	100	>100	100	>100	>100	<1	PASS
12/28/2021*	100	>100	100	>100	>100	<1	PASS

*Test performed by Pacific EcoRisk Laboratory, Fairfield, CA

2. Facility Annual Report Updates

The following annual update reports are submitted in accordance with NPDES Permit Attachment G.

a. Wastewater Facilities Status Report
b. Operations & Maintenance Manual (O&M Manual) Update
c. Contingency Plan for Operations Under Emergency Conditions

a. Wastewater Facility Status

NPDES Permit Attachment G requires annual update of Wastewater Facilities Status. This encompasses major wastewater facility operations or capital improvements over the past year. Activities that involve planning, assessing, and upgrading Facility assets are divided into six areas: Property Management, General Facility Status, Operational Assessment, Infrastructure/Asset Management, Personnel, and Finance.

Pandemic Response and Impacts

The past two years have been unprecedented in recent history. The global pandemic from the SARS-CoV-2 virus that causes COVID-19 impacted everyone, and wastewater treatment services were no exception. Following federal, state, county, and city health and safety guidance has remained a top priority for the Regional Wastewater Facility. Some of the adaptive measures implemented throughout 2020 and 2021 in response to the global health crisis included:

- Staff who could work remotely did so to the extent possible. This included most staff that are not in operational, maintenance, power and automation divisions, and the Environmental Laboratory staff.
- Staffing levels for those responsibilities where work requires an onsite presence were reduced and staff were assigned to rotating shifts to limit number of staff on site and number of different individuals who were coming into even distanced contact with each other.
- Mandatory mask wearing was implemented in the early days of the pandemic, reinforced with ubiquitous signage, frequent reminders of the mandatory mask policy, and disciplinary action if warranted.
- Room occupancy limitations implemented in all shared workspaces including open floor plan office spaces, conference rooms, and break rooms.
- Health screening was implemented on an adaptive basis as new information about symptoms and best practices came in and guidance was refined. Currently all individuals coming on site must log in through an online, automated system through which they verify they are not experiencing any symptoms of COVID-19.
- Ongoing close coordination with Department Contact Tracing leads and the City's Emergency Operations Center (EOC), which has been leading the City's pandemic response from day one.

Health and safety protocols remain in place at the RWF. Despite these changes to day to day operations and despite COVID positive cases from individuals who were on site, the RWF continued to treat 100% of wastewater received, met 100% of effluent water quality requirements, and achieved progress on a number of key Capital Improvement Projects described later in this status report. The pandemic has resulted in suspension of some voluntary environmental monitoring and slight delays to some capital projects.

1) Facility Property Management

South Bay Shoreline Study

US Army Corps of Engineers (USACE) is moving forward with the first phase of the South San Francisco Bay Shoreline Project (Project), which, once completed, will provide coastal flood protection from a rising sea level. USACE closed bidding for the construction of 1.6 miles of flood risk management levees in Reaches 1-3 for Phase I of the Project in January 2021. USACE awarded the construction contract in August 2021. Construction of Reach 1 (from the Alviso Marina to the Union Pacific railroad) and Reaches 2 & 3 (from Union Pacific railroad to the Artesian Slough) began in late 2021. A revised cost estimate for the project was prepared, which will require increased federal appropriations for USACE and cost share funds from non-federal sponsors, the California State Coastal Conservancy and Valley Water. The timeline for the design of the remaining project elements outside of Reaches 1-3 is uncertain. City staff continues to coordinate with USACE, California Coastal Commission, and Valley Water on Reaches 4 and 5 that will extend the levee across the RWF outfall and along the north and west sides of Facility biosolid lagoon areas.

Burrowing Owl Habitat

The burrowing owl habitat south of the RWF is a critical breeding site for the population of burrowing owls in Santa Clara County. The western burrowing owl (Figure 12) population in the grasslands south of the RWF was studied closely throughout 2021. Peak breeding activity occurred in June when there were 12 adults, twice as many adults as in 2020, and 9 chicks. This was the second year with only 9 chicks. Five of these chicks were trapped, banded, and taken to the Peninsula Humane Society as part of the juvenile overwintering program. There were just over half as many chicks in the region 2021 as there were in 2020. Mortality rates and/or missing burrowing owls have been high this year. Biologists attribute fewer chicks and higher mortality of owls to drought conditions, predation, and habitat loss as contributing factors.

FIGURE 12 TWO CHICKS AND ONE ADULT AT AN ARTIFICIAL BURROW.

A highlight from 2021 was the arrival of 3 pairs and 3 males in February and their release in April in the habitat after spending the winter at the Peninsula Humane Society. They were released in artificial burrows under enclosures that were constructed to protect them from predators. One of the females that was brought into the habitat similarly in 2020 nested successfully in 2020 and in 2021.

Talon Ecological Research Group and Santa Clara Valley Audubon Society biologists and Santa Clara Valley Habitat Agency staff manage the RWF owl habitat to improve conditions for burrowing owls. They partnered with Ecology Action to establish a successful native plant test plot and continued a supplemental feeding program for breeding pairs during the spring and summer. Their efforts boosted the nutrition for all owls and supported the owl population throughout the lower San Francisco Bay Conservation Area. In 2021, the City renewed the 5-year management agreement with the Santa Clara Valley Habitat Agency.

2) General Facility Status

a) Capital Improvement Program (CIP) Monthly Status Reports

Quarterly CIP status reports and many other CIP status update documents are available at this web address: https://sjenvironment.org/cip Status of key CIP projects are also summarized in the following sections of this report.

b) Power

Generators

Table 34 summarizes the RWF engine-driven generators. Three Engine Generators (EG-1, EG-2, and EG-3) and associated controls and switchgears that worked in tandem with the four 3 MW emergency backup diesel generators were decommissioned in 2021 as they are no longer needed once the new cogeneration engines were online. Periodic "Black Start" tests are performed to demonstrate continued backup power reliability, keep staff familiar with backup power operating procedures, continue to test the emergency generators, and tune existing engine generators to work seamlessly in event of power loss.

TABLE 34 SUMMARY OF ENGINE-DRIVEN GENERATORS

Engine-Driven Generators				
Generator	Location	Year Built / Overhauled	Capacity (KW)	Operational Status
Emergency Backup (4)	West Side	2017	12,000	Standby
EG-1	Building 40	1994/2015	2,800	Decommissioned in 2021
EG-2	Building 40	1983/2009	2,800	Decommissioned in 2021
EG-3	Building 40	1983/2013	2,800	Decommissioned in 2021
Cogen Engines (4)	Cogeneration Bldg	2020	14,000	In Service

- The four 3 MW Emergency Backup Diesel Engines assume electrical load in the event that RWF power is lost or interrupted.
- Engine Generators, EG-1, EG-2, and EG-3 are out of service and decommissioned.
- Four new 3.5 MW units provide power to the facility and will provide heat needed for digesters. The engines are designed to perform on low BTU, which will utilize all digester gas produced with a fifty percent blend of natural gas. The new control system allows the Cat engines to work in tandem with the current engines.

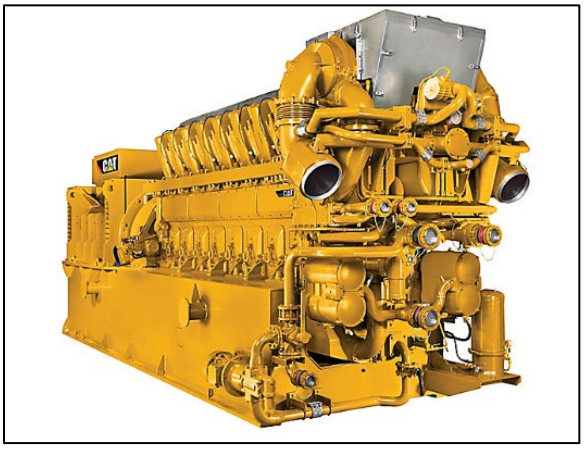


FIGURE 13 MANUFACTURER'S IMAGE OF ONE OF THE NEW 3.5 MW CG260-16 ENGINE GENERATORS

Construction of a new cogeneration building, adjacent to "Building 40" began in March 2018 and houses the four new Caterpillar "CG 260-16" 3.5 MW engine generators (Figure 14). The project reached substantial completion in December 2020. Additional testing, conducted in 2021, brought the units online and enabled decommissioning of older engines. The new units are more powerful with cleaner emissions than the 35 to 60-year old engines they replaced (Figure 15).

FIGURE 14 THE NEW COGENERATION BUILDING AT NIGHT, BEGAN OPERATION IN 2021

FIGURE 15 NEW COGENERATION ENGINES INSTALLED IN THE NEW COGENERATION BUILDING

Blowers

Table 35 summarizes the on-site electric blowers.

Three large capacity electric Process Air Blowers (PABs) are located in Building 40. PAB-2 and PAB-3 were both upgraded and are in service. PAB-1 is out of service as part of the blower upgrade project (Figure 16).

Five "Tertiary Building Blowers" (TBBs), also known as nitrification area blowers, are being upgraded. TBB-3, and 4 have been upgraded and are operational. TBB 5 has been upgraded and is still undergoing testing. TBB 1 and 2 have not been upgraded and are on standby. Three of the six engine-driven blowers in Secondary Blower Building (SBB) are operational while three are out of service and being dismantled. Two of the three out of service SBB blowers will be replaced with electric motors and coupled to the existing blowers. These blowers are also known as "Coopers," built by Cooper-Bessemer Corp).

FIGURE 16 BLOWER IMPROVEMENTS PROJECT PREPARING TO INSTALL A NEW ELECTRIC MOTOR TO IMPROVE THE AERATION SYSTEMS' RELIABILITY

TABLE 35 SUMMARY OF ELECTRIC BLOWERS

Electric Blowers			
3 - *Building 40*			
Blower	**Capacity (BHP)**	**Start Date**	**Operational Status**
PAB-1	4,000	1983	Out-of-Service
PAB-2	4,000	1983	In Service
PAB-3	4,000	1983	In Service
5 - Nitrification Building			
TBB N-1	2,250	1979	Standby
TBB N-2	2,250	1979	Standby
TBB N-3	2,250	1979	In Service
TBB N-4	2,250	1979	In Service
TBB N-5	2,250	1979	Standby
6 Engine-Driven Blowers *Secondary Blower Building*			
Blower	**Capacity (BHP)**	**Startup Date**	**Operational Status**
SBB A-1	2,345	1962/64	In Service
SBB A-2	2,345	1962/65	In Service
SBB A-3	2,345	1962/66	In Service
SBB B-1	1,855	1962/67	Out-of-Service
SBB B-2	1,855	1962/68	Out-of-Service
SBB B-3	1,855	1962/69	Out-of-Service

c) General Maintenance & Construction

Construction

Construction projects underway or completed in 2021 associated with Operational Areas are included in the Operational Assessment section.

Large, disruptive construction projects have been part of daily life at the Facility for several years now due to the Capital Improvement Program that began in earnest in 2014. These construction projects have made it necessary to periodically shut down portions of process sections, an activity that is carefully planned and coordinated through a process shutdown request (PSR) action. In 2021 there were a total of 213 active PSRs.

General construction projects that were performed or completed in 2021:

Electrical Distribution System Improvements. Electrical distribution throughout the Facility is delivered through a 4160 V Ring Bus System. Upgrades and improvements to the system have been ongoing and construction began on a CIP project to upgrade/replace Main Distribution station M4 and G3 and G4 Switchgears in June 2020 with substantial completion expected in late 2022. The improvements will enhance load carrying capacity and strengthen the Ring Bus system.

d) Condition Assessments and Studies

The following studies, reports and condition assessments were completed, initiated, or realized significant progress in 2021:

Blower Improvements Project

The biological processes used to treat wastewater in the BNR-1 and BNR-2 require oxygen so microorganisms can perform treatment through respiration. The RWF has 14 blowers (6 engine-driven and 8 electric), that provide the oxygen for this process. The 14 blowers are between 36-57 years old. These aging blowers play a critical role in meeting discharge permit requirements for ammonia.

The RWF performed a condition assessment and construction on the recommended improvements began in 2019 and continued in 2021 with a number of the electric and engine-driven blowers upgraded. The work is scheduled to continue until substantial completion in January 2023. The improvements will extend the life of the system by approximately 30 years. Process air flow meters, temperature and pressure transmitters, and valve actuators are also recommended for replacement.

Process Optimization Study

A project to identify and evaluate options for optimizing RWF unit treatment processes, individually or in combination, to improve wastewater and solids process treatment efficiencies while accounting for future flows, loads and regulations was initiated in 2020 and completed in October 2021. The study is used the anticipated future nitrogen load caps in the Nutrient Watershed Permit as a driving boundary condition for the analysis.

The Study followed an implementation strategy to select options for optimizing the unit treatment processes while taking into account current and planned CIP Projects. A short list of treatment alternatives, developed in 2020, was evaluated in 2021 and the final technology of SND-InDense was selected as the preferred alternative. The technology will enable the RWF to meet a nitrogen load cap at least through 2051. Timing of implementation will depend on budget flexibility and availability as well as regulatory and scientific drivers.

3) Operational Assessment

a) Headworks

Facility headworks include both a newer headworks area (Headworks 2 or HW2) an old headworks area (HW1) and an upstream Emergency Basin Overflow Structure (EBOS) that receives flow from the main interceptor lines. Each headworks unit consists of bar screens and grit removal chambers to capture and remove screenings and grit material.

FIGURE 17 IRON SALT FEED STATION

An Iron Salt Feed Station at EBOS, comprised of four ferric chloride ($FeCl_3$) tanks and a pump station for injecting $FeCl_3$ into raw sewage to help reduce odors and sulfide emissions from digesters and engines (Figure 17).

A polymer injection station located upstream of the East Primary area can be used to aid primary settling through chemically enhanced primary treatment (CEPT) by dosing 0.2 mg/L of polymer with the 10 mg/L ferric chloride.

New Headworks

Construction began in June 2020 on a design-build project to construct a new headworks facility (Headworks 3 or HW3) to replace aging HW1. The design and equipment selected for HW3, which will be located near EBOS (Figure 18), was chosen following a comprehensive evaluation of cost, hydraulics, odor, O&M issues, environmental and social concerns. As part of the project, the earthen lined emergency basin will be concrete lined. Estimated cost of HW3 is $150M with a substantial completion date of January 2024.

FIGURE 18 SITE FOR NEW HEADWORKS

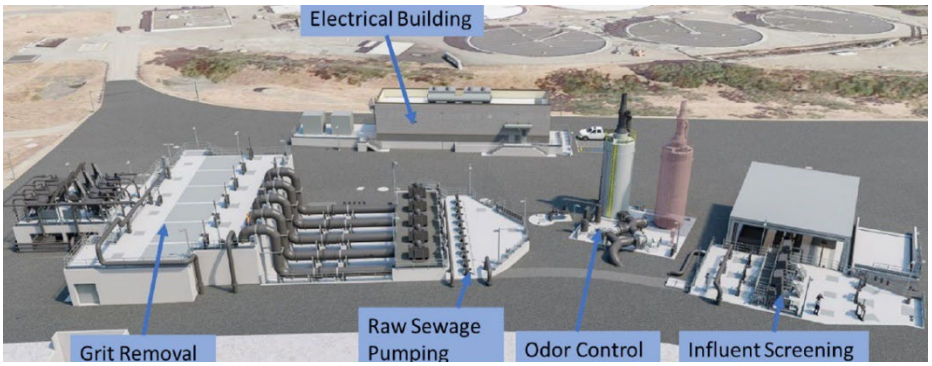


FIGURE 19 COMPUTER RENDERING OF NEW HEADWORKS SITE LAYOUT

b) Primary Clarifiers

West Primary

West Primary area (Figure 20) has been used as needed during shutdowns of select East Primary tanks for necessary repairs. Prior to 2017, West Primary (part of the original 1956 facility) had been out of service for nearly a decade.

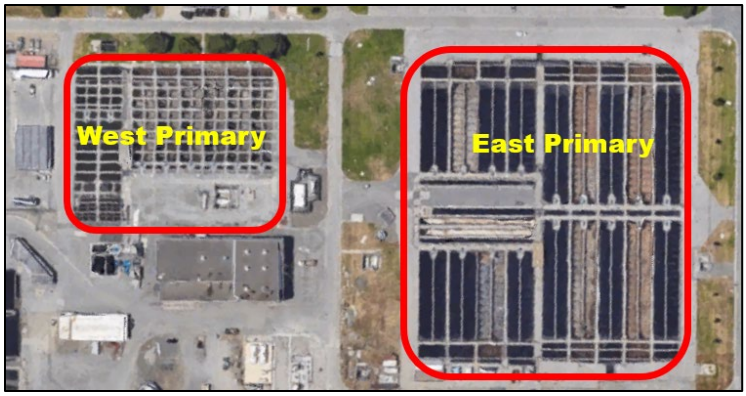


FIGURE 20 WEST AND EAST PRIMARY

East Primary

Following primary sedimentation in the primary clarifiers, primary effluent is piped from East Primary (Figure 20) to the secondary blower building (SBB) where it is then distributed to one of the four BNR process sections or to an equalization basin. Two settled sewage (SES) pipes, a 96-inch and a 87x136-inch, carry the primary effluent from East Primary to SBB. A project to evaluate these two pipes was initiated and scoped in 2018 and design of the plans to rehabilitate both pipes was completed in May 2019. The scope and design include:

- Rehabilitating the 96-inch SES pipe and performing concrete crown repair and epoxy coating for the 87x136-inch pipeline.
- Use existing re-route equipment that was used in the repair of the 78-inch primary effluent line in 2018 to re-route SES flows as work on the pipelines begins (Figure 21, Figure 22).
- Construction work on the SES rehabilitation project began in June 2020 and reached substantial completion in October 2020 and was accepted as complete in 2021.

FIGURE 21 SECTIONS OF 36-INCH HDPE PIPE, USED AS A TEMPORARY PIPING SYSTEM IN 2018 THAT WILL BE USED AGAIN FOR THE SES REHABILITATION PROJECT

FIGURE 22 TWO OF THE PUMPS UTILIZED IN THE TEMPORARY PIPING SYSTEM THAT WAS USED IN 2018 AND WILL BE USED AGAIN FOR THE SES REHABILITATION PROJECT.

c) Digesters, Gas, & Sludge

Digester Status

Seven digesters are currently in service (Figure 23).

- Digester 11 was cleaned in 2020 and brought back in service in 2021.
- Digester 10 was taken out of service for cleaning but cleaning has not yet begun.
- None of the Digesters are currently being cleaned and Digesters 9, and 11-16 are all in service.
- Digesters 2 & 4 suffer permanent structural degradation and will be eventually demolished.
- Digesters 5 thru 8 continue to be out of service pending rebuild as part of the Digester and Thickener Facilities Upgrade project.

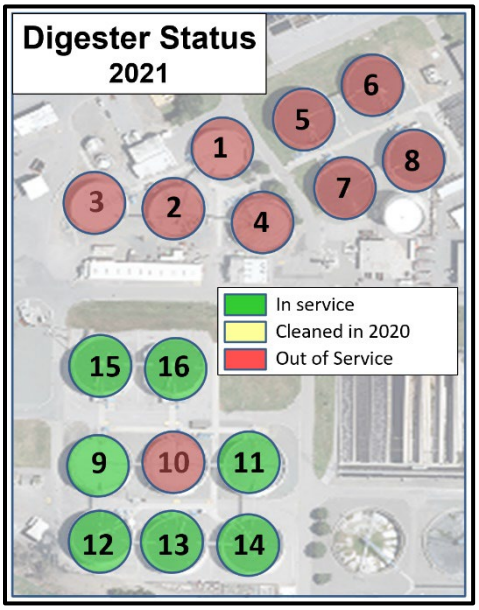


FIGURE 23 DIGESTER STATUS 2021

Digester and Thickener Facilities Upgrade Project

This project was initiated in 2016 and includes converting digesters 5 thru 8 to thermophilic digestion to allow Temperature-Phased Anaerobic Digestion (TPAD) in conjunction with the remaining mesophilic digesters, conversion of six DAFT tanks to operate as co-thickener units (primary and secondary sludges), construction of a new primary sludge screening facility (Figure 24), along with two new electrical buildings, and external elevated gas piping and gas flare systems. Testing is complete on several elements with mechanical fixes underway to address identified issues.

FIGURE 25 AERIAL IMAGE OF PROGRESS ON UPGRADES TO DIGESTERS 5 - 8

FIGURE 24 NEW SLUDGE SCREENING BUILDING WAS COMPLETED IN 2021

Highlights in 2021 include:

- Interior work on digesters 5 through 8 completed with testing underway. Associated digester equipment, equipment pads and piping are also nearing substantial completion.
- Permanent elevated, above-ground pipe racks nicknamed the "monorail" are complete (Figure 26).
- All associated systems are being tested and modified as needed before substantial completion and beneficial use, which are expected in 2022.

FIGURE 26 NEW PERMANENT ABOVE-GROUND PIPING RACKS: "THE MONORAIL" AT THE REMOTE DIGESTERS

Digested Sludge Dewatering Facility

A project to build new digested sludge dewatering facility, including a new building, centrifuges, conveyors, truck bays, and polymer storage & dosing equipment is underway. Ancillary facilities include digested sludge pump stations & pipelines from digesters to a storage tank, digested sludge pump station & pipeline from the storage tank to the dewatering building, and a centrate return pump station & pipeline. Design contract was awarded in late 2019 to Brown and Caldwell. The project is following the progressive design build model with design completion forecast for early 2022 and substantial completion of construction forecast for early 2025.

d) Biological Nutrient Removal (BNR)

The Biological Nutrient Removal (BNR) Process is carried out in two locations, historically referred to the "Secondary" and "Nitrification" areas, with each area having two batteries (A-side and B-side). The two areas employ the same 4-stage BNR process and are run in parallel.

Secondary Area (BNR-1)

An Advanced Facility and Meter Control Replacement Project has been underway since 2016 when the RWF selected Black & Veatch as the design consultant to provide engineering services. The project will replace aging flow meters, valves, actuators, and sensors to ensure accurate and effective process control in the BNR process areas.

FIGURE 27 SECONDARY AREA (BNR-1)

- The Advanced Facility Meter Replacement Project is being implemented in two phases to align with planned maintenance shutdowns of the four BNR process areas.
- Phase 1 has been in the construction phase since July 2018 and will replace control equipment in the secondary (BNR-1, Figure 27) B-side batteries as well as the nitrification (BNR-2) B-side batteries and is expected to reach beneficial use in the first half of 2022.
- Phase 2 will replace flow meters, valves and actuators, and sensors in the A-side batteries. Following completion of design work, a contract was awarded to Kiewit in mid-2020 with construction beginning in September 2020 and expected to be completed in March 2023.

Nitrification Area (BNR-2)

The RWF's 16 clarifiers (Figure 28) in the nitrification-BNR-2 section were constructed in the 1970s and 1980s. Following a previous series of shut-downs in the BNR-1 section to evaluate necessary repairs to degraded Return Activated Sludge (RAS) lines, a two-phase project to enhance the efficiency of the clarifiers and minimize unscheduled maintenance began. Engineering services contract was awarded to HDR Engineers and the project will follow the conventional design-bid-build approach.

FIGURE 28 WORKER ON A CLARIFIER "TOW-BRO" ARM

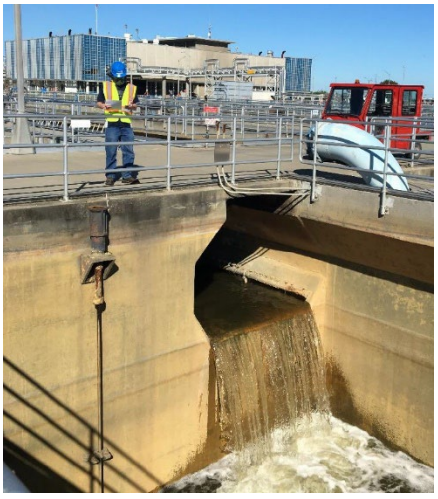


FIGURE 29 A WORKER COLLECTING READINGS AS PART OF THE ONGOING ADVANCED FACILITY CONTROL AND METER REPLACEMENT PROJECT

- Phase 1 of the nitrification clarifiers rehabilitation project will replace clarifier mechanisms and appurtenances for 8 clarifiers, rehab up to 8 RAS pipelines, and install groundwater monitoring wells. Phase 1 will also replace drain valves, RAS valves, pressure relief valves, electrical and instrumentation control equipment for all 16 clarifiers in BNR-1. Following completion of design work for phase 1, construction began in January 2020 and substantial completion is forecast for August 2023.
- Phase 2 will follow completion of Phase 1 and will include rehabilitation of up to 8 of the remaining RAS pipelines and rehabilitation of the 8 remaining clarifiers. Phase 2 is at 60% design and is expected to reach detailed design following completion of phase 1.

Ongoing improvements to Secondary/BNR valves and meters and fine bubble diffuser maintenance has been steadily improving nitrogen control and removal. Incidents of ammonia and nitrite breakthrough have been greatly reduced since 2013.

Optimizing for Nitrogen Removal in BNR-1 and BNR-2

In 2019, BNR operations teams began modifying aeration levels in the mixed liquor channels of BNR-2 to determine if additional denitrification could be achieved, a practice that was continued in 2020 and improved upon in 2021 with operational adjustments also implemented in BNR-1. Results have demonstrated that approximately an additional 20% nitrogen removal is possible by strategically reducing aeration to achieve lower DO set points. The reduced aeration also has the added benefit of energy savings.

While future upgrades may be necessary to meet nitrogen load caps in the long term, the operational optimizations demonstrate that meaningful reductions are possible without significant capital investments to basin and flow design or expensive upgrades to the existing BNR system.

e) Filtration & Disinfection

The RWF tertiary filtration process consists of 16 granular media filters and associated ancillary equipment. The filtration process is one of the final treatment steps and is responsible for producing effluent that is in compliance with the RWF NPDES Permit and Title 22 requirements for recycled water.

Filter Rehabilitation Project

The RWF tertiary filtration process consists of 16 granular media filters and associated ancillary equipment. Many of the filtration process components (valves, electrical switchgear and control, filter media, piping, concrete) are nearing 40 years old and are in need of replacement or upgrade.

- The construction cost estimate is approximately $38.3M
- The project is being delivered using the conventional design-bid-build approach and reached 100% design completion in February 2020.
- Construction contract was awarded to Walsh Construction Company in November 2020. Construction began in September 2021 and beneficial use in anticipated by mid 2024.

Outfall Bridge, Levee, and Instrumentation Improvement Project

Following filtration, disinfection, and de-chlorination, the RWF final effluent is discharged to the outfall channel, which ends at the outfall weir bridge structure. The weir is the final point of regulatory compliance. Contractor AECOM provided a condition assessment report in June 2018 that evaluated the condition of the bridge, weir, monitoring instrumentation (including chlorine and flow meters), electrical components, and support buildings. In 2019, the final scope of the project was completed and subsequently revised in 2020 in consideration of the Final Effluent Pump Station Project. The scope includes:

- Repair erosion scour along downstream edge of the outfall weir.
- Replace electrical transformer and water quality instrumentation at the outfall weir.
- Improve staff access to support buildings.
- Provide fiber optic system to support buildings and final effluent daylight station.
- Replace existing outfall pipe flow meters with new insertion-style flow meters that use doppler technology. New meters will greatly improve access to maintain and calibrate the flow meters (Figure 30).

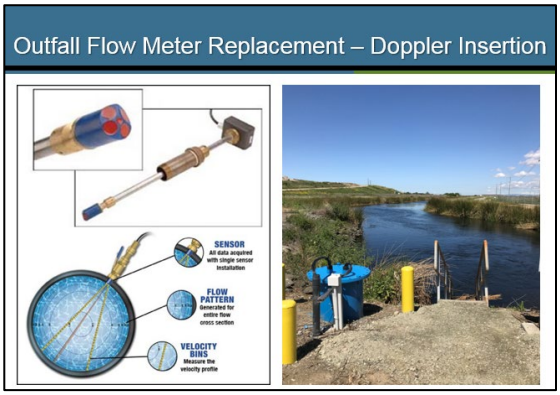


FIGURE 30 EXAMPLE OF DOPPLER INSERTION SENSOR TECHNOLOGY

Construction has been delayed and is anticipated to start in mid-2022 with beneficial use currently forecasted for late-2022.

Final Effluent Pump Station

A project was initiated in late 2019 to provide a new pump station that pumps RWF final effluent to the Bay when the Shoreline Flood Control Levee is completed by US Army Corps of Engineers and their

closure structure prevents gravity flow out to the bay through the Artesian Slough. Several alternative discharge strategies were evaluated in 2020 and a raised outfall channel levee walls plus a pump station located at RWF was the preferred option. Design, timing of implementation, and tie-in with the are being discussed with USACE to determine how best to integrate the Shoreline Levee and Pump Station projects.

4) Plant Infrastructure / Asset Management

Asset Management Support

The Asset Management Group oversees implementation of the Computerized Maintenance Management System (CMMS) and the Geographic Information System (GIS) and the O&M Electronic Document Management System, consisting of WMDocs (Wastewater Document Management System) and the OLM (Online Operations & Maintenance Manual).

CMMS

The RWF has been using Infor Enterprise Asset Management (EAM) system as its CMMS system since July 2009.

- Infor EAM tracks life cycle acquisition & maintenance cost of thousands of pieces of equipment and infrastructure (vertical & linear assets) (Table 36).
- Warehouse inventory items are cataloged, and their usage is tracked.
- Non-inventory parts acquired through direct purchase by various shops are logged.
- Preventative maintenance is scheduled and tracked for appropriate equipment following manufacturer's recommendations.
- Work orders and purchase orders are tracked and analyzed for labor and material costs that are added to a work order history for future reference.
- The current Infor version 11.3 has been in use since April 2018, and the Facility is currently considering a newer version or a Cloud version of INFOR EAM. As in previous years, the group has been integrating new equipment into the CMMS for new CIP projects coming online. This has been done through active engagement with the concerned process groups/shops and meetings with vendors/contractors.

In 2021, the Digester Upgrade project was the main CIP project undergoing testing with parts of it coming online. All associated equipment were integrated into the CMMS database, along with the associated hierarchical structure, prior to testing and pre-commissioning. At the request of O&M staff, all of the required Preventive Maintenance schedules were also created in the CMMS.

The Digested Sludge Dewatering project and the Headworks 3 project are in their respective design stages. The CMMS group and the CIP teams are continuously collaborating regarding asset tagging and SOP requirements for both of these projects.

TABLE 36 INFOR EAM TRACKING SUMMARY

Infor EAM (Enterprise Asset Management)	2019	2020	2021
Current Software version	V.11.3	V.11.3	V.11.3
Assets tracked; vertical and linear	16,543	16,722	16,855
Warehouse inventory items cataloged & tracked	5,162	5,180	5,622
Non-inventory parts/direct purchase items logged	3,328	2,161	2,136
Preventative Maintenance items scheduled/recorded	2,416	2,485	2,518
Work Orders created & executed (regular/other)	3,606/3,373	3,606/3,373	2,709/3,719

GIS

The RWF Geographic Information Systems (GIS) group creates, collects, manages, analyzes, and maps all types of data for RWF operations, maintenance, electrical, and CIP/master planning groups. Integrated into GIS support for CIP projects as well as construction management, the group also implements and supports the Subsurface Utility Damage Prevention Program.

In 2021, the City of San Jose migrated to an Enterprise Agreement (EA) with ESRI (the GIS software vendor used by the City and RWF). Deployment of the new license has transitioned to a more robust and secure GIS Portal that allows the sharing of online maps, mobile applications, and other geographic information with staff throughout the RWF as well as other departments within the city, leading to improved communication and efficiency as well as better management and decision making. This innovative approach to disseminating geographic information allows users throughout the department access to detailed information ranging from environmentally sensitive areas to geotechnical reports to buried pipe diameter, material, and drawings.

O&M Engineering

In addition to supporting the Plant's engineering needs, O&M Engineering is also responsible for electronically storing, organizing, and managing all wastewater related documents that are critical for the successful operation and maintenance of the Plant.

RWF Wastewater Management Electronic Document Update

RWF maintains an electronic OLM on Cold Fusion Platform (this platform is no longer supported) and WMDocs on SharePoint Online Platform that updates Standard Operating Procedures (SOPs), Operations and Maintenance manuals (O&M Manuals) and Plant Record Drawings. The OLM is accessible via the Department's intranet from any onsite networked computer, while WMDocs on the SharePoint Online platform can be access through a web browser from any device with internet connection. At the end of 2021, the WMDocs site consisted of 767 SOP's, 404 Record Drawings, and 90 O&M manuals.

RWF OLM (Online Operations & Maintenance Manual) Conversion

The O&M Engineering group is currently implementing a task to convert the existing RWF OLM Cold Fusion Platform to a new OLM SharePoint Online Platform. The completed platform would not only establish a workflow incorporating new information from recently completed, ongoing, and future Plant's improvement projects, but should also provide 24x7 onsite accessibility even during a disaster.

Process Control Group

The RWF Process Control Systems (PCS) group oversees the administration, configuration, and maintenance of the Distributed Control System (DCS). The DCS is a collection of industrial computer controllers, networks, and input/output devices used to control, monitor, and report thousands of wastewater treatment processes and parameters throughout the facility.

The PCS group is actively engaged in the design/review process of most CIP projects. The role of the group is to verify that all equipment is correctly wired and networked into the DCS system and to guide or assist contractors with the creation of all code and graphics.

In addition, part of the 10-year CIP program includes a DCS upgrade project that is replacing the existing 25+ year old System Six DCS with a new Harmony DCS. Upgrades to the DCS system are being implemented through a phased, multi-year project with direction and leadership from the PCS team.

FIGURE 31 THE DCS IS BEING UPGRADED FROM SYSTEM SIX (LEFT) TO NEW HARMONY (RIGHT) CONTROLLERS

5) Personnel

The Facility, under direction of the Deputy Director of Wastewater Management, is supported by three principal divisions: Operations, Mechanical Maintenance, and Energy and Automation. Additional support is provided by Capital Improvement Program, Sustainability and Compliance Division, Environmental Laboratory, and an Asset Management group.

Facility operations, maintenance, energy, asset management and administrative staffing totaled 225 positions of which 47 were vacant at end of 2021.

Vacancies included: 1 air conditioning mechanic, 1 associate engineering technician, 2 engineering technicians, 3 industrial control process specialists, 4 industrial electricians, 1 painter, 1 senior engineering technician, 1 senior geographic information specialist, 1 senior heavy equipment operator, 1 senior painter, 1 supply clerk, 1 warehouse worker, 10 wastewater attendants, 9 wastewater mechanics, 1 wastewater mechanic supervisor, 1 wastewater operations superintendents, 3 wastewater operators, 1 wastewater operator trainee, 2 wastewater operations forepersons.

Operations Division

80 positions are responsible for daily control of the treatment processes. A minimum of 8 personnel are on site at all times supervised by a wastewater operations foreperson, whose working title is shift foreperson.

In 2021, one senior heavy equipment operator was hired, offset by 2 retirements, 4 separations, and 1 transfer.

Seven wastewater superintendents supervise seven functional areas: 1) computer room & shift forepersons; 2) training & scheduling; 3) primary & sludge control treatment; 4) biological nutrient removal treatment; 5) filtration & disinfection; 6) residual solid management; and 7) liaison for capital improvement projects. Superintendents are supported by 20 wastewater forepersons: 6 assigned to each treatment area, 6 to the computer room, 6 as Shift Forepersons, and 2 training forepersons. Wastewater superintendents and forepersons rotate through various assignments on about a two-year basis.

Facility Maintenance Division

72 positions are organized in three sections:

Mechanical Process Maintenance and CIP Support - repairs and maintains all mechanical equipment including, pumps, piping, rotating equipment, and structures, as well as provides design review and assistance in construction of various capital improvement projects.

Training, Scheduling, and Special Projects - administers and develops technical training for Wastewater Attendants Mechanics; researches and procures parts for mechanical equipment work orders; plans and schedules large maintenance projects.

Facilities and Maintenance - maintains all buildings on site, provides protective coatings for equipment and infrastructure, and is responsible for landscaping, warehouse, and bufferland management.

Energy and Automation Division

59 positions maintain electrical infrastructure, power generation, instrumentation, and process control systems. They are organized in four sections: Electrical & HVAC, Instrument Control, Power & Air, and Process Control. This Division also oversees Facility energy use and purchase of natural gas and electricity.

CIP Division

54 positions are responsible for design and construction of capital projects. CIP Division is comprised of 6 sections: Program Management, Power and Energy, Solids, Liquids, Facilities, and Process Engineering. Twelve positions are currently vacant. This Division is supported by co-located Public Works staff and consultant program management staff.

Environmental Compliance and Safety

13 positions. These personnel are comprised of environmental and regulatory analysts, scientists, and engineers who monitor, report, manage renewal of, and handle corrective action related to the National Pollutant Discharge Elimination System (NPDES) permit, air emissions permit, and health and safety regulations.

Environmental Laboratory

30 positions. Laboratory chemists, biologists, microbiologists, and laboratory technicians provide analytical support under California Environmental Laboratory Accreditation Program (ELAP), for Facility NPDES and Watershed Permits, and Pretreatment programs.

6) Finance

The Facility operates through a Joint Powers Agreement (JPA) titled "Agreement between San José and Santa Clara Respecting Sewage Treatment Plant" dated May 6, 1959. Under this "master agreement," the Facility is jointly owned by both cities and is administered and operated by City of San José. Through a series of additional "Master Agreements for Wastewater Treatment," five additional tributary collection systems hold rights to a share of SJ-SC RWF treatment capacity (Figure 32). In addition to cities of San José and Santa Clara, agreements cover: City of Milpitas, Cupertino Sanitary District, West Valley Sanitation District, County Sanitation District Nos. 2-3, and Burbank Sanitary District. Each agency retains sole ownership and responsibility of its own sanitary sewer collection system.

Each tributary agency prepares its revenue program annually. Rates are adopted by ordinance or resolution of the governing body of each Agency. Each Agency submits its revenue program to City of San José for review to determine conformity with State Water Board revenue program guidelines.

FIGURE 32 JPA CONTRIBUTING AGENCIES

2022-2026 Capital Improvement Program (CIP)

The 2022-2026 CIP provides funding of $1.2 billion, of which $290.0 million is allocated for 2021-2022. Revenues for the five-year CIP are derived from several sources: transfers from the City of San José Sewer Service and Use Charge (SSUC) Fund and Sewage Treatment Plant Connection Fee Fund; contributions from the City of Santa Clara and other tributary agencies; interest earnings; Calpine Metcalf Energy Center Facilities repayments; a federal grant from the US Bureau of Reclamation; and debt-financing proceeds.

- $243.5 million: transfers from the City of San José Sewer Service and Use Charge Fund.
- $266.4 million in contributions from the City of Santa Clara and other agencies.
- $659.8 million in wastewater revenue notes proceeds and bond proceeds. This element consists of short-term "bridge" financing until long-term bond funding is available.

A Plant Master Plan (PMP) was approved by City of San José and City of Santa Clara City Councils in November and December 2013. The PMP recommended more than 114 capital improvement projects to be implemented over a 30-year period at an investment level of roughly $2 billion.

Additional information can be found in the Water Pollution Control 2021-2022 Capital Budget at: https://www.sanjoseca.gov/home/showpublisheddocument/78031/637696259576500000 Table 37 below provides 2020-2021 actual CIP expenditures & encumbrances as of June 30, 2021.

TABLE 37 CIP FISCAL YEAR-END EXPENDITURE

2020-2021 Capital Improvement Program Year-end Expenditure Summary				
	Appn	Project	Expenditure on 6/30/2021	Current Encumbrances
1	401B	OWNER CONTROLLED INSURANCE PROGRAM	354,914	0
2	402M	FLOOD PROTECTION	197,701	195,150
3	404V	STORMWATER IMPROVEMENTS	939,347	187,692
4	410S	VARIOUS INFRA DECOMMISSIONING	0	0
5	410T	MASTER PLAN UPDATES	1,184,996	106,904
6	412H	FINAL EFFLUENT PUMP STATION & STORMWATER	204,972	132,237
7	418N	LEGACY LAGOON REMEDIATION	4,828,139	0
8	4127	DIGESTER & THICKENER FACILITIES UPGRADE	23,727,593	21,583,738
9	4341	PLANT ELECTRICAL RELIABILITY	3,503,319	3,620,917
10	5690	PLANT INFRASTRUCTURE IMPVT	554,495	387,514
11	5957	PUBLIC ART	34,834	108,000
12	6000	CITY-WIDE & PW CAP SUPPRT COST	1,049,397	0
13	7074	NITRIFICATION CLARIFIER REHAB	10,341,057	24,146,047
14	7224	ADVNCD FACILITY CONTRL & METER REPLACEMENT	4,502,246	11,452,251
15	7226	E PRIMARY REHAB-SEISMIC & ODOR	0	0
16	7227	FILTER REHABILITATION	1,210,740	46,415,860
17	7394	T.P. DISTRIBUTD CONTROL SYSTEM	1,833,930	2,526,409
18	7395	URGENT & UNSCHEDULD T.P. REHAB	0	0
19	7396	YARD PIPING & ROAD IMPROVEMENTS	7,037,099	5,182,941
20	7448	HEADWORKS IMPROVEMENTS	5,576,562	9,153,772
21	7449	NEW HEADWORKS	46,183,522	79,803,561
22	7452	DIGESTED SLUDGE DEWATERING FACILITY	5,913,355	12,954,164
23	7454	ENERGY GENERATION IMPROVEMENTS	12,358,214	988,469
24	7456	PRELIMINARY ENGINEERING	348,557	1,570,188
25	7481	PROGRAM MANAGEMENT	10,110,493	4,446,181
26	7677	AERATION TANKS & BLOWER REHAB	9,332,206	14,193,667
27	7678	OUTFALL BRIDGE & LEVEE IMPROVEMENTS	831,864	78,585
28	7679	FACILITY WIDE WATER SYSTEM IMPROVEMENTS	1,466,792	345,641
29	7681	SUPPORT BUILDING IMPROVEMENTS	1,038,380	1,679,891
		TOTAL	154,664,726	241,259,780

Operating and Maintenance Budget

ENVIRONMENTAL SERVICES DEPARTMENT

San Jose-Santa Clara Regional Wastewater Facility

FY 2021-22 Operating & Maintenance Budget Summary

Budget Summary	2020-2021 Actual Expenses	2020-2021 Adopted Budget	2021-2022 Base Budget	2021-2022 Adopted Budget
Personal Services	$56,568,955	$62,263,776	$66,211,759	$64,782,760
Non-personal Services	27,896,799	36,747,159	34,485,735	41,627,171
Equipment	2,059,510	906,000	906,000	944,000
Inventory	476,154	600,000	600,000	600,000
Overhead	12,888,925	12,255,861	13,045,344	13,045,344
NCH Debt Service	1,063,423	988,825	1,105,918	1,105,918
SCVWD- Adv. Water Treatment	3,896,432	1,116,344	641,127	641,127
SSUC Fund	2,000,000	1,000,000	464,265	464,265
Legacy Lagoon Remediation		39,300,000	2,500,000	5,000,000
Workers' Compensation	244,239	605,000	700,000	700,000
City Services	902,418	887,638	763,871	766,183
Total Operating Expenses	**$107,996,856**	**$156,670,603**	**$121,424,019**	**$129,676,768**

ESTIMATED COST DISTRIBUTION

2021-2022 Estimated Total Gallons Treated (MG)	(1) Percent of Total Sewage Treated	City / District	2021-2022 Proposed
25,499.396	63.451	City of San Jose	$82,281,206
4,694.500	15.332	City of Santa Clara	$19,882,042
30,193.896	**78.783**	**Sub-Total**	**$102,163,248**
3,469.668	9.192	West Valley Sanitation District	$11,919,889
1,898.657	5.384	Cupertino Sanitary District	$6,981,797
2,028.060	5.458	City of Milpitas	$7,077,758
353.377	0.954	Sanitation District # 2 - 3	$1,237,116
84.974	0.229	Burbank Sanitary District	$296,960
7,834.736	**21.217**	**Sub-Total**	**$27,513,520**
38,028.632	**100.000**	**TOTAL**	**$129,676,768**

(1) Composite of four parameters (flow, BOD, SS, ammonia). Source 2018-19 Revenue Program.

Regulatory fees and membership dues

Major Permit Fees		Paid	Paid	Invoiced
Fees	**Agency**	**2019-20**	**2020-21**	**2021-22**
Permit: Annual NPDES Fee	State Water Resources Control Board	$653,081	$712,888	$796,532
Permit: Annual RMP Participation	Regional Monitoring Program – SFEI	$247,382	$230,098	no invoice
Permit: Alternate Monitoring Fee*	Regional Monitoring Program – SFEI	$9,726	$9,726	no invoice
Permit: Annual Air Permit Fee	Bay Area Air Quality Management District	$86,073	$59,921	no invoice
Related Membership Dues				
BACWA Annual Dues	Bay Area Clean Water Agencies	$385,355	$376,334	$372,138
CASA Annual Dues	CA Association of Sanitation Agencies	$20,053	$20,500	$20,500

*A new "RMP Alternate Monitoring Fee" was established in 2016 that allows discharging agencies to elect to pay a supplemental fee in lieu of NPDES required quarterly and semiannual monitoring of EPA listed "Priority Pollutants."

b. O&M Manual Update

The RWF maintains an electronic Online Manual (OLM) and continuously updates Standard operating procedures (SOPs). Both the OLM and SOPs are accessible via the department intranet from any onsite networked computer. At the end of 2021, 714 documents were filed in the SOP library, which included SOPs and ancillary documents.

TABLE 38 2021 SOP COUNT BY RWF DIVISION

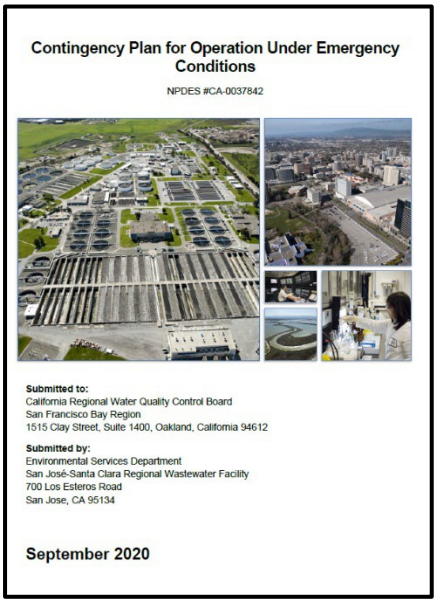
RWF Division	Number of SOPs
Operations	447
Maintenance	78
Energy & Automation	124
Support & Administration	65
Totals	***714***

Many SOPs are utilized by multiple divisions and workgroups. SOPs are cross-referenced so they appear in searches for all relevant groups. For example, Lock-Out Tag-Out (LOTO) SOPs appear under maintenance, operations, and energy.

- Operations includes process treatment areas, utility service, recycled water, and operations management SOPs.
- Maintenance includes all mechanical, paint shop, facilities and grounds keeping, and LOTO SOPs.
- Energy and Automation includes electrical, HVAC, instrumentation, and power & air SOPs.
- All other SOPs for general documentation, administration, asset management, regulatory compliance, safety, and security are under Support and Administration.

c. Contingency Plan Update

Since 1974, the facility has maintained a "Contingency Plan for Continued Operations Under Emergency Conditions." The Plan was updated in September 2020 to reflect changes in personnel, plan holders, provide clarifying language on spill response, and to improve consistency between the Contingency Plan and other internal emergency response plans. The Plan was also reviewed and updated to expand flood response protocols under more typical storm conditions and under more extreme storms such as 100-year or stronger storms. The Plan resides in SOP and Safety Libraries on the Facility's network and hard copies are kept in key locations such as the Computer Room and will be updated in early 2022.


Contingency Plan for Operation Under Emergency Conditions

NPDES #CA-0037842

Submitted to:
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400, Oakland, California 94612

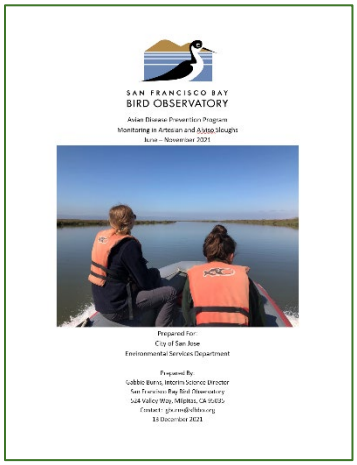
Submitted by:
Environmental Services Department
San José-Santa Clara Regional Wastewater Facility
700 Los Esteros Road
San Jose, CA 95134

September 2020

3. ENVIRONMENTAL MONITORING

Due to the global pandemic, worker safety, and restrictions on close contact work, the majority of field monitoring elements that RWF staff performed in past years was suspended for 2020 and was limited in 2021. The nature of this field work requires close contact among the field crew for extended periods of time. Monitoring of Bay water quality, biological integrity, beneficial uses is incredibly valuable, and the portions of monitoring presented below summarize the required environmental monitoring that was conducted in 2021 and the limited-scope non-required monitoring that resumed in 2021.

a. Avian Botulism Monitoring



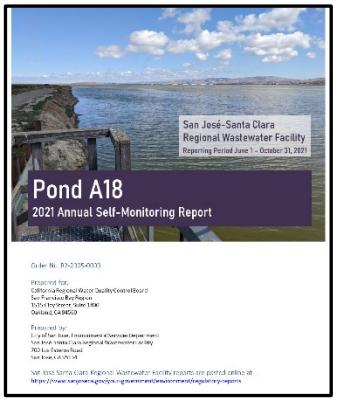
Since 1983, the Facility has contracted with San Francisco Bay Bird Observatory (SFBBO) to monitor for avian botulism outbreaks in the wastewater discharge vicinity from June through November.

In 2021, no outbreaks of avian botulism were detected. One injured, six sick, and eight dead birds were found in the Artesian Slough – Lower Coyote Creek survey area over the six-month survey period from 1 June through 22 November. None of the sick birds were diagnosed with avian botulism. Additionally, two dead striped bass and seven dead unidentified fish were found and collected.

The Avian Botulism Report is posted on the City's web site:

https://www.sanjoseca.gov/your-government/environment/regulatory-reports/-folder-71

b. Pond A18 Monitoring



Pond A18 is a shallow, 856-acre former salt pond owned by City of San José. The pond circulates Bay water using two hydraulic control structures located at northern and southern ends of its western levee. Discharge of pond water is regulated by Waste Discharge Requirements (WDR) Order No. R2-2005-0003.

During dry season (June through October), the WDR requires continuous monitoring for DO, pH, temperature, and salinity in the pond. Four receiving water stations in Artesian Slough and Coyote Creek are monitored once per month with additional monitoring conducted whenever pond dissolved oxygen concentration falls below WDR specified thresholds. Sixteen years of pond discharge monitoring have demonstrated no negative impacts to receiving water.

Pond A18 Annual Reports are posted on City of San José web site at:

https://www.sanjoseca.gov/your-government/environment/regulatory-reports/-folder-70

c. Monitoring of Beneficial Uses

UC Davis monitoring

The Lower South Bay Alviso Marsh Complex provides essential habitat for many diverse populations of native Bay fishes. In an effort to document the health of these communities and the support of beneficial uses within the Facility's receiving waters, The Facility contracted with UC Davis fisheries researchers to perform monthly fish monitoring. The monitoring tracks population distribution, species composition, and abundance levels of fish and the research also collect discrete water quality measurements for temperature, salinity, and dissolved oxygen. These researchers, formally known as the Otolith Geochemistry and Fish Ecology Laboratory (Fish Ecology Team), conduct this monitoring by performing 10-minute otter trawls at 20 different stations throughout the Alviso Marsh Complex. Results from this study help characterize temporal and spatial variation among Bay fish and macroinvertebrate communities.

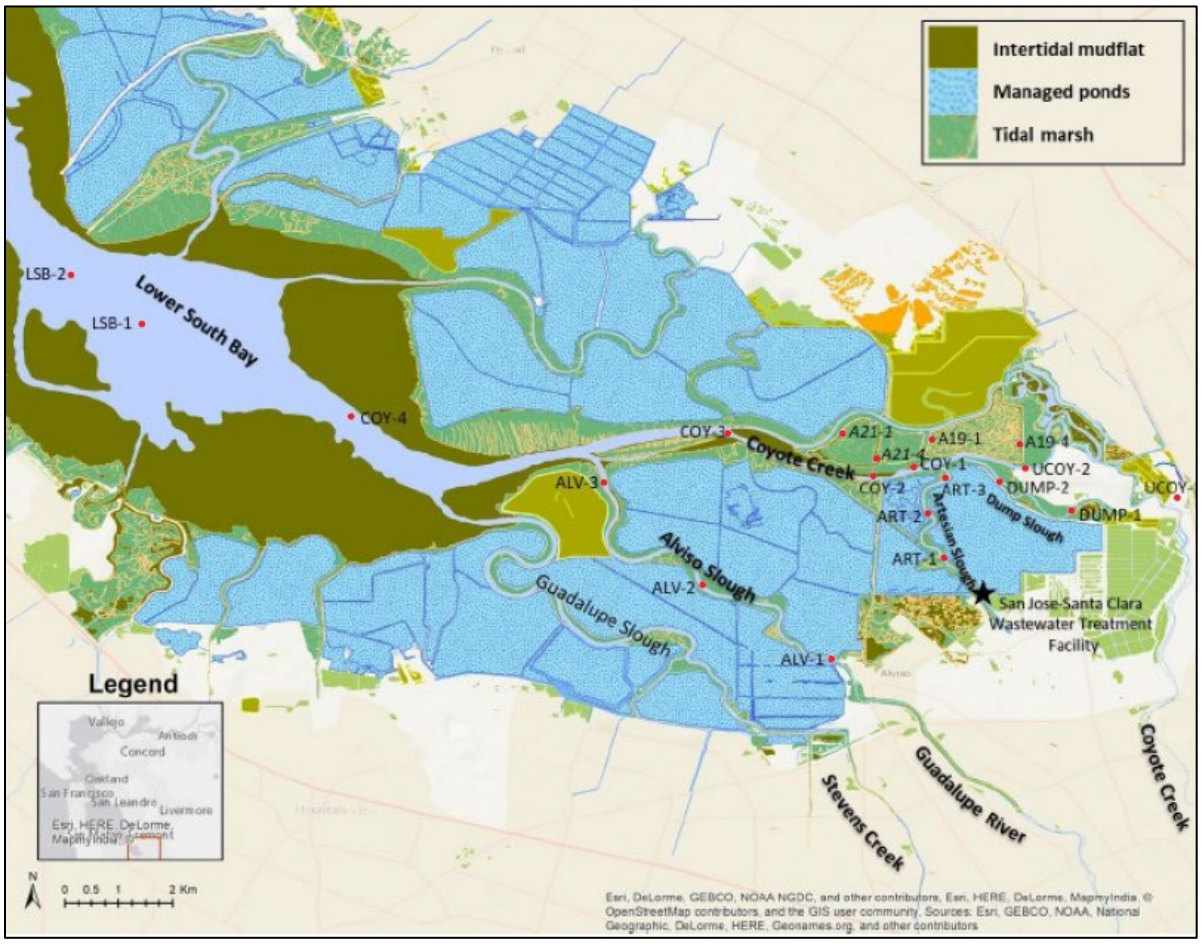


FIGURE 33 LOCATION OF UC DAVIS FISH MONITORING TRAWLS

Status and Trends of Fishes and Macroinvertebrates Report

In 2021 the Fish Ecology team submitted a final report summarizing the status and trends of fishes in tidal ponds, sloughs, and open water habitats of the Alviso Marsh Complex in SF Bay from years 2010 to present. Highlights from the report include:

- Fish abundance was recorded at an all time high in 2021, rebounding from lower abundances in years 2015-2019. In 2021, native taxa of fish and macroinvertebrates represented 68% and 58% of their respective total catches.
- The 3 most common native fish species found in the study area were the Northern Anchovy, Threespine Stickleback, and Pacific Staghorn Sculpin.
  - Northern Anchovy: Was the most abundant fish species observed and the fourth most numerous species collected over the study period. This species prefers to spawn and rear in warm, brackish water during the summer months.
  - Threespine Stickleback: Until 2021, this had been the 2nd most abundant species observed throughout the study period of 2010-2021. Stickleback numbers are lower during drought years and populations are slow to recover following successive years of drought. This species is most prevalent in upstream/lower salinity areas as seen in the Artesian slough, Dump Slough, and Upper Coyote Creek areas.
  - Pacific Staghorn Sculpin: After seeing a sharp population decline, catch increased dramatically in 2021 making them become the 2nd most abundant fish species observed. This species is most prevalent around stations ALV 2, ALV 3, and further upstream in Alviso Slough.

FIGURE 34 PACIFIC STAGHORN SCULPIN CAUGHT IN A FORMER SALT POND

- The most common native macroinvertebrates found in the study area was the Crangonid shrimp. High populations of pregnant females were typically observed December through February.

Water Quality Observations

Dissolved oxygen (DO) ranged between>10mgl/L in colder winter months and <2mg/L in warmer summer months. More abundant fish populations were observed in summer months with the lowest levels of DO, and native species exhibited abundance maxima at the lowest observed DO. These results suggest that native fish species in the Alviso Marsh Complex are hypoxia-tolerant and may even show signs of benefiting from hypoxic conditions which may provide refuge from predators.

Salinity had the greatest spatial variation compared to other water quality parameters. As expected, fresher water was observed at upstream sites where higher numbers of Threespine Stickleback occurred. Stations in the lower south bay with higher salinities were where the more marine species, such as Northern

Anchovies occurred in higher numbers. Salinity was elevated at all stations during drought years, with the highest levels recorded in years 2014 and 2015. This corresponds to the high abundance of Northern Anchovies in 2014 and sharp declines in Threespine Stickleback in 2014 and 2015, suggesting salinity, rather than DO is a better predictor of species occurrence.

FIGURE 35 THREESPINE STICKLEBACK CAUGHT AT STATION

Tidally Restored Pond Habitats

A multitude of different fish species and higher fish abundances were observed in tidally restored ponds A19 and A21. Macroinvertebrate abundance tended to remain more prevalent in the sloughs due to the tidal nature of the ponds. The Alviso Marsh Complex experiences large 2.5-3.0m semi-diurnal tides that exchange roughly half the water volume of the Alviso Marsh Complex with the Lower South Bay. Low tide water conditions result in a significant amount of dewatering which decreases habitat for macroinvertebrates.

Longfin Smelt

Longfin Smelt is listed as threatened under the California Endangered Species Act. Long term surveys in the San Francisco Estuary have shown a substantial decline in their abundance levels over time, especially in the northern part of the estuary. Despite these population challenges, the Lower South Bay has served as one of the most suitable and stable habitats in the Bay for Longfin Smelt to spawn and rear. Greater numbers of longfins have been caught in the Lower South Bay than any other portion of the Bay in the past few years. The Longfin Smelt's preferred rearing habitat includes shallow low salinity marsh habitat, which the upper reaches of the Lower South Bay fittingly provide due to the physical characteristics of the marsh and the steady input of fresh water the San José-Santa Clara Regional Wastewater Facility. Tidally restored ponds A19 and A21 also provide quality habitat that draws high numbers of Longfin Smelt.

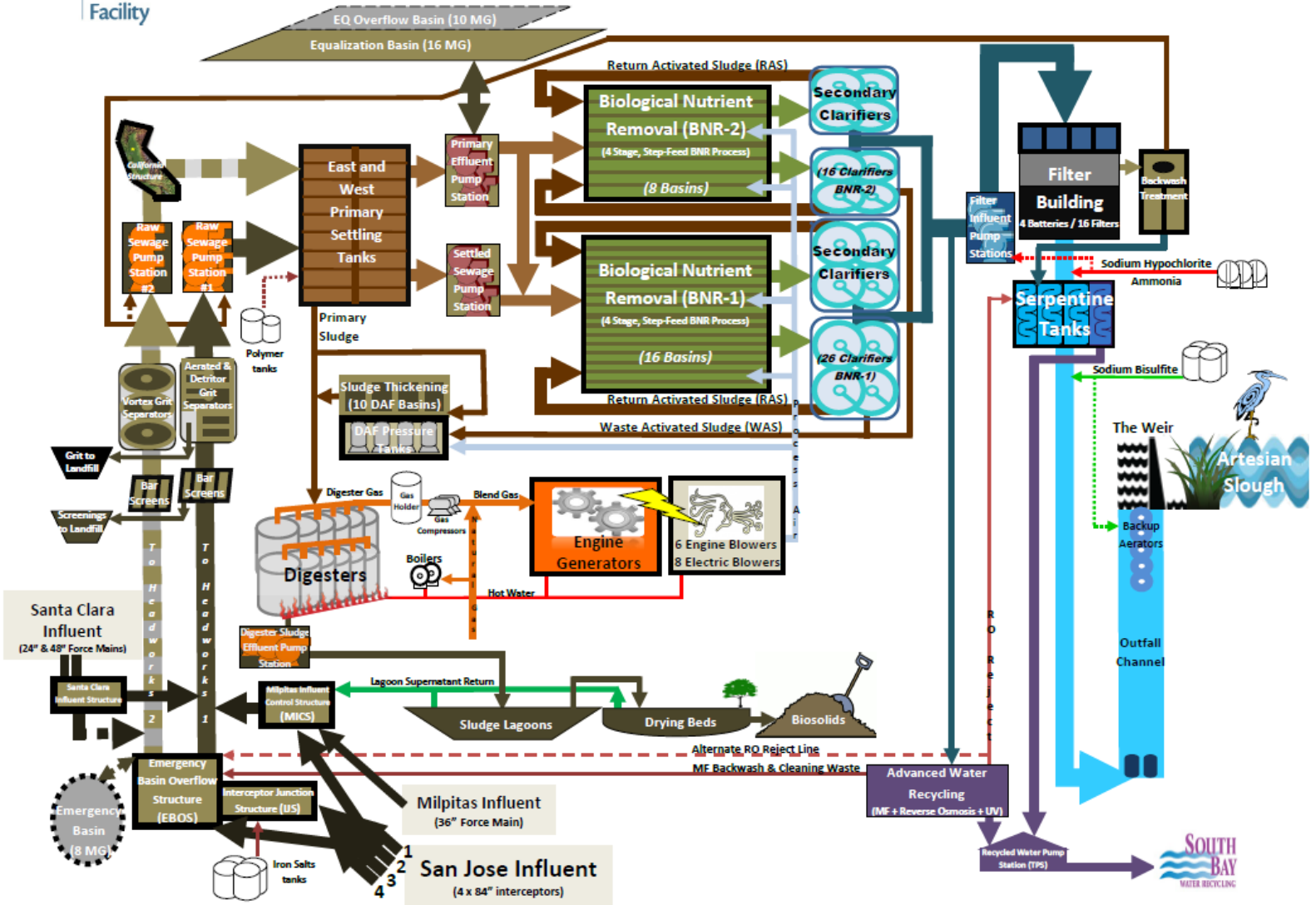
FIGURE 36 EGG BEARING LONGFIN SMELT FROM POND A19

With funding from Department of Water Resources (DWR) for larval fish surveys, the fish ecology team studies Longfin Smelt populations by trawling at multiple stations throughout the Alviso Marsh Complex. During the 2020 winter spawning season, population numbers seemed to blossom as 176 Longfin Smelt were recorded over the combined months of November and December with 115 egg bearing females among those counted fish. The spawning season carried over to January 2021 resulting in even larger numbers as a whopping 465 longfins were recorded, the most ever caught in several years of weekend trawling in the Lower South Bay. The month of February continued to have the high abundance with 155 adult longfins caught, 30 of which were milting males and 25 were females visibly extruding eggs. Hopefully the consistent trend of the past few years continues and water year 2021-22 will be as much of a major spawning success as the 2020-2021 water year was.

San José-Santa Clara Regional Wastewater Facility

Process Schematic

Revised: 9/2019



ATTACHMENT A - Laboratory Accreditation

Accreditation covering all of 2021

CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL LABORATORY ACCREDITATION

Is hereby granted to

San Jose / Santa Clara WPCP Laboratory

Watershed Protection

4245 Zanker Road

San Jose, CA 95134

Scope of the certificate is limited to the
"Fields of Accreditation"
which accompany this Certificate.

Continued accredited status depends on compliance with applicable laws and regulations, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1313**

Effective Date: **10/1/2020**

Expiration Date: **9/30/2022**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program