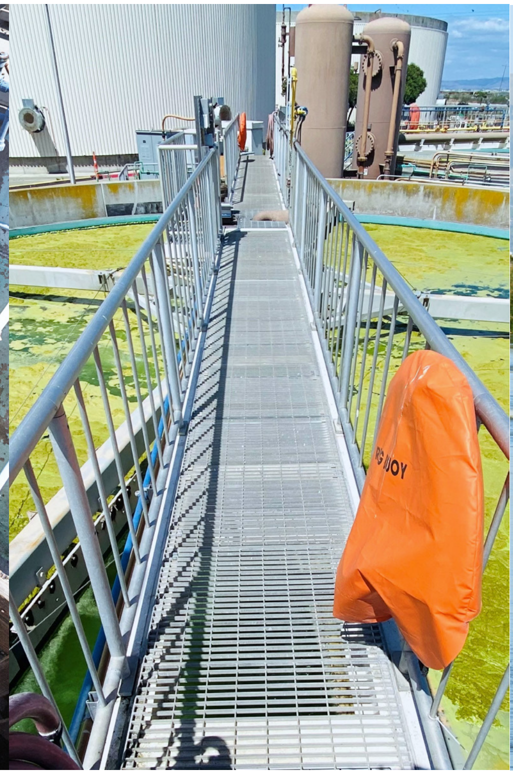
City of Sunnyvale | Environmental Services Department



Water Pollution Control Plant

Plant Compliance

Annual NPDES Report
R2-2020-0002

Sunnyvale

2022

2022 ANNUAL NPDES REPORT

City of Sunnyvale

Prepared for:

Ms. Eileen White

California Regional Water Quality Control Board

San Francisco Bay Region

1515 Clay Street, Suite #1400

Oakland, CA 94612

Prepared by:

City of Sunnyvale

Environmental Services Department

Regulatory Programs Division

P.O. Box 3707

Sunnyvale, CA 94088-3707

February 1, 2023

February 1, 2023

Water Pollution Control Plant
1444 Borregas Avenue
Sunnyvale, CA 94088-3707
TDD/TYY 408-730-7501
sunnyvale.ca.gov

Ms. Eileen White
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite #1400
Oakland, CA 94612

Attn: NPDES Division

Re: 2022 Annual Self-Monitoring Report, City of Sunnyvale Water Pollution Control Plant

The attached 2022 Annual Self-Monitoring Report is submitted in accordance with the requirements of Order No. R2-2020-0002 for the City of Sunnyvale Water Pollution Control Plant.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact me at (408) 730-7788.

Sincerely,

RAWikramanayake

RAWikramanayake (Jan 31, 2023 17:09 PST)

Rohan Wikramanayake
WPCP Division Manager

Attachment: 2022 Annual NPDES Report

TABLE OF CONTENTS

List of Figures

LIST OF TABLES

I. INTRODUCTION

The 2022 Annual National Pollutant Discharge Elimination System (NPDES) Report for the City of Sunnyvale (City) Water Pollution Control Plant (WPCP) is prepared in accordance with NPDES Permit No. CA0037621, San Francisco Bay Regional Water Quality Control Board (RWQCB) R2-2020-0002 (effective April 1, 2020). This report summarizes the monitoring results from the January 1 to December 31, 2022, reporting period and has been divided into seven chapters to address the requirements contained in Section V.C.1.f of Attachment G, as well as Provisions VI.C.2 (Effluent Characterization Study and Report) and VI.C.4.b (Sludge and Biosolids Management) of the Order.

San Francisco Bay Mercury and PCBs Watershed Permit

The City is also subject to Waste Discharge Requirements of the Mercury and PCB Watershed Permit No. CA0038849, RWQCB Order No. R2-2022-0038. This permit's annual reporting requirements may be met either in the Annual NPDES Report or through participation in a group report submitted by the Bay Area Clean Water Agencies (BACWA). The City meets these reporting requirements with the reporting summarized in **Chapter II, Section 2.1.4** and **Section 2.1.5**.

San Francisco Bay Nutrients Watershed Permit

The City is also subject to Waste Discharge Requirements of the Nutrient Watershed Permit No. CA0038873, RWQCB Order No. R2-2019-0017. As allowed by the annual reporting requirements of this Order, the City participates in the 2022 Group Annual Report that will be prepared and submitted by BACWA by February 1, 2023. Nutrient data are also reported electronically in the California Integrated Water Quality System (CIWQS) via monthly Self-Monitoring Reports (SMRs) and are presented and discussed in **Chapter II, Section 1.5**.

Alternate Monitoring Program

The City participates in the Alternate Monitoring Program, RWQCB Order No. R2-2021-0028. The Order establishes alternative monitoring requirements for municipal wastewater discharges subject to RWQCB Permit No. CA0038849. Participating wastewater treatment facilities can reduce their effluent monitoring costs for most organic priority pollutants. In exchange for the reduced monitoring requirements, facilities make supplemental payments to the Regional Monitoring Program (RMP) for regional studies to inform management decisions about water quality in the San Francisco Bay. Through participation in the Alternative Monitoring Program, the Plant reduced effluent monitoring frequencies for priority pollutants, including Dioxin-TEQ, Polychlorinated Biphenyl (PCB) aroclors, and chlorinated pesticides to once per permit term. Priority pollutant monitoring was performed in March 2022 under the alternate reduced monitoring frequencies and the results are presented and discussed in **Chapter II, Section 2.1.1**.

1.0. FACILITY DESCRIPTION

The City owns and operates the Donald M. Sommers WPCP, located at 1444 Borregas Avenue, Sunnyvale, CA 94088. The WPCP is one of 37 Publicly Owned Treatment Works (POTWs) that discharge to the San Francisco Bay (**Figure 1**). Situated in the Lower South Bay subembayment, the WPCP is considered a shallow water discharger and is subject to more stringent treatment standards as compared to deep-water dischargers. Residential, commercial, and industrial wastewater collected from the surrounding service areas, including Rancho Rinconada and Moffett Field, enters the WPCP via 295 miles of gravity sewer mains and interceptors. Wastewater is treated to tertiary standards before being discharged into Moffett Channel, a tributary to San Francisco Bay via Guadalupe Slough.

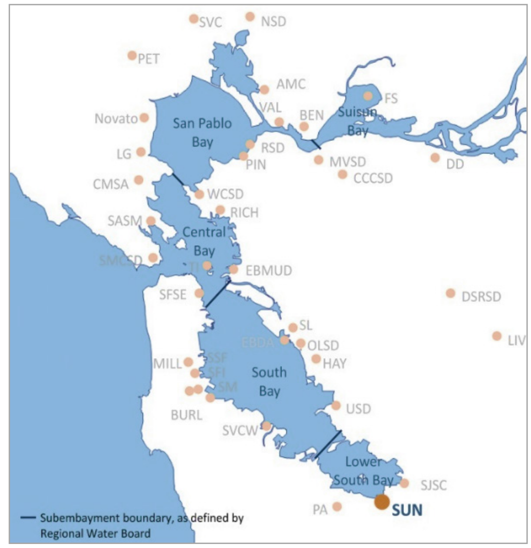


Figure 1: POTWs located in the Bay Area

Originally constructed in 1956, the City has periodically increased the WPCP's treatment capacity as Sunnyvale's population has grown to 159,731 (2022) and has incorporated new treatment systems to improve effluent water quality and meet regulatory standards. The City is implementing the largest Capital Improvement Program in its history known as the Sunnyvale Cleanwater Program (SCWP) to address aging infrastructure and make necessary upgrades to support continued and compliant operations.

2.0. WASTEWATER TREATMENT PROCESS

The WPCP is comprised of distinct process areas, including preliminary, primary, secondary, tertiary, and solids processing facilities (**Figure 3**). A subset of treatment units in these process areas are used for recycled water production. Wastewater is treated to tertiary standards according to the process flow diagram shown in **Figure 2** and represented in more detail in **Attachment A**.

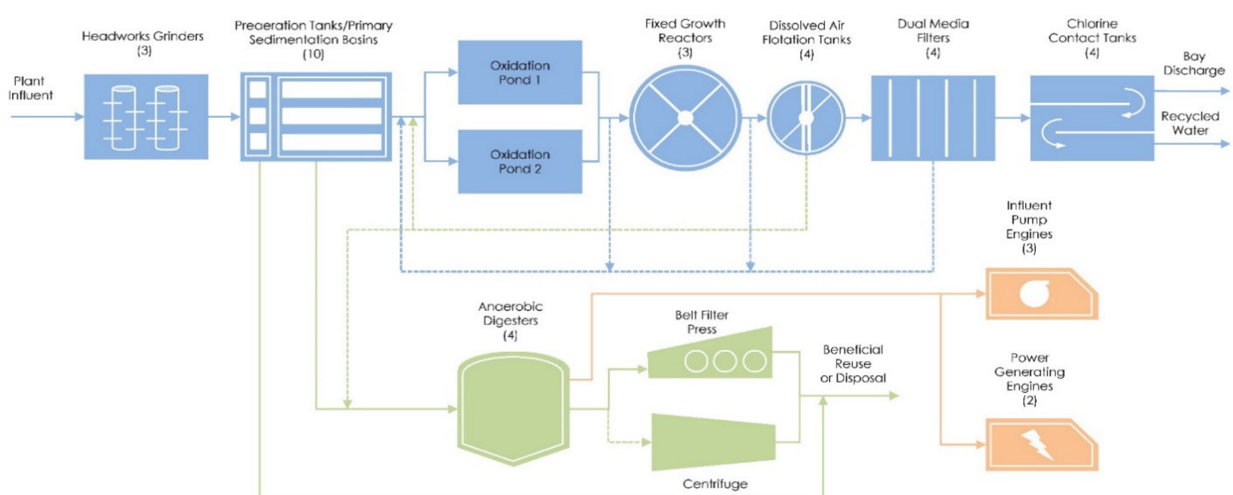


Figure 2: WPCP Process Flow Diagram. Blue lines correspond to liquid, green lines to solids and orange lines to gas flows

Figure 3: Aerial photo of WPCP and its various treatment processes

2.1. Preliminary and Primary Treatment

The Preliminary and Primary Treatment Facilities were originally constructed in 1956 to provide influent screening/grinding, raw sewage pumping and metering, preaerated grit removal, and primary sedimentation. The facilities were expanded several times, most recently in 1984 with the construction of the tenth sedimentation basin, grit handling equipment, and the Auxiliary Pump Station (APS).

Wastewater from the sanitary sewer collection system is primarily conveyed to the WPCP by gravity and enters the Headworks 30 feet below grade where barrel grinders break down large debris. Gas-driven (biogas) centrifugal pumps convey the raw sewage into Preaeration Basins and then to Primary Sedimentation Tanks (**Figure 4**). Pressurized air is injected into wastewater in the Preaeration Basins to discourage septic conditions and odors, and to remove grit (typically inorganic, heavy solids such as sand, gravel, coffee grounds, etc.) that could otherwise damage downstream pumping equipment and accumulate inside anaerobic digesters. Grit accumulates on the bottom of the basins and is conveyed to a screw press where it is dewatered before being hauled offsite for landfill disposal. Aerated wastewater then flows into the Primary Sedimentation Tanks, where the velocity is slowed to allow suspended solids to either rise to the surface (floatable solids/scum) or settle to the bottom of the tanks (settable solids/sludge). Floatable solids are skimmed off the surface while settled solids are removed from the bottom of the tanks and pumped to anaerobic digesters for further treatment. Refer to **Chapter II, Section 1.6** for additional information on solids handling. The clarified wastewater (primary effluent) from each basin is collected by launders and conveyed via a common channel into a pipeline that leads to the Oxidation Ponds where it undergoes secondary treatment. During dry weather conditions (May-October), only five of the ten Preaeration Basins/Sedimentation Tanks are operated on any given day.

If the Headworks is unable to handle the incoming wastewater flow due to mechanical failure or excessive flows, the APS is placed in service to convey wastewater from the collection system into the Preaeration Basins and Primary Sedimentation Tanks. The APS consists of a vertical bar screen for removing large floatable and suspended debris and an electric motor-driven centrifugal submersible pump to convey the wastewater. Screenings are hand-separated and hauled off-site for landfill disposal.

Figure 4: Preliminary and primary treatment processes. Barrel grinders (top), and Preaeration Basins and Primary Sedimentation Tanks (bottom)

Construction of a new Headworks and Primary Treatment Facilities is currently underway with a projected completion year of 2023 (**Chapter IV, Section 3.0**). As a part of this project, a new 2 MW diesel generator will replace the existing 1 MW generator installed in 2018 as part of the Emergency Flow Management Project. Unlike the 1 MW generator, which can only be used to power specific areas of the WPCP during power outages, the 2 MW generator has the capability to provide emergency power to the entire WPCP in the event of a power loss. This project will also address Title V air regulatory requirements by replacing three combustion engines that power the influent pumps with electric motor-driven pumps.

2.2. Secondary Treatment

Primary effluent undergoes secondary (biological) treatment in two Oxidation Ponds that have a combined surface area of roughly 412 acres and are offset from the main Plant (**Figure 5**). The Oxidation Ponds were constructed in their present form in 1968 and designed to treat high biochemical oxygen demand (BOD) loadings during the summer canning season. BOD loadings were greatly reduced with the departure of the canneries in 1983. The original surface aerators (2,500 hp of total surface aeration capacity) were replaced by seven smaller (15 hp) aerators located in the distribution and return channels that help to break apart algal mats that otherwise disrupt wastewater conveyance and to supplement aeration provided by microalgae and atmospheric diffusion.

Primary effluent is conveyed to a distribution channel and into the ponds through a series of cross-over pipes embedded in the levees. Return channels connected to each pond collect the treated wastewater. The return channel connected to the smaller pond (Pond 1) redistributes the treated wastewater into the distribution channel where it is mixed with primary effluent and recirculated throughout the system. This in effect creates a single pond system. Fully treated wastewater in the larger pond (Pond 2) enters the return channel and is pumped to downstream treatment processes within the main Plant.

Figure 5: WPCP Oxidation Ponds

Ammonia and organic material are readily degraded by aerobic and anaerobic bacteria through oxidative processes and through nitrification and denitrification that occur throughout ponds simultaneously. Ammonia removal in the ponds is subject to seasonal variability, with the highest removal rates observed in the warmer summer months and the lowest in the colder winter months. BOD removal is less susceptible to the same seasonal fluctuations. The average detention time of the Oxidation Ponds is 30-45 days and is dependent on flows, operating depth, and other factors.

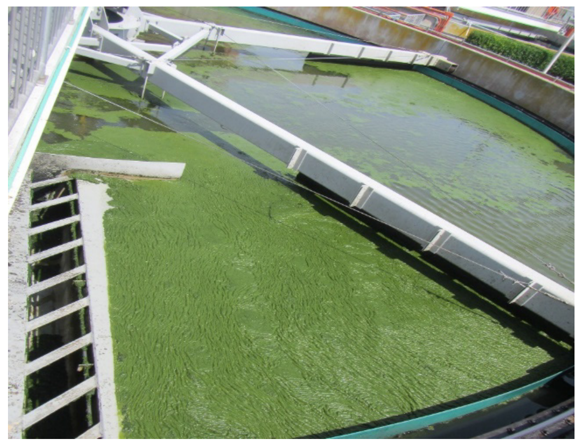


Figure 6: Fixed Growth Reactor (top) distributing wastewater over plastic growth media. Dissolved Air Flotation Tank (bottom) processing secondary solids

The City implements a pond dredging program to remove solids that have accumulated in the Oxidation Ponds from primary effluent inflows and various process return flows, including flocculated solids and filter backwash, thereby recovering lost volume and maintaining treatment efficacy. Like the liquid wastewater, these solids from return flows are degraded in the ponds through biological processes. Dredged solids are processed on-site before being hauled off-site as Class B biosolids. Refer to **Chapter II, Section** for more information on solids handling. The City also manages a maintenance program to address erosion along the levees that delineate the Oxidation Ponds and are essential to their continued performance (**Chapter IV, Section 7.0**).

Following treatment in the Oxidation Ponds, effluent is conveyed to three Fixed Growth Reactors (FGRs), commonly known as trickling filters, which provide additional nitrification of residual ammonia. The FGRs are comprised of plastic cross-flow media (**Figure 6**) on which a film of microorganisms (biofilm) attach and readily convert ammonia (NH_3) to nitrate (NO_3^-). During the colder wet weather season, the nitrification efficacy of the Oxidation Ponds is reduced (or stops altogether), and the FGRs provide the majority of nitrification needed to meet ammonia discharge limits.

FGR effluent flows by gravity to the Dissolved Air Flotation Tanks (DAFTs), where compressed air and polymer are introduced to coagulate and flocculate biological solids (algae and bacteria) generated during treatment in the Oxidation Ponds (**Figure 6**). Flocs rise to the water surface, are skimmed into troughs, and returned to the Oxidation Ponds via the 36-inch Pond Return Line along with filter backwash water and other return flows.

The City is preparing to begin construction of a new Conventional Activated Sludge (CAS) system, consisting of bioreactors and secondary clarifiers configured as a Modified Ludzak-Ettinger system.

Construction of the new CAS system will occur in two stages. For the Stage 1 project, a portion of the CAS system will be constructed to consist of two aeration basins, four secondary clarifiers, and associated appurtenances. This system (CAS-1) will operate in parallel with the existing secondary treatment system (Oxidation Ponds, FGRs, DAFTs) under a split-flow regime until 2035 when Stage 2 will be constructed, and the existing secondary treatment system will be phased-out. Additional project information is presented in **Chapter IV, Section 4.0**.

2.3. Tertiary Treatment

The Tertiary Treatment Facilities were originally constructed in 1978 and then expanded in 1984 to provide additional treatment of Oxidation Pond effluent. Improvements were made in the 1990s and again in 2018 to facilitate the production of recycled water. As a final polishing step, clarified effluent from the DAFTs is conveyed to the Dual Media Filters (DMFs), which provide additional removal of residual algae and particulate matter via gravity filtration through anthracite (top, coarse layer) and sand (bottom, fine layer) (**Figure 7**). The filters are routinely backwashed to remove accumulated solids, and the backwash water is returned to the Oxidation Ponds.

Figure 7: Dual Media Filters treating wastewater

Effluent from the DMFs is disinfected with liquid sodium hypochlorite for at least one hour in a series of Chlorine Contact Tanks (CCTs) before dechlorination with sodium bisulfite (**Figure 8**). The disinfected wastewater is discharged into Moffett Channel, a tributary to the San Francisco Bay via Guadalupe Slough.

Figure 8: Chlorine Contact Tanks disinfection process

A portion of the filtered wastewater undergoes additional treatment in dedicated CCTs to meet the requirements for disinfected tertiary recycled water as described in **Chapter II, Section 1.7**. Additionally, a portion of the disinfected wastewater is partially dechlorinated and redistributed throughout the WPCP as process water for filter backwashing, engine cooling and other purposes.

2.4. Solids Management

Solids removed during primary treatment are fed into primary anaerobic digesters and detained for approximately 35 to 40 days at a temperature around 100 °F. Primary digestion is typically followed by additional treatment in a secondary digester for 12 to 15 days. Within the digesters, anaerobic bacteria degrade organic matter and produce biogas, a mixture of methane, carbon dioxide, and hydrogen sulfide gases in addition to stabilized, nutrient-rich biosolids and water.

Figure 9: Biosolids dewatering operation

A portion of the biogas produced in the anaerobic digesters powers the three main influent engines. Each engine drives a dedicated centrifugal pump that lifts wastewater into the Headworks from the sanitary sewer collection system in addition to driving blowers that aerate the Preaeration Basins. Exhaust heat recovered from the main influent engines and jacket water from the Power Generation Facility (PGF) engines is captured and used to maintain a nearly constant temperature in the digesters. The remainder of the biogas is blended with landfill gas from the adjacent closed landfill and air-blended natural gas. This gas mixture is utilized by two engine generators that comprise the PGF. The PGF produces 1.2 MW of power on average, which satisfies most of the WPCP's power demand and offsets its purchases from PG&E and Silicon Valley Clean Energy.

Currently, all biosolids are mechanically dewatered by an onsite contractor (Synagro) using either a belt filter press or centrifuge (**Figure 9**). Filtrate and centrate are returned to the Oxidation Ponds for additional treatment. A solids process flow diagram is included in **Attachment A**. A new Thickening and Dewatering Building is being constructed as part of the CAS-1 system upgrades to accommodate an increase in solids generation due to waste activated sludge (WAS) from new system. The new system will be owned and operated by the City. Additional project information is presented in **Chapter IV, Section 4.0**.

2.5. Recycled Water Production

The WPCP has a rich history of providing recycled water since the 1990s. Under the current system configuration, a portion of the FGR effluent is sent to a dedicated DAFT, a pair of DMFs, and two of the CCTs. The treatment process achieves a level of treatment that meets the requirements for disinfected tertiary recycled water as specified in CCR Title 22 and is in accordance with the water reclamation requirements in Regional Water Board Order No. 94-069. The treatment configuration allows for the simultaneous production of recycled water and Bay (NPDES) discharge. The facilities dedicated to recycled water production can be switched quickly to NPDES discharge if higher discharge flows are needed in conjuncture with the WPCP's Flow Management Strategy. In the recycled water steam, the polymer dose, chlorine dose, and chlorine contact time are adjusted as needed to meet the more stringent treatment requirements. As a final production step, recycled water is partially dechlorinated with sodium bisulfite prior to entering the distribution system.

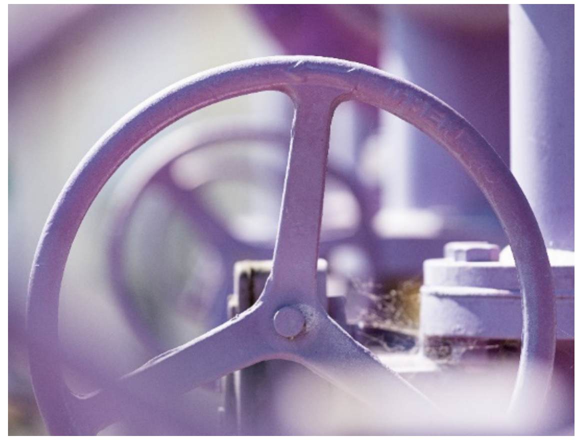


Figure 10: Recycled water distribution pumps

Recycled water is distributed in "purple pipes" throughout the service area for irrigation of private and public landscapes, parks, and golf courses, for use in decorative ponds and for other approved uses (**Figure 10**). Typically around 8% of the daily wastewater flow is diverted for recycled water. In addition, disinfected secondary recycled water (No. 3 Water) is partially dechlorinated and reused internally for filter backwashing, engine cooling, and other purposes. Use of No. 3 Water is relatively constant throughout the year with an average annual use around 250-300 MG.

3.0. WPCP LABORATORY

The WPCP operates an on-site laboratory that analyzes samples for monitoring treatment process performance and permit compliance, industrial pretreatment samples collected from industrial facilities that discharge to the sanitary sewer system, and City drinking water samples to monitor for compliance with drinking water regulatory standards. A list of the Laboratory's approved analyses and the current Environmental Laboratory Accreditation Program's (ELAP) certification is included in **Attachment B**. The laboratory is in the process of transitioning to ELAP's TNI standard by the required date of December 31, 2023.

The laboratory utilizes a Laboratory Information Management System (LIMS) to effectively manage data from different analyses and instruments and generate lab reports. As part of the SCWP, design of the Cleanwater Center, which will include new Administration, Laboratory, and Maintenance facilities within one building, reached 90% design. However, construction has been deferred to prioritize the Condition Assessment and Existing Plant Rehabilitation Project as well as the Secondary Treatment and Dewatering Facilities Project.

II. Plant Performance and Compliance

1.0. PLANT PERFORMANCE

The WPCP continues to maintain a high level of performance as discussed herein. Compliance with permit limits is discussed in **Section 2.0** of this Chapter.

1.1. Wastewater Flows

The current average dry weather flow design capacity of the WPCP is 29.5 million gallons per day (MGD), which also corresponds to the facility's permitted effluent capacity. The peak wet weather design capacity of the WPCP is 40 MGD with a proven capability of handling instantaneous flows of 55 MGD.

WPCP Flow Rates

Flow Type (MGD)	Influent	Effluent
Average Daily	12.2	11.1
Average Dry Weather	11.5	8.6
Average Wet Weather	12.6	12.4
Peak-Hourly Max	35.1	---
Instantaneous Max	36.2	---
Total Treated (MG)	4,467	---

During the 2022 reporting period, the WPCP treated 4,467 MG of influent wastewater at an average rate of 12.2 MGD and discharged an average of 11.1 MGD. The highest average daily influent flow rate of 21.3 MGD occurred on December 31, 2022, and was associated with the heaviest storm event of the year where an almost unprecedented five inches of rainfall was recorded over 24-hours. This storm event was also preceded by several days of heavy rainfall and high flow rates. An influent peak hourly flow rate of 35.1 MGD and an instantaneous flow rate of 36.2 MGD were recorded on the same day, making 2022 one of the wettest years in recent record.

Average daily influent and effluent flow rates for the past 10-years are shown in **Figure 11A**. A comparison between influent and effluent flow rates reflect the seasonal effects of recycled water production and evaporation from the Oxidation Ponds. For example, during summer months (May-Aug), when recycled water production and evaporation rates are highest, influent flow rates exceed effluent flows by the greatest margins. Influent flows are also influenced by seasonal precipitation patterns, resulting in higher flow rates during the wet weather season. Average daily influent flow rates during the 2022 reporting period remained relatively consistent with a 10-year average of 12.6 MGD (**Figure 11B**). There was a slight drop, however, in influent flows when compared to previous years, which is attributed to drought conditions and water conservation efforts. Moreover, the City's typical daily net workforce influx of approximately 21,000 (15%) non-resident workers[1] was likely reduced during 2022 in response to the continued COVID-19 pandemic, as commuter behavior has favored increased teleworking. The drop in

[1] Calculated as an annual average from U.S. Census Bureau data available from 2002-2019 (https://onthemap.ces.census.gov/). Daily workforce influx data unavailable for 2021-2022 and are anticipated to be lower due to the COVID-19 pandemic.

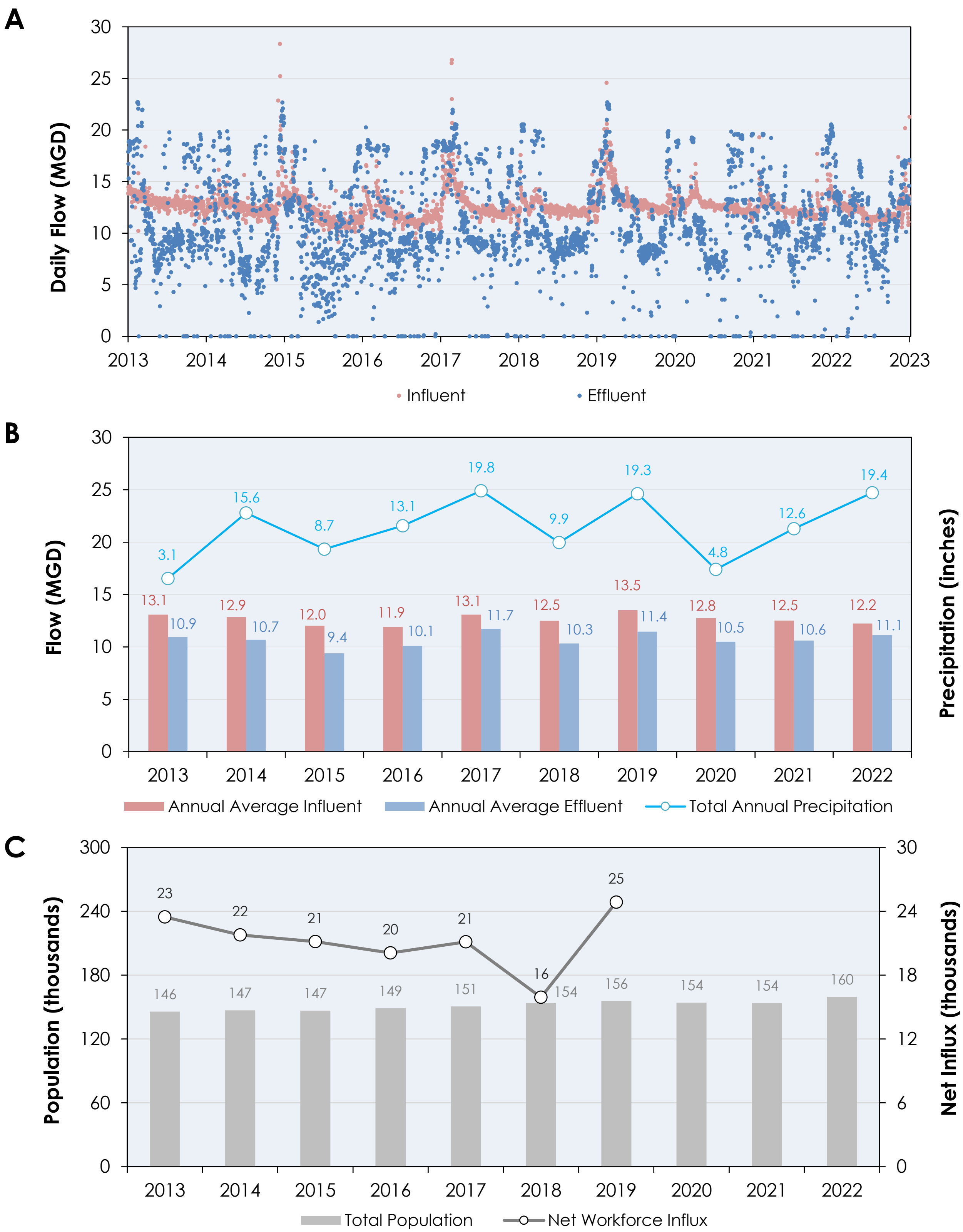


Figure 11: WPCP Wastewater Flow Rate and Population Trends from 2013-2022. A) Daily and B) Annual Average Influent and Effluent Wastewater Flows through the WPCP from 2013-2022. C) Total Population and Net Workforce Influx (thousands) in Sunnyvale from 2013-2022 (net workforce influx data not yet available for 2020-2022)

influent flows was observed despite a nearly 4% increase in Sunnyvale's population (**Figure 11C**) and heavier than normal rainfall at the end of the year.

Effluent flow rates typically follow influent flow trends during the wet weather season but are often much higher in order to offset precipitation directly into the Oxidation Ponds and maintain a relatively consistent operating depth. The large variation in effluent flow rates reflects the WPCP's Flow Management Strategy, which utilizes the more than 250 MG storage capacity of the ponds to help normalize flows and allows temporary cessation of discharge to perform essential maintenance. In essence, pond storage capacity results in a decoupling of influent and effluent flows. The annual average effluent flow rate of 11.1 MGD is also consistent with the 10-year average of 10.7 MGD shown in **Figure 11B** and well within the permitted capacity of 29.5 MGD.

1.2. Carbonaceous Biochemical Oxygen Demand

cBOD

Type	Limit	Performance
% Removal:	85%	98%
Daily (MDEL):	20 mg/L	2.0 – 9.9 mg/L
Monthly (AMEL):	10 mg/L	2.2 – 6.0 mg/L

Carbonaceous biochemical oxygen demand (cBOD) is a measure of the organic content in wastewater and is used by the RWQCB as one of the parameters for evaluating and regulating WPCP performance. **Figure 12** summarizes cBOD concentration data and removal performance from 2018 to 2022. Influent and effluent cBOD samples are collected as flow-weighted composites over a 24-hour period. In mid-2019, rag accumulation on the composite sampler intake line was identified as a contributing factor to high cBOD data variability, resulting in adjustments to the orientation of the intake tubing within the influent channel in conjuncture with a more rigorous tubing replacement schedule. Data variability subsequently reduced and has remained more stable.

As shown in **Figure 12A** and **Figure 12B**, influent cBOD concentrations gradually increased during the 2022 reporting period, coinciding with the lifting of workplace restrictions and a partial return to in-office work. In contrast, the drop in average influent cBOD concentration observed between 2020 and the beginning of 2022 are attributed to the COVID-19 pandemic and various shelter-in-place orders and shifting workforce structure to favor more telework. Both instances of elevated influent cBOD concentrations observed on March 20 and November 11 are associated with heavy precipitation and the likely flushing of the collection system after prolonged periods of low flows due to ongoing drought conditions.

Average daily and monthly cBOD concentrations remained well below permit limits as shown in **Figure 12A** and **Figure 12B**, ranging from 2.0 to 9.9 mg/L and 2.2 to 6.0 mg/L, respectively. Similar to previous years, effluent cBOD concentrations demonstrated a general trend of lower removal during the colder months and higher removal during the warmer months, which is a typical pattern of the unique secondary treatment pond system at the WPCP. Biological activity in the secondary treatment processes declines during the colder months, resulting in somewhat lower removal rates compared to the summer months.

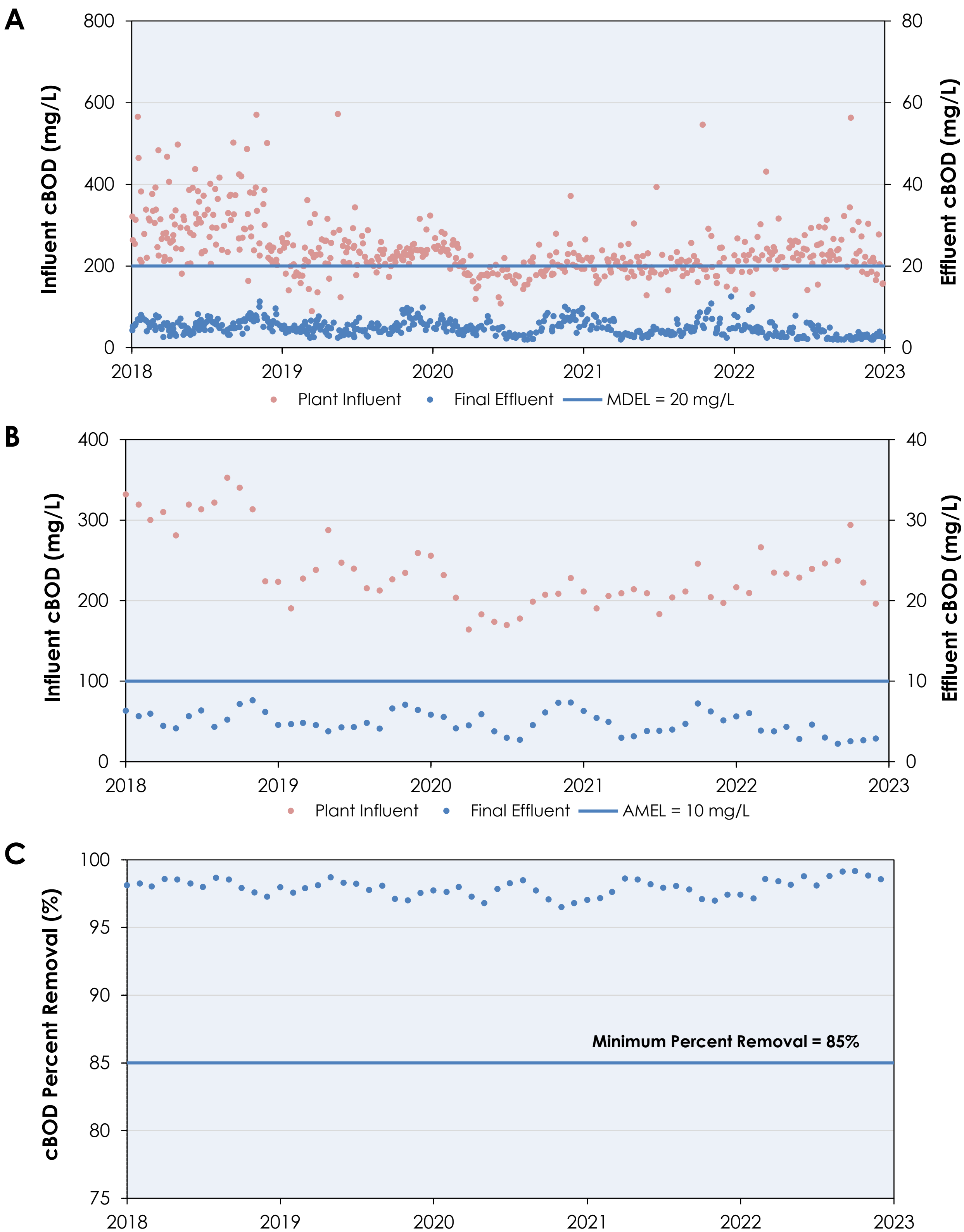


Figure 12: cBOD Trends through the WPCP from 2018-2022. A) Daily and B) Average Monthly Influent and Effluent cBOD (mg/L) through the WPCP from 2018-2022. C) Average Monthly Effluent Percent Removal of cBOD from 2018-2022

The percent removal of cBOD, as measured by the difference between influent and effluent concentrations, also remained well above the minimum monthly average removal rate of 85% with an average of 98% (**Figure 12C**). Effluent cBOD concentrations during the 2022 reporting period were some of the lowest on record and coincided with an abundance of a single species of cyanobacteria (*Synechocystis sp.*) in the pond system. *Synechocystis sp.* can act as both an autotroph and heterotroph, consuming atmospheric CO_2 as well as organic matter as its carbon source for growth and reproduction.

Figure 13 summarizes average daily and annual influent and effluent cBOD loading rates, as measured in kilograms per day (kg/day) and kilograms per year (kg/yr), from 2018 to 2022. Daily influent cBOD loading rates shown in **Figure 13A** exhibited a pattern similar to those observed for concentrations, despite influent flows remaining relatively consistent with previous years, suggesting that concentrations were a stronger driver than flows during 2022. Average annual influent loads over the past 5-years are on a downward trajectory, whereas effluent loads are relatively stable due to the consistent performance of the secondary treatment process in removing organics (**Figure 13B**).

Figure 13: Average A) Daily and B) Annual cBOD Loading Rates from 2018-2022

1.3. Total Suspended Solids

TSS		
Type	Limit	Performance
% Removal:	85%	95%
Daily (MDEL):	30 mg/L	4.2 – 33.0 mg/L
Monthly (AMEL):	20 mg/L	6.6 – 18.7 mg/L

Total suspended solids (TSS) is a measure of the suspended solids content of wastewater that will not pass through a standard laboratory glass fiber filter. Similar to cBOD, TSS is used by the RWQCB for evaluating and regulating the WPCP's performance.

Figure 14 summarizes TSS concentration data and removal performance from 2018 to 2022. Overall, TSS removal performance remained strong with one exceedance of the 30 mg/L MDEL caused by the proliferation of the cyanobacteria *Synechocystis sp.* Influent and effluent TSS samples are collected as flow-weighted composites over a 24-hour period. In typical years, influent TSS concentrations exhibit a seasonal pattern, wherein higher concentrations of TSS observed in late winter and early spring give way to lower summer and fall concentrations. These patterns coincide with heavy rainfall which can contribute to scouring of accumulated sediment (grit) within the collection system. The spike gradually subsides as the rainy season gives way to the drier summer months and flows decrease. Occasionally, a second rise in concentration will appear toward the end of the summer months (Aug-Sep) and is attributed to enhanced water conservation efforts. This pattern was somewhat apparent during the 2022 reporting period. As with cBOD, data variability observed in 2018 was significantly reduced following adjustments made to the influent sampler intake line in mid-2019 to reduce rag accumulation and promote data accuracy.

As shown in **Figure 14A** and **Figure 14B**, influent TSS concentrations gradually increased during the 2022 reporting period similar to cBOD, coinciding with the lifting of workplace restrictions and a partial return to in-office work. In contrast, the drop in average influent TSS concentration observed between 2020 and the beginning of 2022 is attributed to the COVID-19 pandemic and various shelter-in-place orders and shifting workforce structure to favor more telework. Both instances of elevated influent TSS concentrations observed on March 20 and November 11 are associated with heavy precipitation and the likely flushing of the collection system after prolonged periods of low flows due to the ongoing drought.

Effluent TSS concentrations continued to show a relatively consistent seasonal trend during the 2022 reporting period, with higher concentrations measured in the colder months as compared with the warmer months. While effluent TSS trends are similar to influent trends in terms of seasonal patterns, the mechanism is different and somewhat counter-intuitive. Algae grown in the Oxidation Ponds represent the largest fraction of residual solids in secondary effluent and are conveyed to the WPCP's tertiary system for additional treatment prior to discharge. Algae growth is usually highest during the warmer months, suggesting that the highest TSS concentrations during the year would be observed during those months. However, the dominant species of algae grown within the Oxidation Ponds typically undergoes a seasonal shift between summer and winter. Historically, during the summer months, colonial algal species (i.e. *Scenedesmus sp.*) dominate and are readily harvested and removed by the DAFTs and DMFs; whereas,

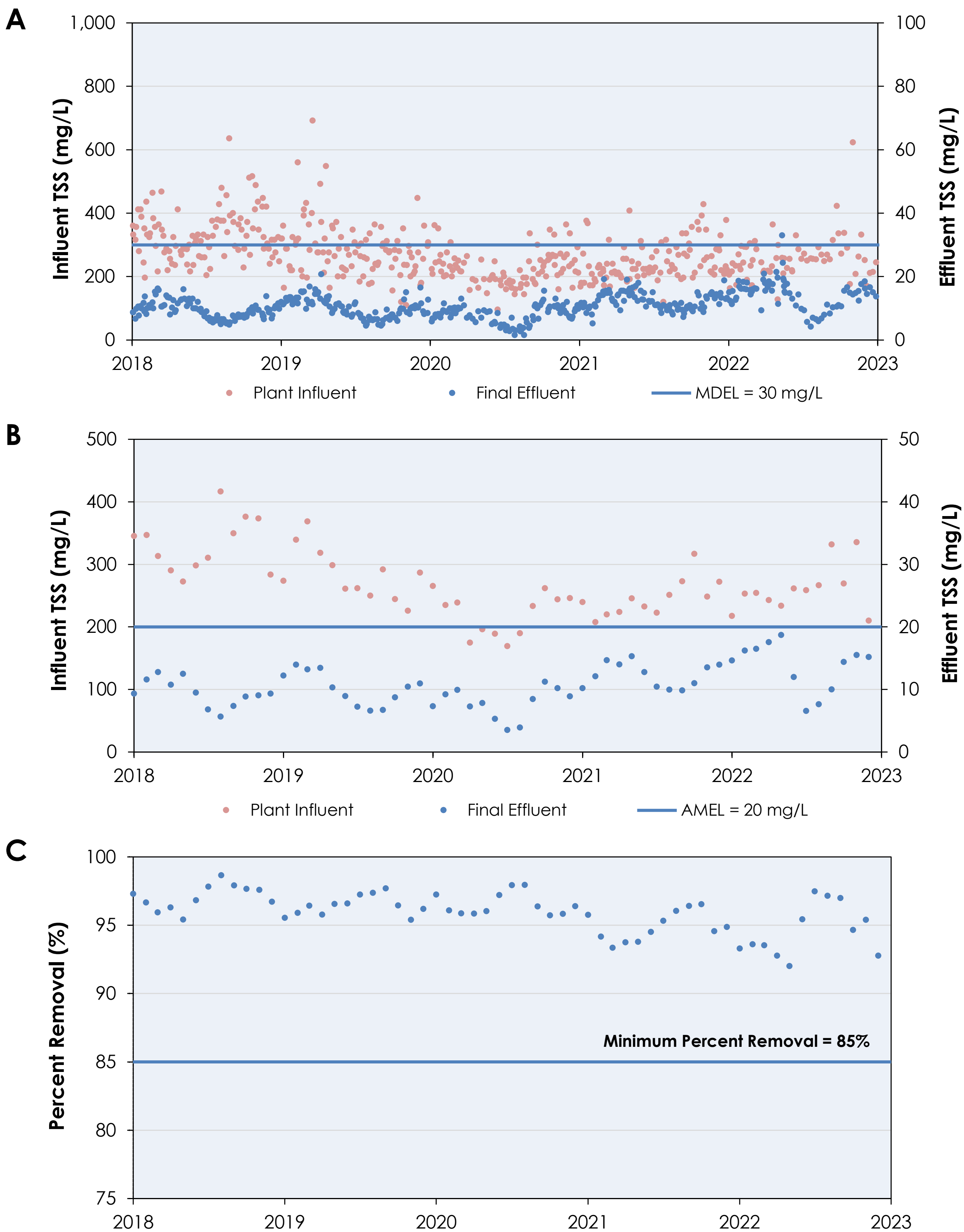


Figure 14: TSS Trends through the WPCP from 2018-2022. A) Daily and B) Average Monthly Influent and Effluent TSS (mg/L) through the WPCP from 2018-2022. C) Average Monthly Effluent Percent Removal of TSS from 2018-2022

dosing in the DAFTs and CCTs to provide a margin of safety for meeting daily and monthly TSS permit limits, as well as the turbidity limit. The majority of average daily and monthly effluent TSS concentrations remained below their respective permit limits, ranging from 4.2 to 33.0 mg/L and 6.6 to 18.7 mg/L, respectively. The exceedance of the MDEL and relatively lower removal rate during the reporting period are attributed to a persistent change in the algal community hierarchy within the Oxidation Ponds that began in April 2021. At that time, a species of single cell algae belonging to the picoplankton class (<2 microns) was identified that quickly outcompeted other algae species that are generally easier to remove in DAFTs. The species was later identified as *Synechocystis sp.*, which is a type of cyanobacteria that has the potential to produce microcystin.

The dominance of this species has created significant operational challenges in managing effluent TSS and turbidity and was a major contributing factor to the higher effluent TSS concentrations observed during this reporting period as compared with previous years (**Figure 15**). This also resulted in the percent removal of TSS, as measured by the difference between monthly average influent and effluent concentrations (**Figure 14C**), being lower than in recent years with the exception of 2021. It is still unclear what conditions or events may have triggered the rapid dominance of *Synechocystis sp.* in the ponds. The City has responded with several mitigation efforts in pursuit of a reliable compliance strategy that are discussed in more detail in **Section 2.1.**

Figure 15: Impact of *Synechocystis sp.* on the DAFTs (top) and DMFs (bottom).

Figure 16 summarizes daily and annual influent and effluent TSS loading rates as measured in kilograms per day (kg/day) and kilograms per year (kg/yr) from 2018 to 2022. Influent TSS loading rates shown in **Figure 16A** exhibited a pattern similar to those observed for concentrations, despite influent flows remaining relatively consistent with previous years, indicating that concentrations were a more significant driver of loading rates than flows in 2022. Overall, influent loading rates over the last 5-years exhibited a downward trend as shown in the average annual loading rates in **Figure 16B**; whereas, effluent displayed a higher than normal loading rate compared to the last 5-years which is attributed to the presence of the more challenging algae species.

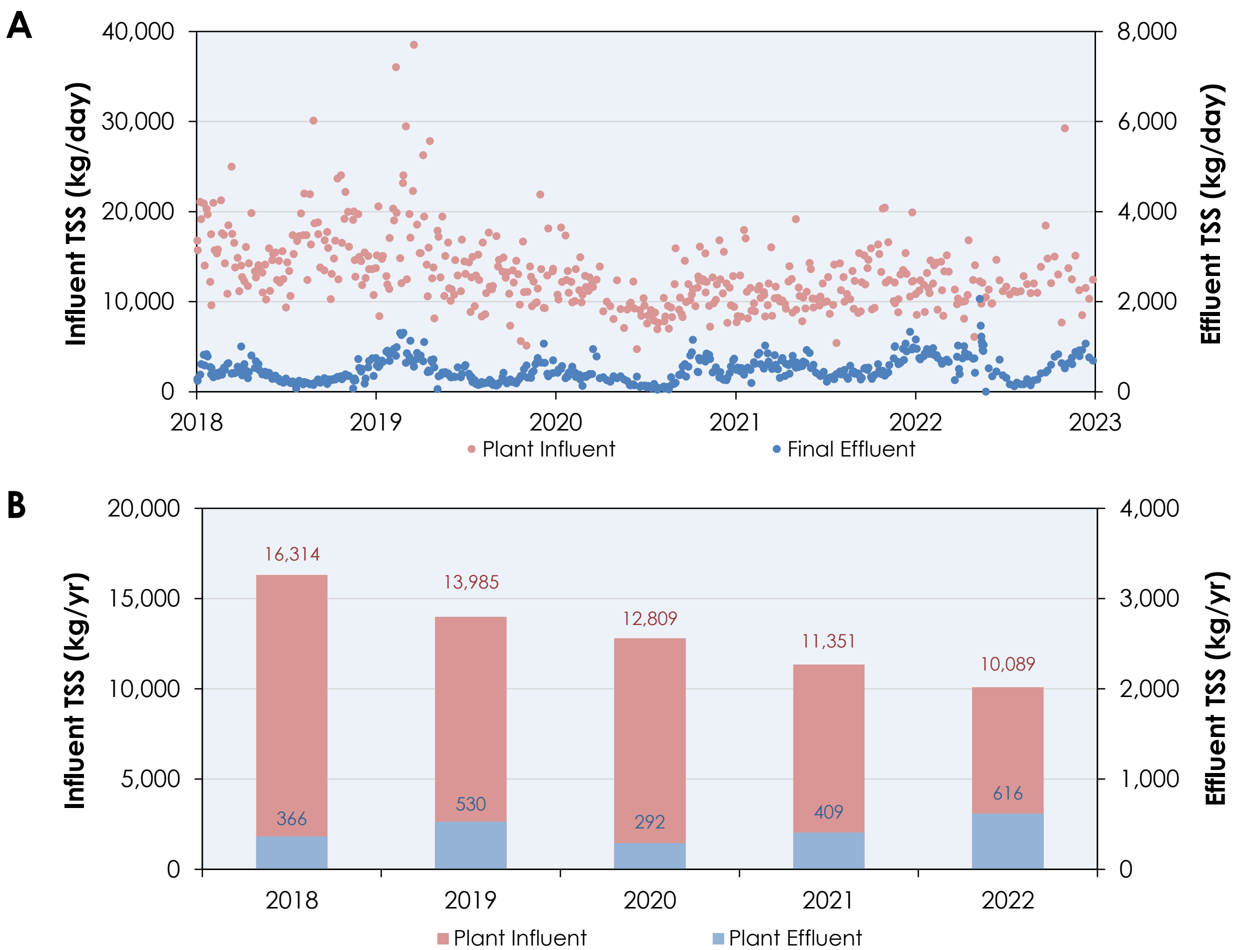


Figure 16: Average A) Daily and B) Annual TSS Loading Rates from 2018-2022

1.4. Total Ammonia

Ammonia removal occurs primarily in both the Oxidation Ponds and the FGRs. In the Oxidation Ponds, ammonia removal is achieved through biological nitrification as well as uptake by algae, and as a result it is highly susceptible to seasonal fluctuations. Lower removal rates occur during the fall/winter (Oct-May) when ambient temperatures are colder and daytime is shorter; whereas, higher removal rates occur during the summer (Jun-Sep) when ambient temperatures are warmer and daytime is longer. Consequently, nitrification in the FGRs is the primary process of ammonia removal during this time. Limited ammonia removal also occurs in the DMFs, resulting in final effluent concentrations being slightly lower than that in the FGR effluent. The WPCP's NPDES permit includes seasonal performance limits for ammonia that reflect the seasonal variability.

Ammonia

Type	Limit	Performance
Daily (MDEL):	26 mg/L (Oct-May) 5 mg/L (Jun-Sept)	0.1 – 11.8 mg/L 0.2 – 2.0 mg/L
Monthly (AMEL):	18 mg/L (Oct-May) 2 mg/L (Jun-Sept)	0.4 – 9.4 mg/L 0.4 – 1.4 mg/L

1.4.1. Data Review

Figure 17 summarizes ammonia concentration data and removal performance trends. As shown in **Figure 17A** and **Figure 17B**, influent ammonia trends were also influenced by the continued COVID-19 pandemic, similar to cBOD and coincide with the lifting of workplace restrictions and a partial return to in-office work. In contrast, the drop in average influent NH3 concentrations observed between 2020 and the beginning of 2022 are attributed to the COVID-19 pandemic and various shelter-in-place orders and shifting workforce structure to favor more telework. The elevated influent NH3 concentrations observed on November 11 is associated with heavy precipitation and the likely flushing of the collection system after prolonged periods of low flows due to ongoing drought conditions. As is also shown in these figures, daily and average monthly effluent ammonia concentrations in 2022 remained below their respective seasonal permit limits, ranging from 0.1 to 11.8 mg/L (Oct-May) and 0.2 to 2.0 mg/L (Jun-Sep) daily and from 0.4 to 9.4 mg/L (Oct-May) and 0.4 to 1.4 mg/L (Jun-Sep) monthly.

Figure 17C depicts removal performance of the Oxidation Ponds and FGRs from 2018 through 2022. Seasonal removal trends are clearly visible, with the Oxidation Ponds demonstrating ammonia removal from March through September, and the FGRs removing most of the ammonia during the remainder of the year. The seasonal increase in effluent ammonia from the Oxidation Ponds is typical and attributed to low ambient temperatures and sunlight. The seasonal effects on the Oxidation Ponds with respect to ammonia removal are also apparent in the FGRs and can be compounded by snail predation on nitrifying bacteria as described in more detail in the *Strategies to Enhance Performance* section below. The WPCP did not perform any snail control events during the 2022 reporting period as FGR ammonia data did not indicate significant nitrifier predation that would jeopardize FGR performance. The Oxidation Ponds exhibited a high level of performance in 2022 as indicated by low effluent concentrations that appear to have also offset the need for a snail abatement event.

Figure 18 summarizes average daily (kg/day) and annual (kg/yr) influent and effluent ammonia loading rates from 2018 to 2022. Influent ammonia loading rates shown in **Figure 18A** exhibited a pattern similar to those observed for concentrations, despite influent flows remaining relatively consistent with previous years, indicating that concentrations were a more significant driver of loading rates than flows in 2022. Overall, influent loading rates over the last five years exhibited a slight downward trend as shown in the average annual loading rates in **Figure 18B.** Effluent ammonia loading rates are variable, with the higher values generally occurring during the wet weather season and lower values generally occurring during the dry weather season, reflecting the seasonal nature of the Oxidation Ponds and FGRs performance. Despite the increased algae presence in the Oxidation Ponds in 2022, there was minimal impact to ammonia removal, and loading trends are similar to those observed for cBOD. The slightly higher effluent loads are attributed to low recycled water production associated with process impacts caused by *Synechocystis sp.* and the inability to consistently achieve less than 2 NTU water quality. Additional information pertaining to ammonia and other nutrient trends is presented in **Section 1.5** of this Chapter and is available in the *2022 Nutrient Watershed Permit Annual Report* submitted by BACWA.

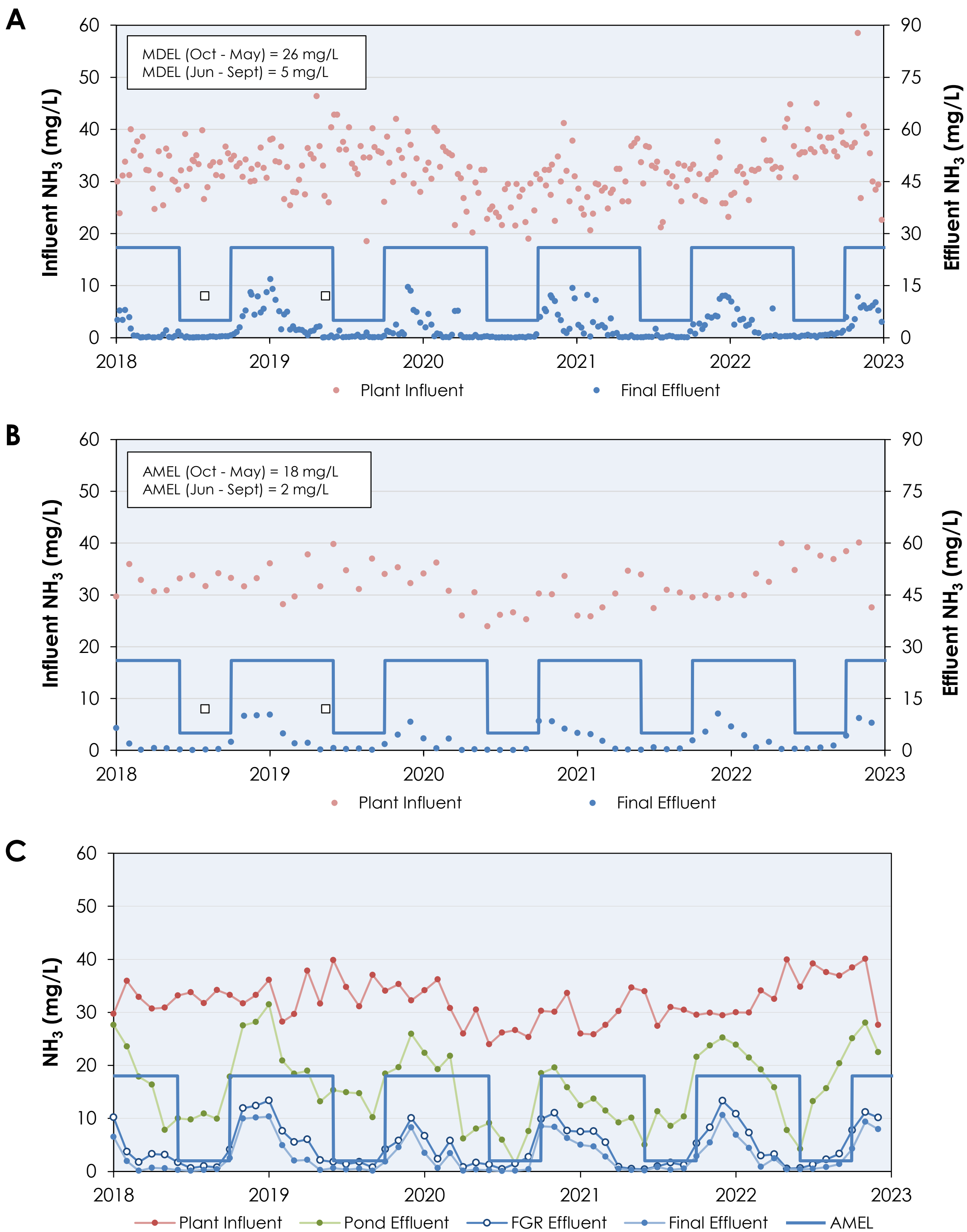


Figure 17: Ammonia Trends at the WPCP from 2018-2022. A) Daily and B) Monthly Average Influent and Effluent Total Ammonia from 2018-2022. C) Monthly Average Total Ammonia from Pond, FGR, and Final Effluent from 2018-2022

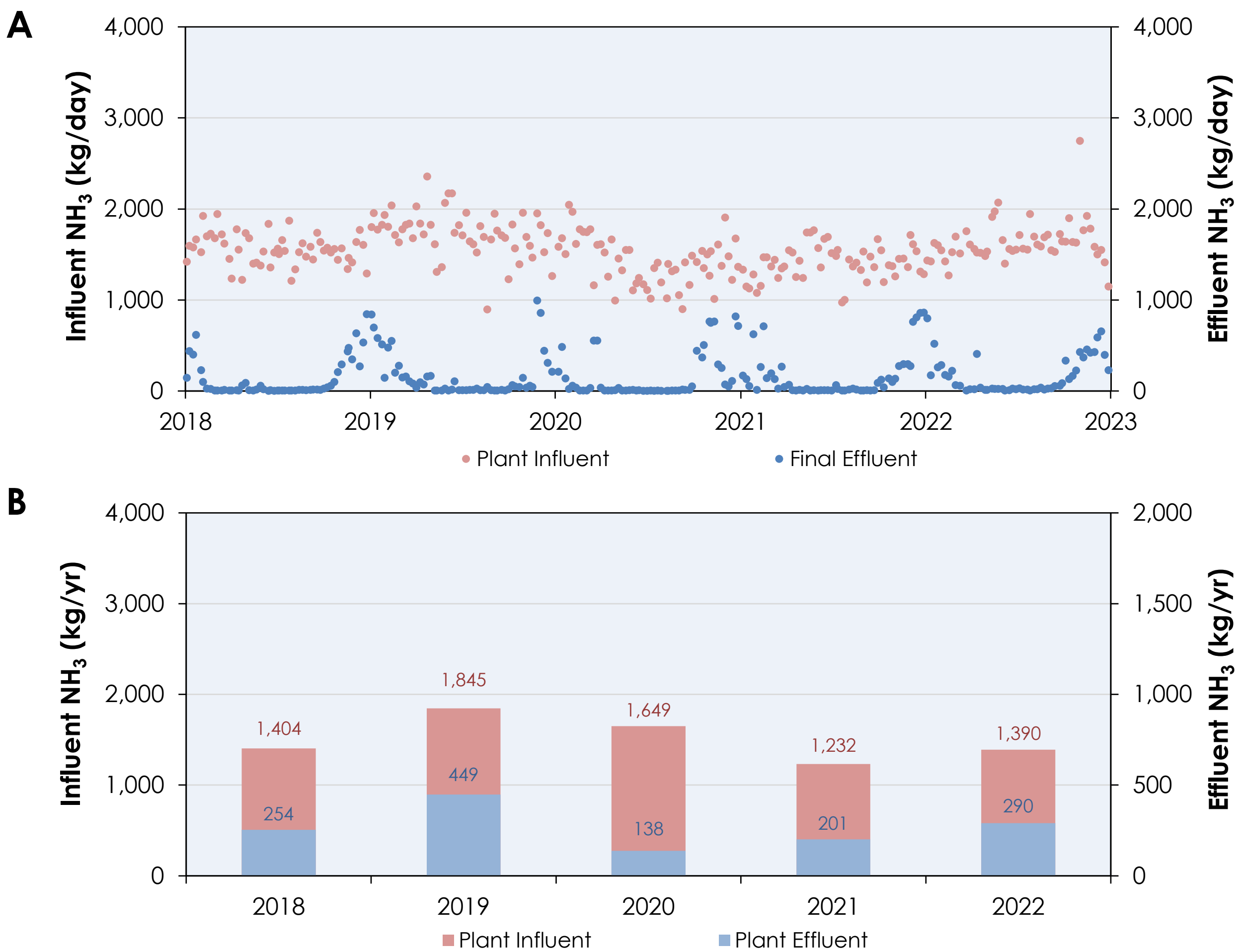


Figure 18: Average A) Daily and B) Annual Ammonia Loading Rates from 2018-2022

1.4.2. Performance Optimization Strategies

Oxidation Pond Dredging

Ammonia removal in the Oxidation Ponds is highly variable and seasonal in nature. Although variability in weather patterns plays a significant role, the loss of volume due to solids deposition over time has likely impacted performance by reducing the "working" capacity of the Oxidation Ponds. The Oxidation Ponds are the WPCP's primary mechanism for cBOD removal and promote ammonia removal by direct assimilation into photosynthetic algae as well as through bacterial nitrification. As such, maintaining a sufficient water column and working volume is a performance essential and one of the only control variables for an open system of this type.

There are numerous entry routes for solids, including algae and bacterial growth within the Oxidation Ponds, float (flocculated solids) skimmed from the DAFTs, DMF backwash water, solids handling wash water, and digester supernatant. Consequently, the City began dredging the ponds in 2012 to restore capacity. Dredging continued during this reporting period but was restricted to the wet weather season to avoid releasing ammonia from sediments in excess of the FGRs' processing capacity and the stringent dry season ammonia limits. A total of 1,850 dry tons of biosolids were removed from the Oxidation Ponds and were reused for agricultural land application in 2022.

Snail Control Program

Trickling filters, such as the FGRs, are prone to declining ammonia removal performance due in large part to snail predation on nitrifying bacteria that attach to the plastic growth media. As a result, the City periodically performs snail removal treatments. During a treatment event, the FGRs are placed into recirculation mode and effluent from the Oxidation Ponds is dosed with ammonium sulfate (approx. 8-9 tons at 40% solution) and sodium hydroxide (approx. 7 tons at 25% solution) in a batch process. The rise in pH from the sodium hydroxide effectively converts the ammonium sulfate to ammonia, which is toxic to the snails but beneficial to nitrifying bacteria up to a certain point. Snail shells and other solids are collected in the FGR distribution structure and wasted to the Oxidation Ponds, which help contribute a carbonate source to facilitate secondary treatment and provide beneficial reuse for the pond ecosystem.

In a given year, the WPCP will typically perform one or two snail treatment events. The first typically occurs in spring and the second in fall during seasonal shifts when the potential decline in Oxidation Pond performance is at its highest and seasonal limits become more stringent. The timing of these events is dependent on performance data and may not occur at all, as was the case in 2022, if ammonia removal is high and the WPCP is able to meet its seasonal limit. The WPCP plans to continue performing these control events as needed as long as the FGRs are required to provide nitrification.

1.5. Nutrients

In addition to the current NPDES permit, the City is also subject to Waste Discharge Requirements of the Nutrient Watershed Permit No. CA0038873, RWQCB Order No. R2-2019-0017. The purpose of the Nutrient Watershed Permit is to track and evaluate Bay Area POTWs' treatment performance, fund nutrient monitoring programs, support load response modeling, and conduct treatment plant optimization and upgrade studies for nutrient removal. Analytical results pertaining to permit requirements are reported electronically in CIWQS by the City. In addition, information pertaining to the Nutrient Watershed Permit is prepared in a separate annual report by BACWA. The following summary is provided as an additional indicator of plant performance and in support of the trends presented in previous Sections.

The issuance of Order No. R2-2019-0017 shifted the focus of the previous RWQCB Order No. R2-2014-0014 from monitoring effluent total nitrogen (TN) to total inorganic nitrogen (TIN) and required influent monitoring of additional parameters including total phosphorus (TP). Since nitrogen is the growth-limiting nutrient for phytoplankton in the San Francisco Bay, a planning level target (PLT) was established for TIN, which is the bioavailable form of nitrogen. This Order did not establish numeric effluent limits, primarily due to the current uncertainties as to whether TIN is causing or contributing to impairment in the San Francisco Bay. The PLT is intended to forecast nutrient discharge performance in 2024 and provide an indication of potential future effluent limitations that ongoing performance can be measured against, such that the City can implement necessary early actions to reduce nutrients in current or future facility planning efforts. The PLTs allow time for additional scientific studies to understand the connectivity between nutrient discharges and potential impairment of the San Francisco Bay and an evaluation of cost-effective nutrient management opportunities.

The Nutrient Watershed Permit established PLTs using a two-step process. For Sunnyvale, the first step established a baseline of 630 kg/day from the maximum dry season average effluent TIN load measured between May 1, 2014, and September 30, 2017. Only dry season discharge data were used to calculate the PLT because it more accurately defines the current performance of treatment when accounting for variability in nutrient discharges caused by increased influent flows and lower temperatures during wet weather. This is also the time during the year when algae growth resulting from nutrient discharges is more likely to contribute to adverse conditions in the San Francisco Bay. In the second step, a 15% growth factor was added to the baseline to account for a projected population growth rate of 1.5% per annum over the next 10 years, resulting in the WPCP's PLT of 730 kg/day.

Nitrogen

Total Inorganic Nitrogen

Average Dry Weather Effluent Load	499 kg/day
Planning Level Target (PLT)	730 kg/day
Average Dry Weather % Removal	59%

Total Inorganic Nitrogen (TIN) is the measure of the total concentration of ammonia (NH3) and nitrate and nitrite (NOx); whereas, total nitrogen (TN) is a measure of TIN and the organic fraction of nitrogen (Org-N). Influent TN consists primarily of ammonia and Org-N, with the contribution from NOx being negligible, as illustrated in **Figure 19A.** On average, Org-N comprises 40% of influent nitrogen with ammonia making up the remaining 60%. The composition of nitrogen in the effluent differs, as nitrification occurs in the Oxidation Ponds and FGRs, resulting in ammonia being largely oxidized to NOx. In this case, nitrate (NO_3) is the dominant form of oxidized nitrogen in the effluent, averaging 98% of NOx and roughly 85% of TIN. Effluent TIN is subject to seasonal variability for reasons discussed below.

Figure 19A shows average monthly influent nitrogen concentrations collected as flow-weighted composite samples over a 24-hour period. In the current Nutrient Watershed Permit, influent Total Kjeldahl Nitrogen (TKN) monitoring was retained from the previous order and is considered equivalent to influent TN since NOx has been shown to be negligible. As such, influent TKN is simply referred to as TN for the purposes of this report. Monthly average influent TN concentrations in 2022 ranged from 26.3 to 58.0 mg/L with an annual average of 46 mg/L. In general, influent TN concentrations exhibited the same pattern as cBOD, TSS, and ammonia and are likewise attributed to the same COVID-19 factors. The 2022 trends are a departure of those observed prior to 2020, wherein higher TN concentrations predominate in the summer, with lower concentrations in the winter, and are inverse to influent flow patterns. Unlike previous years (Jun-Jul 2018, and Apr 2019), there were no observable spikes in influent TN.

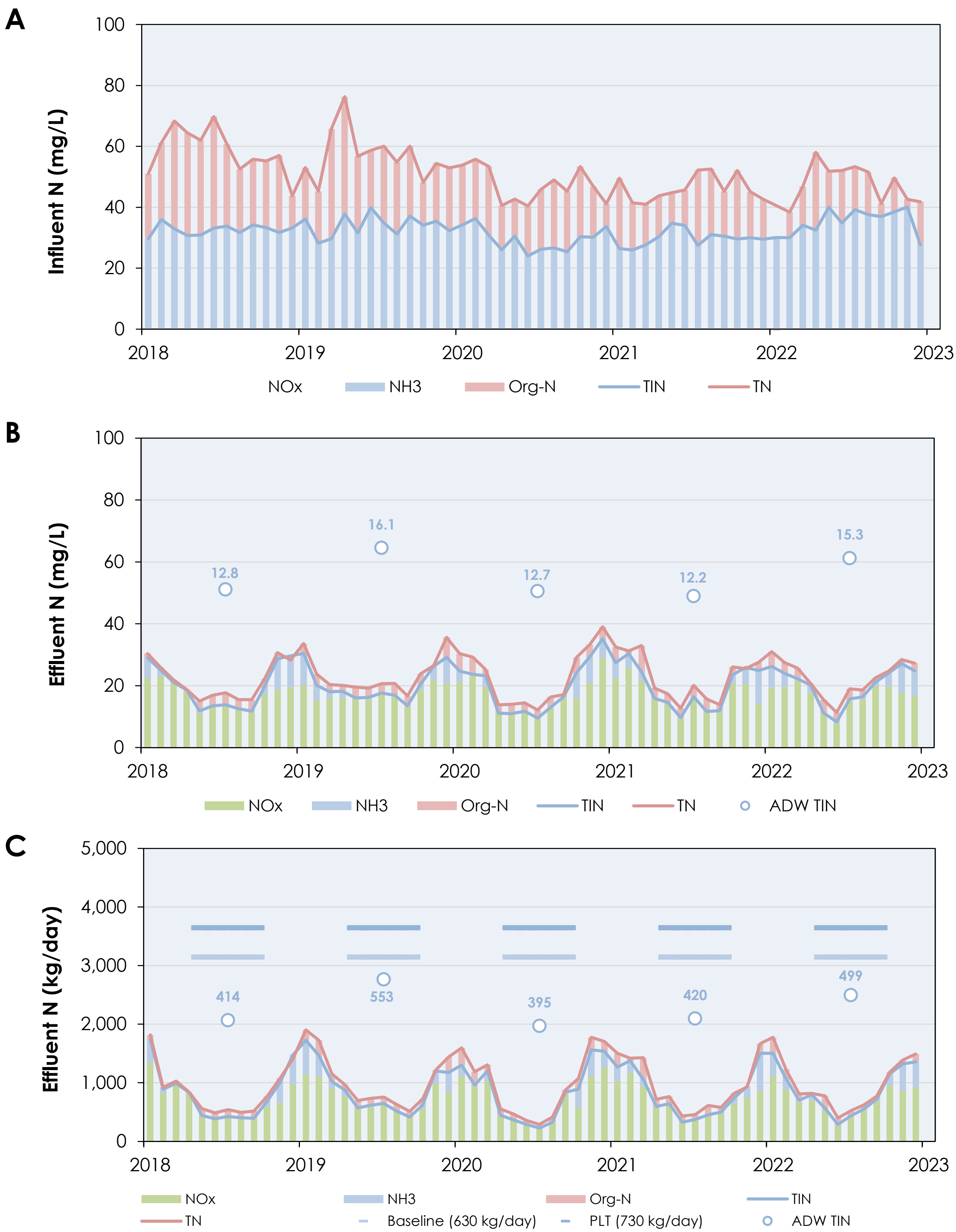


Figure 19: Nitrogen Trends at the WPCP from 2018-2022. A) Monthly Average Influent Nitrogen Concentrations. B) Speciated Monthly Average Effluent Nitrogen Concentrations and C) Effluent Nitrogen Loading Rates

Monthly average effluent TIN and TN concentrations are separated into the dominant forms of nitrogen (NOx, NH3, and Org-N) in **Figure 19B.** The seasonal influence on nitrification at the WPCP becomes more apparent at this scale, with influent ammonia concentrations converting to NOx in the warmer dry weather months under more kinetically favorable biological conditions and then remaining more dominant in the colder wet weather months. Denitrification is also apparent in the dry weather months, as decreases in ammonia are not fully offset by increases in NOx, thereby driving down TIN concentrations. Though not shown graphically in this report, process data indicate that the majority of denitrification occurs in the Oxidation Ponds during the dry weather months and to a lesser degree in the DMFs, where anoxic conditions required for denitrification can develop. The FGRs and DAFTs promote aerobic conditions through mechanical turbulence and the introduction of dissolved air, which favor nitrification rather than denitrification. Effluent TIN concentrations during the 2022 reporting period were relatively consistent with previous years, ranging from 8.3 to 26.4 mg/L and an annual average of 19.6 mg/L. Average dry weather effluent TIN concentrations averaged 15 mg/L, which is also consistent with previous years and reflects the seasonality of the nitrification/denitrification processes at the WPCP.

Average monthly effluent nitrogen loading rates shown in **Figure 19C** are a product of the seasonal nitrification/denitrification experienced at the WPCP as well as variations in flow rates associated with recycled water production and the Flow Management Strategy. Consequently, the loading rate curve peaks in the wet weather months when demand for recycled water is low and biological activity (nitrification/denitrification) slows. Higher loading rates are also observed in the wet weather months as effluent flows tend to be higher in order to offset increases operating depth of the Oxidation Ponds resulting from precipitation directly into the Oxidation Ponds and inflow/infiltration contributions to influent flows. Conversely, effluent loads are lowest during the dry weather months when recycled water production and biological activity are high but precipitation and influent flows are low. **Figure 19C** also shows the annual average dry weather (ADW) effluent TIN load in relation to the current performance (baseline) as well as the PLT. The calculated effluent ADW loads during the 2022 reporting period remained below the PLT at 499 kg/day. Reductions in influent ammonia that would otherwise drive down effluent TIN concentrations are offset by the production of NOx as a result of nitrification in the Oxidation Ponds and FGRs. ADW TIN removal efficiency, on the other hand, remained relatively high around 59%.

Phosphorous

Average monthly influent and effluent total phosphorous (TP) concentrations are shown in **Figure 20A**. The WPCP began voluntarily analyzing for influent TP during 2015 to complement the monitoring requirements in the previous Nutrient Watershed Permit, RWQCB Order No. R2-2014-0014 and support nutrient discussions with a more complete dataset. Since then, influent TP monitoring requirements have been incorporated into the current Nutrient Watershed Permit,

Total Phosphorous

Annual Average Effluent	4.9 mg/L
Annual Average Effluent Load	204 kg/day
% Removal	23%

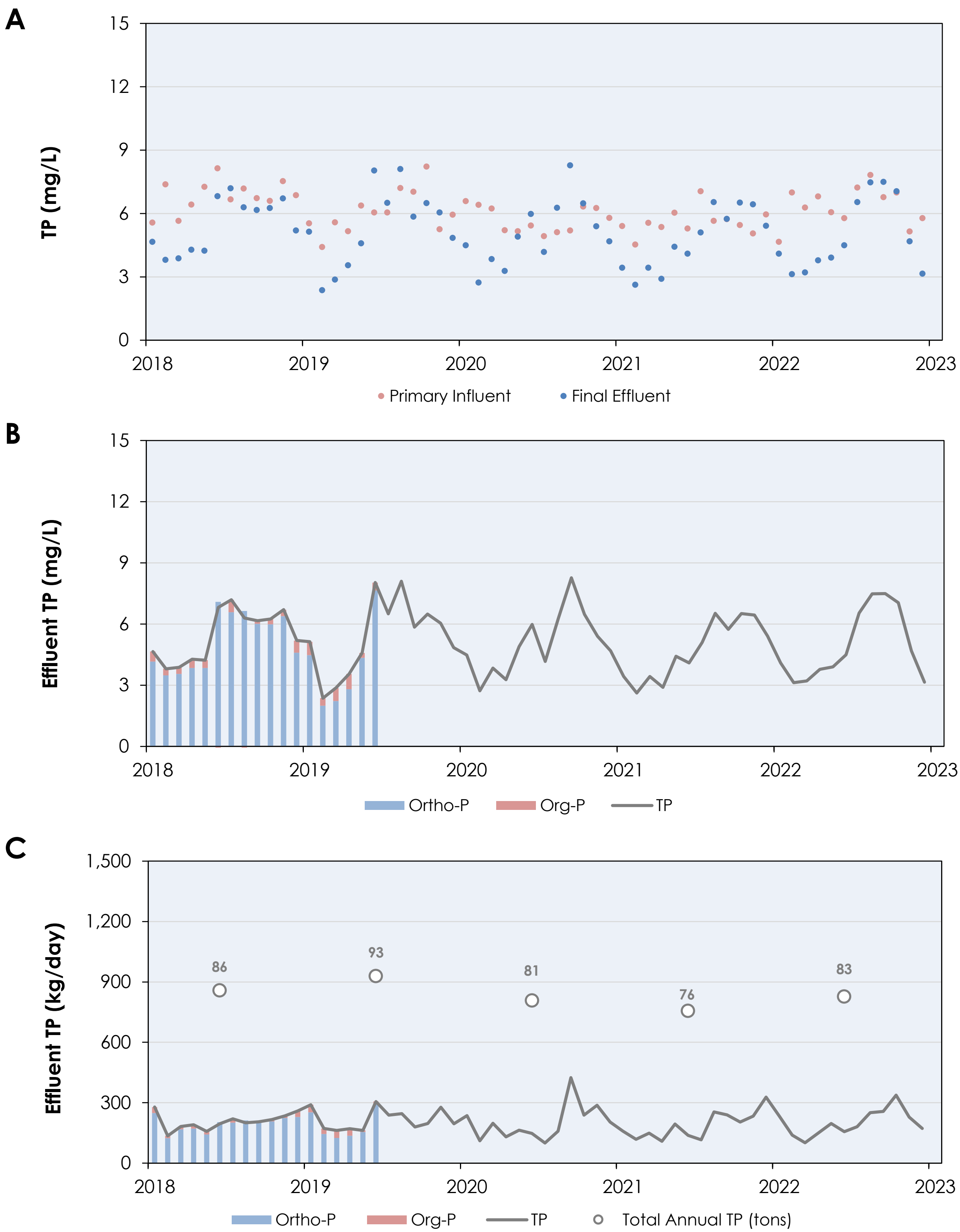


Figure 20: Phosphorous Trends at the WPCP from 2018-2022. A) Monthly Average Influent and Effluent TP Concentrations. B) Speciated Monthly Average Effluent Phosphorous Concentrations and C) Loading Rates with Annual Total TP Loads

TP is less influenced by seasonal variation as compared to nitrogen. Influent TP data indicate relatively consistent concentrations ranging from 4.7 to 7.8 mg/L and averaging 6.4 mg/L.

As shown in **Figure 20B**, average monthly effluent TP concentrations ranged from 3.1 to 7.5 mg/L with an annual average of 4.9 mg/L. Effluent TP concentrations have been separated into the dominant forms of orthophosphate (Ortho-P) and organic phosphorous (Org-P). Ortho-P, also known as dissolved reactive phosphorous, represents the form of phosphorous that is readily available for biological growth and comprises the largest fraction of effluent TP. Analysis of the various forms of phosphorus began in 2013 and ended in July 2019 when RWQCB Order No. R2-2019-0017 became effective and shifted the focus solely to TP. During the 2022 reporting period, effluent TP concentrations peaked in warmer months and were complimented by lower concentrations during the colder months. Effluent TP concentrations trended closely with influent concentrations and were only slightly lower on average. The approximate 23% difference between influent and effluent levels is consistent with previous years and reflective of incidental removal of phosphorus at various stages throughout the treatment process.

Average and total annual phosphorous loading rates are shown in **Figure 20C**. Overall, average TP loading rates have remained relatively consistent around 204 kg/day with approximately 72 tons of TP being discharged during the 2022 reporting period. Unlike TIN, there were no PLTs established for phosphorous loads in the current Order.

1.6. Solids Management

Biosolids produced at the WPCP undergo a series of analytical tests prior to being hauled off-site to ensure compliance with regulations set forth in 40 CFR Part 503. Biosolids are typically disposed of through a combination of land application, which includes agricultural application and compost, and surface disposal in a landfill. The location of the disposal site varies depending on availability and the composition of the solids. In a typical year, the majority of biosolids produced at the WPCP are land applied to agricultural fields, with a much smaller portion being sent to landfill disposal or for further treatment off-site in order to meet Class A requirements for resale as compost. The City also has the option of disposing of biosolids through surface disposal in the Sunnyvale Biosolids Monofill (SBM). Historically, the SBM has been used for surface disposal of biosolids produced when an anaerobic digester is cleaned-out, though it has other approved uses not limited to this biosolids stream. The frequency at which a digester is cleaned-out can vary depending on the feed rate and composition of the raw sludge and scum, but on average occurs every 3 to 4 years.

Solids

Disposal Type	Tonnage (Dry Tons)
Land Application	2,068
Annual Total	*2,068*

During the 2022 reporting period, the WPCP disposed of 2,068 dry tons of biosolids (**Figure 21**). The total solids disposed were slightly lower than in previous years as Synagro did not restart pond dredging in the second-half of the year. Of the total, 1,850 dry tons were dredged from the Oxidation Ponds and 218 dry tons were removed from the anaerobic digesters. For additional information on biosolids management at the WPCP, refer to the *Biosolids Management Annual Report* for 2022, scheduled for submittal by February 19, 2023, per Provision VI.C.4.b of NPDES Order No. R2-2020-0002.

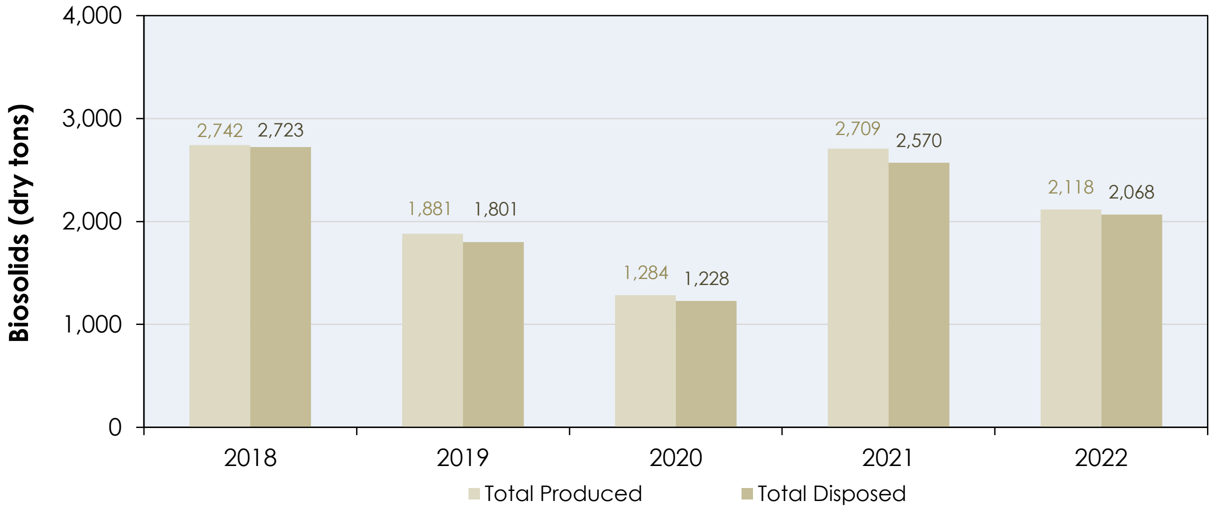


Figure 21: Biosolids generation and disposal trends from 2018 to 2022

1.7. Recycled Water

Recycled Water

Flow Type	Volume (MG)
Recycled Water Produced *WPCP*	40
Potable Water Added *WPCP*	10
Potable Water Added *San Lucar Facility*	287
Total Delivered	*337*

During the 2022 reporting period, the WPCP produced a total of 40 MG of recycled water and delivered 337 MG to the recycled water system (**Figure 22**). The difference represents potable water additions made at the WPCP or the off-site San Lucar Facility to satisfy total system demand. In 2022, recycled water production at the WPCP was lower than previous years due to treatment challenges related to algae populations discussed further in **Chapter II, Section 1.3**. and the completion of emergency repairs related to the unexpected failure of the Secondary Effluent Pipeline (**Chapter II, Section 2.3**). However, overall demand for recycled water, as reflected in the data for total recycled water system deliveries, was relatively consistent with previous years despite the ongoing COVID-19 pandemic and the reductions in the daily workforce influx to the City. For additional information on recycled water production at the WPCP, refer to the *Recycled Water Annual Report* for 2022, scheduled for submittal to the RWQCB by March 15, 2023, as well as submittal on the State Water Board's GeoTracker system by April 30, 2023, per the requirement of Sections VIII and IX.D. of Attachment E of the current NPDES permit.

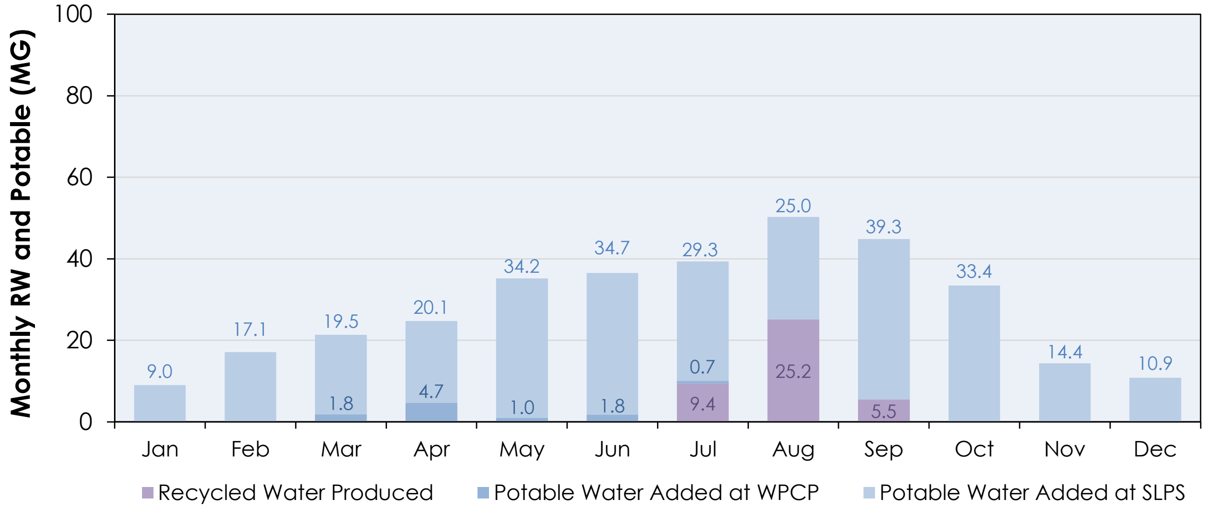


Figure 22: Recycled water production and distribution in 2022. The difference between produced and delivered represents potable water added at either the WPCP or SLPS.

1.8. Plant Performance Summary

The WPCP maintained a high level of performance and pollutant removal efficiency during the 2022 reporting period. Influent pollutant data collected during 2022 exhibited much less variability than in previous years, suggesting a high level of accuracy and confirming the success of new preventative maintenance measures placed on the composite sampler in 2019. Pollutant trends generally followed the same patterns and were strongly correlated with the various restrictions due to the ongoing COVID-19 pandemic that likely dampened Sunnyvale's typical large net influx of daytime workforce. Influent flow rates remained relatively consistent throughout 2022 and with previous years despite changes to commuter patterns and local business operations brought about by the COVID pandemic. Overall, effluent loads also remained relatively consistent with previous years due primarily to the decoupling effect of the long detention time created by the Oxidation Ponds and the associated Flow Management Strategy. Despite the challenges presented by the novel algae species, the WPCP managed to adapt and adjust its process control strategies such that compliance with TSS and turbidity limits as well as all other effluent limits were maintained for the majority of 2022.

2.0. PERMIT COMPLIANCE

All required monitoring data were reported electronically to CIWQS via monthly SMRs. Per Attachment G, Provision V.C.1.h.3 of the current NPDES permit, such reporting removes the requirement to present data in this report. The City has opted to provide a tabulation and graphical summary of CIWQS data.

2.1. Effluent Limitations

During 2022, the WPCP maintained a high degree of performance despite challenges meeting TSS and turbidity compliance between March and May as shown in **Table 1.** All other parameters remained below compliance limits. The leading cause for the exceedances of the TSS and turbidity limits is the continued dominance of *Synechocystis sp.* in the Oxidation Ponds, which is out-competing other species.

Table 1: Effluent Monitoring Summary and Compliance with Discharge Limits in 2022

Parameter Class	Parameter	Parameter Limit Type	Parameter Limit	2022 Final Effluent			Number of Samples[1] / Exceedance
				Min	Avg	Max	
Standard	cBOD	MDEL (mg/L)	20	<2.0	5.6	9.9	94 / 0
		AMEL (mg/L)	10	2.2	3.7	6.0	12 / 0
		Percent Removal (%)	85	97	98	99	12 / 0
	TSS	MDEL (mg/L)	30	4.2	14.7	33	74 / 1
		AMEL (mg/L)	20	6.6	13.7	18.7	12 / 0
		Percent Removal (%)	85	92	95	97	12 / 0
	Ammonia (as N)	MDEL [Oct-May] (mg/L)	26	0.1	5.2	11.8	33 / 0
		AMEL [Oct-May] (mg/L)	18	0.4	4.6	9.4	8 / 0
		MDEL [Jun-Sept] (mg/L)	5.0	0.2	0.8	2.0	18 / 0
		AMEL [Jun-Sept] (mg/L)	2.0	0.4	0.8	1.4	4 / 0
	Oil & Grease	MDEL (mg/L)	10	<1.5	<1.5	<1.5	4 / 0
		AMEL (mg/L)	5.0	<1.5	<1.5	<1.5	4 / 0
	Turbidity[3]	IMEL [Oct-May] (NTU)	10 (TSS ≥20 mg/L)	4.5	12.3	17.7	40 / 4
		IMEL [Jun-Sep] (NTU)	10	3.9	6.9	9.1	21 / 0
	pH[1]	Max / Min	8.5 / 6.5	6.6	7.2	7.6	349 / 0
	Cl_2 Residual[1]	IMEL (mg/L)	0.0	0.0	0.0	0.0	349 / 0
	Enterococci	90th percentile (month) [MPN/100 mL]	110	<1.0	4.8	9.8	12 / 0
		6-wk Rolling GeoMean (MPN/100mL)	30	1.1	1.8	3.2	365 / 0
Toxicity	Acute Toxicity	90th% (% Survival)	70	100	100	100	4 / 0
		Moving Median (% Survival)	90	100	100	100	4 / 0
Organics	Cyanide	MDEL (ug/L)	17	1.1J	1.5J	2.4J	12 / 0
		AMEL (ug/L)	7.0	1.1J	1.5J	2.4J	12 / 0
	Dioxin TEQ[2]	AMEL (ug/L)	1.4×10^{-8}	ND	ND	ND	1 / 0
		MDEL (ug/L)	2.8×10^{-8}	ND	ND	ND	1 / 0
Metals	Copper	MDEL (ug/L)	19	0.7	1.9	5.4	12 / 0
		AMEL (ug/L)	10	0.7	1.9	5.4	12 / 0
	Mercury	AMEL (ug/L)	0.025	0.0003	0.0006	0.0009	6 / 0
		AAEL (kg/yr)	0.120	---	---	0.008	1 / 0
	Nickel	MDEL (ug/L)	33	2.0	2.6	3.5	12 / 0
		AMEL (ug/L)	24	2.0	2.6	3.5	12 / 0

Notes:
1: Sample collection required only during active discharge – sample count below 365 indicates periods of zero discharge to San Francisco Bay.
2: Sampling conducted for Dioxin TEQ once every permit cycle (RWQCB Order R2-2021-0028). Sample collected in March 2022. ND (non-detect) indicates that no dioxin congeners were detected above respective MDLs.
3: The limit for turbidity is not applied during June 1 through September 30 if concurrent effluent TSS concentrations are less than 20 mg/L.
AAEL: Average annual effluent limit; AMEL: Average monthly effluent limit; AWEL: Average weekly effluent limit; IMEL: Instantaneous maximum effluent limit; MDEL: Maximum daily effluent limit.
J: Analyte detected, but not quantifiable.
<#: Analytical results less than the laboratory detection limit.
---: Indicates that data are not available or applicable.

Turbidity and TSS trends are shown in **Figure 23A**. The current NPDES permit updated how the 10 NTU turbidity limit is applied. The conditional turbidity limit was adopted in recognition that algae generated in the Oxidation ponds as part of the secondary treatment process constitutes a significant portion of residual solids in the final effluent, resulting in an increase in turbidity but not necessarily TSS. The limit is continuously applied during the dry weather season (Jun-Sep) but applied during the wet weather season (Oct-May) only when effluent TSS exceeds 20 mg/L.

Within the pond system, algae generally undergo seasonal shifts that follow ambient weather conditions. Historically, colonial species that are easily harvested in the DAFTs and filtered-out in the DMFs predominate during the dry weather season with more solitary species that challenge removal efficiencies predominating in the wet weather season. This generally results in higher effluent turbidity and TSS during the winter months as compared with the summer months. In 2021 and 2022, these general trends were impacted by the emergence of the picoplankton algae species and contributed to higher effluent turbidity throughout the year as well as exceedances of the turbidity and TSS limits.

Between March and May, effluent turbidity exceeded the conditioned 10 NTU limit when corresponding TSS results were greater than 20 mg/L. Additionally, TSS exceeded the MDEL of 30 mg/L on one occasion in May. Visual observations of the receiving water (Moffett Channel) made immediately after the exceedances identified no indications of an impact on water quality or biota (i.e., fish kill, discoloration, excessive foaming, nuisance odor, etc.), nor did any of the subsequent observations made during the accelerated monitoring periods. The results are summarized in **Table 2**.

During this time, the City met with the RWQCB to discuss the exceedances and the treatment challenges associated with *Synechocystis sp.* Given the potential of the species to produce the cyanotoxin microcystin, the RWQCB requested that the City monitor for the presence of the toxin in the WPCP's final effluent and report the results in the monthly SMRs. The is no water quality based effluent limit or objective for microcystin. At the request of the RWQCB, the City is using 8 ug/L (EPA) as a trigger for notifying the SWRCB and posting advisory signs along the receiving water channel. During the reporting period, microcystin concentrations remained well below the EPA trigger as shown in **Figure 23**.

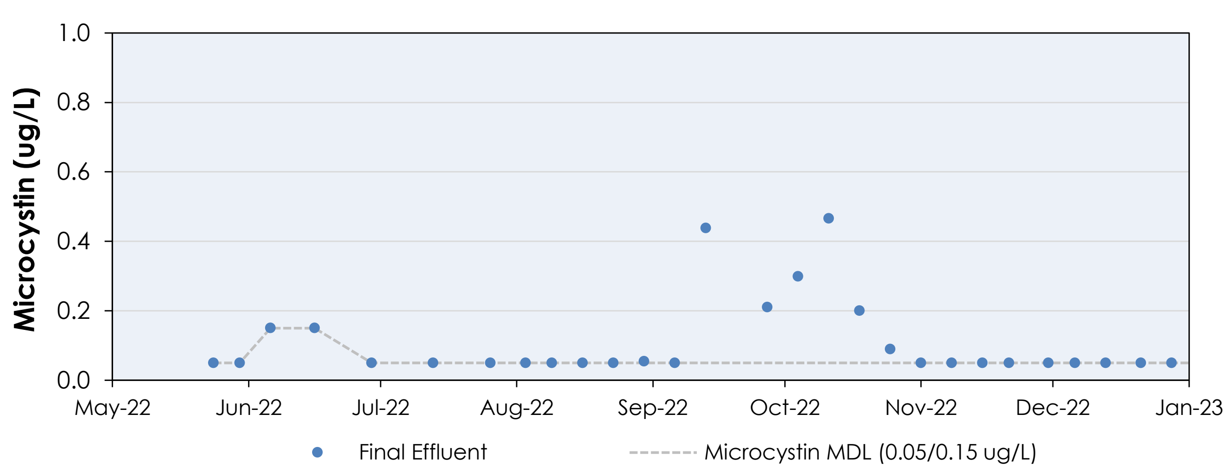


Figure 23: Microcystin results in final effluent monitoring during 2022

Table 2: Effluent TSS and turbidity results from March to May 2022

Sample Date[1]	TSS (mg/L)	Monthly Average TSS (mg/L)	Turbidity[2] (NTU)	Comments
3/1/22 – 3/2/22	16.0	16.0	14.0	
3/6/22 – 3/7/22	16.3	16.2	---	
3/10/22 – 3/11/22	16.1	16.1	13.5	
3/22/22 – 3/23/22	9.3	14.4	4.5	
3/27/22 – 3/28/22	19.0	15.3	---	
3/29/22 – 3/30/22	**20.9**	16.3	**14.8**	Exceedance of turbidity limit
3/31/22 – 4/1/22	17.9	16.5	13.2	Accelerated monitoring for turbidity exceedance
4/1/22 – 4/2/22	15.5	15.5	12.9	Compliance with turbidity limit achieved
4/7/22 – 4/8/22	16.7	16.1	8.9	
4/10/22 – 4/11/22	18.5	16.9	---	
4/12/22 – 4/13/22	17.8	17.1	15.0	
4/17/22 – 4/18/22	15.5	16.8	---	
4/19/22 – 4/20/22	17.6	16.9	11.2	
4/28/22 – 4/29/22	**21.4**	17.6	**11.9**	Exceedance of turbidity limit
5/1/22 – 5/2/22	19.6	19.6	11.8	Accelerated monitoring for turbidity exceedance
5/2/22 – 5/3/22	11.4	15.5	6.7	Compliance with turbidity limit achieved
5/12/22 – 5/13/22	**33.0**	**21.3**	**16.7**	Exceedance of TSS MDEL/AMEL & turbidity limit
5/14/22 – 5/15/22	**24.3**	**22.1**	**17.6**	Accelerated monitoring for TSS MDEL/AMEL & turbidity exceedances; exceedance of turbidity limit
5/15/22 – 5/16/22	19.3	21.5	16.3	Accelerated monitoring for TSS MDEL/AMEL & turbidity exceedances
5/16/22 – 5/17/22	18.8	21.1	17.1	Accelerated monitoring for TSS AMEL & turbidity; Compliance with TSS MDEL and turbidity achieved
5/17/22 – 5/18/22	16.9	20.5	---	Accelerated monitoring for TSS AMEL exceedance
5/18/22 – 5/19/22	15.2	19.8	---	Compliance with TSS AMEL achieved
MDEL[2]	***30***	***---***	***10***	
AMEL	***---***	***20***	***---***	

Notes:

1: TSS samples are typically collected twice-per-week and turbidity samples once-per-week. This explains why some TSS results do not have associated turbidity results. The minimum required frequency is once-per-week. All TSS results to date for May have been included in this table to illustrate compliance with the AMEL.

2. Turbidity instant maximum limit listed as MDEL for compliance evaluation purposes. A turbidity limit of 10 NTU is only applied when TSS is greater than 20 mg/L during the wet weather season (Oct 1 – May 31).

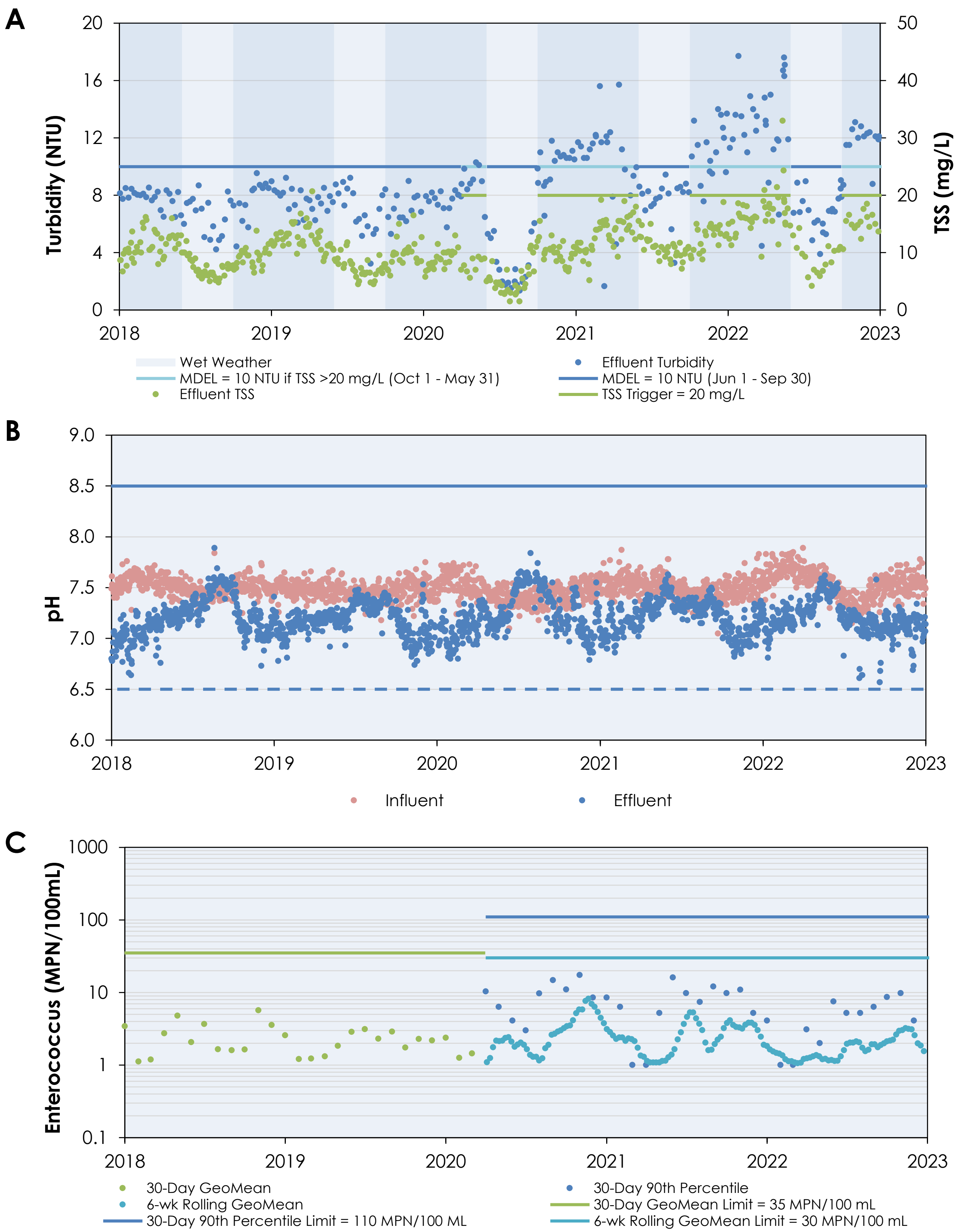


Figure 24: Turbidity, pH, and enterococcus trends from 2018-2022

Consistent with Provision I.H of Attachment D, the unexplained emergence and persistence of this novel class of algae represent an *Upset* in the form of unintentional and temporary noncompliance with the technology-based turbidity limit because of factors beyond the WPCP's reasonable control. Leading up to the emergence of this novel algae class, the WPCP did not identify significant changes made to operational strategies, unit treatment processes, or the preventative maintenance program that correlate with this incident. Since then, process adjustments have been and will continue to be made in a good faith effort in pursuit of compliance with discharge limits.

The WPCP initiated several projects to mitigate process and compliance impacts. These projects included a chemical trial and competitive bidding process that successfully identified a more effective coagulant/flocculant product, construction of an Alum Tank System to allow for feeding alum into the DAFT influent stream to assist in the coagulation of algae and extension of filter runtimes, and physical modifications to a pair of DAFTs to provide the flexibility for in-series treatment as an alternative to the normal parallel operation of the system. Each of these projects are described in more detail in **Chapter III, Section 3.1.1**. Pilot projects are also planned for 2023 to determine whether it is possible to biologically catalyze a shift in the algal community to a more favorable assemblage of species that are easier to treat and similar to historical populations. Construction of the CAS-1 system, which is scheduled to begin in 2023, will greatly improve the effluent water quality and mitigate these process and compliance impacts to a large extent. While the system will operate in parallel with the existing secondary treatment system (Oxidation Ponds, FGRs, DAFTs) under a split-flow regime until 2035, the majority of flow will be treated by the CAS-1 system and result in lower TSS and turbidity in the blended effluent. CAS-1 is currently scheduled to be operational by the end of 2027.

Influent and effluent pH trends are shown in **Figure 23B**. Influent pH tends to vary less than effluent pH with no consistent seasonal variation. However, signs of seasonal variability were observed during 2022 with higher pH in the winter months and lower pH during the summer. One possible explanation is higher rates of organic decomposition and the formation of sulfuric acid in the collection system during periods of higher temperatures and lower flows associated with drought conditions. Though not shown graphically, a similar pattern was observed in 2014 and 2015 during drought conditions. Seasonal variation is more apparent with effluent pH and driven by pond system dynamics and the tertiary disinfection process. Effluent pH approached the lower limit of 6.5 on a few occasions during the 2022 reporting period. These swings were driven by the Chemical Procurement Project, which systematically tested the efficacy of various organic and inorganic polymers and coagulants in the DAFTs in response to the ongoing process challenges brought about by *Synechocystis sp.*

Effluent enterococcus trends are shown in **Figure 23C**. Enterococcus limits changed from a 30-day geomean limit of 35 MPN/100 mL with the reissuance of the NPDES permit in April 2020. While the required sampling frequency remains the same (5 samples per week), compliance is now evaluated against a 30-day 90th percentile limit of 110 MPN/100 mL and a 6-week rolling geometric mean limit of 30 MPN/100 mL evaluated weekly. Compliance was maintained during the 2022 reporting period. Occasional spikes in the daily samples contributed to the higher calculated values observed and are typically associated with regrowth in the flow-through sampling system rather than effluent water quality. The WPCP implements a rigorous cleaning protocol to mitigate regrowth and anomalous data.

2.1.1. Priority Pollutants

Section VI.C of the current NPDES permit Fact Sheet establishes priority pollutant monitoring requirements and frequencies. The *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges* (Order No. R2-2021-0028) continued the monitoring frequency to once-per-permit set in the previous Order in exchange for diverting the analytical costs to the Regional Monitoring Program. The City performed priority pollutant monitoring in March 2022. The results from this monitoring effort are presented in **Attachment C** for comparison with the results from the 2014 and 2015 monitoring events. The majority of the results were not-detected and the remainder were below WQOs.

Figure through **Figure 27** show influent and effluent concentrations for metals and organic compounds that are included in Table B of Attachment G and their corresponding effluent limits (MDEL, AMEL) and water quality objectives (WQOs). Provision VI.C.2.a requires an annual evaluation of effluent characteristics to identify any significant increases in pollutant concentrations over past performance that would invalidate the conclusions of the current Order's reasonable potential analysis and cause or contribute to an exceedance of WQOs. During the 2022 reporting period, effluent from the WPCP was compliant will these limitations and remained below WQOs.

2.1.2. Chronic Toxicity Effluent Triggers

The required frequency of chronic toxicity testing changed from monthly to quarterly under the reissued NPDES permit beginning April 1, 2020. *Thalassiosira pseudonana*, a marine alga (diatom) was selected as the most sensitive species based on a chronic toxicity screening testing conducted during the 2014 permit renewal process (**Figure 28**). The chronic toxicity test is conducted by Pacific Ecorisk Laboratory (PERL) and is performed over four days with growth measured as the endpoint.

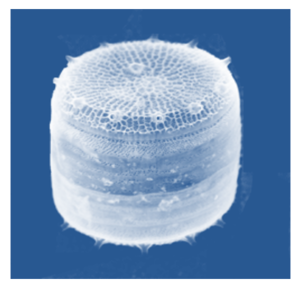


Figure 25: ***Thalassiosira pseudonana***

The City developed a Generic TRE Workplan, which includes a six-tiered approach for evaluating and responding to chronic toxicity events. The basic approach is to start at Tier 1 (accelerated monitoring) and Tier 2 (review of available effluent data, examination of operational practices and process chemical use) to identify potential causes or sources of toxicity before moving on to more complex and costly laboratory investigations or potential operational or physical modifications. The workplan further requires the implementation of a Toxicity Identification Evaluation (TIE) upon exceedance of a trigger value of 1.25 toxicity units (TUc) based on EC_{50} or IC_{50} values. Provision V.B.3.b. in Attachment E of the current NPDES permit contains effluent triggers if the single test maximum exceeds 2.0 TUc or the three-sample median exceeds 1.0 TUc based on the IC_{25}[2]. If either condition is triggered, the City must implement an accelerated monitoring schedule for chronic toxicity testing of once-per-month and submit an event-specific Toxicity Reduction Evaluation (TRE) Workplan to the RWQCB within 30 days of detecting toxicity.

[2] IC_{25} is the statistical calculation of the effluent concentration which causes a 25% reduction in growth or reproduction of test organisms.

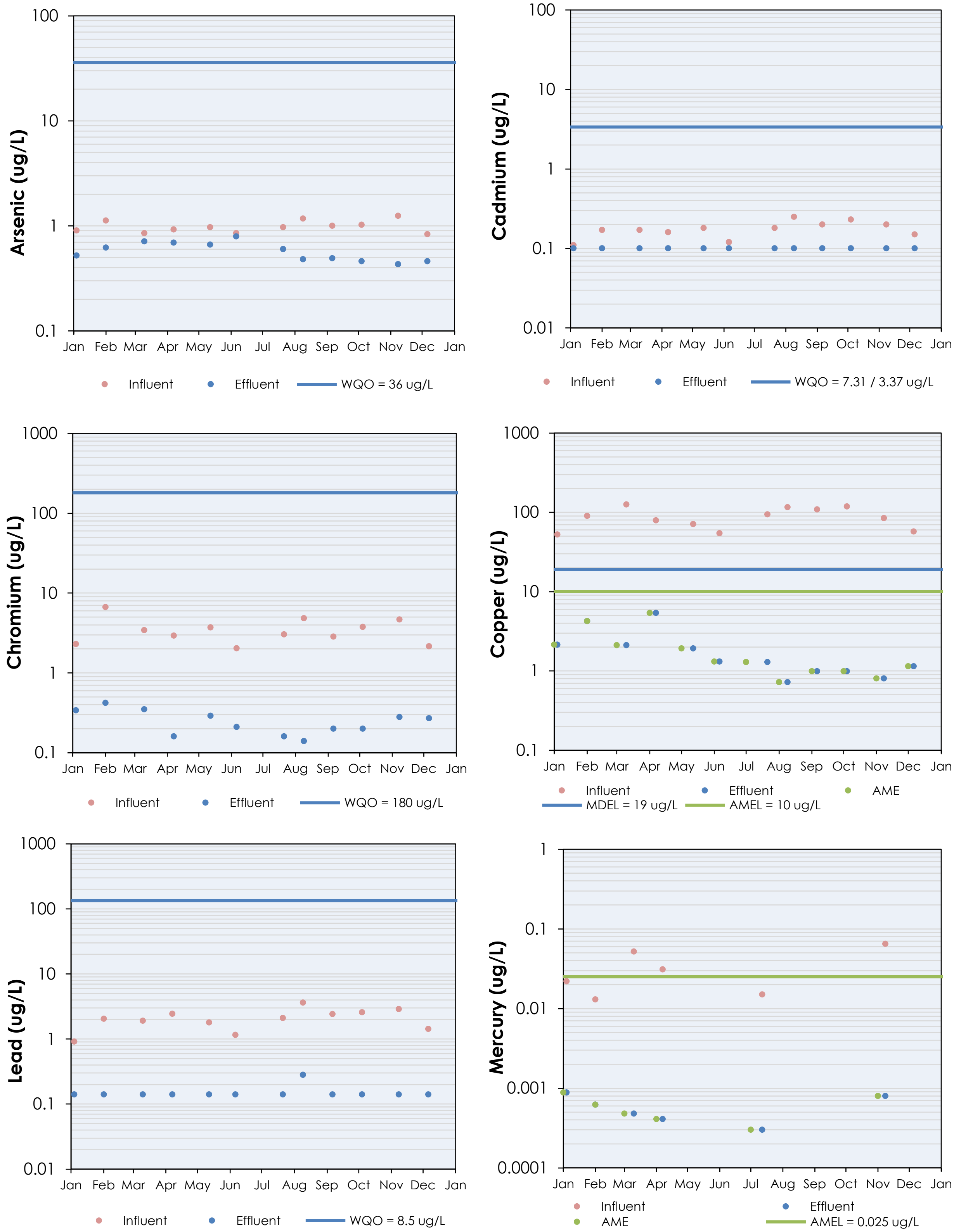


Figure 26: Select Metal Pollutants measured during 2022

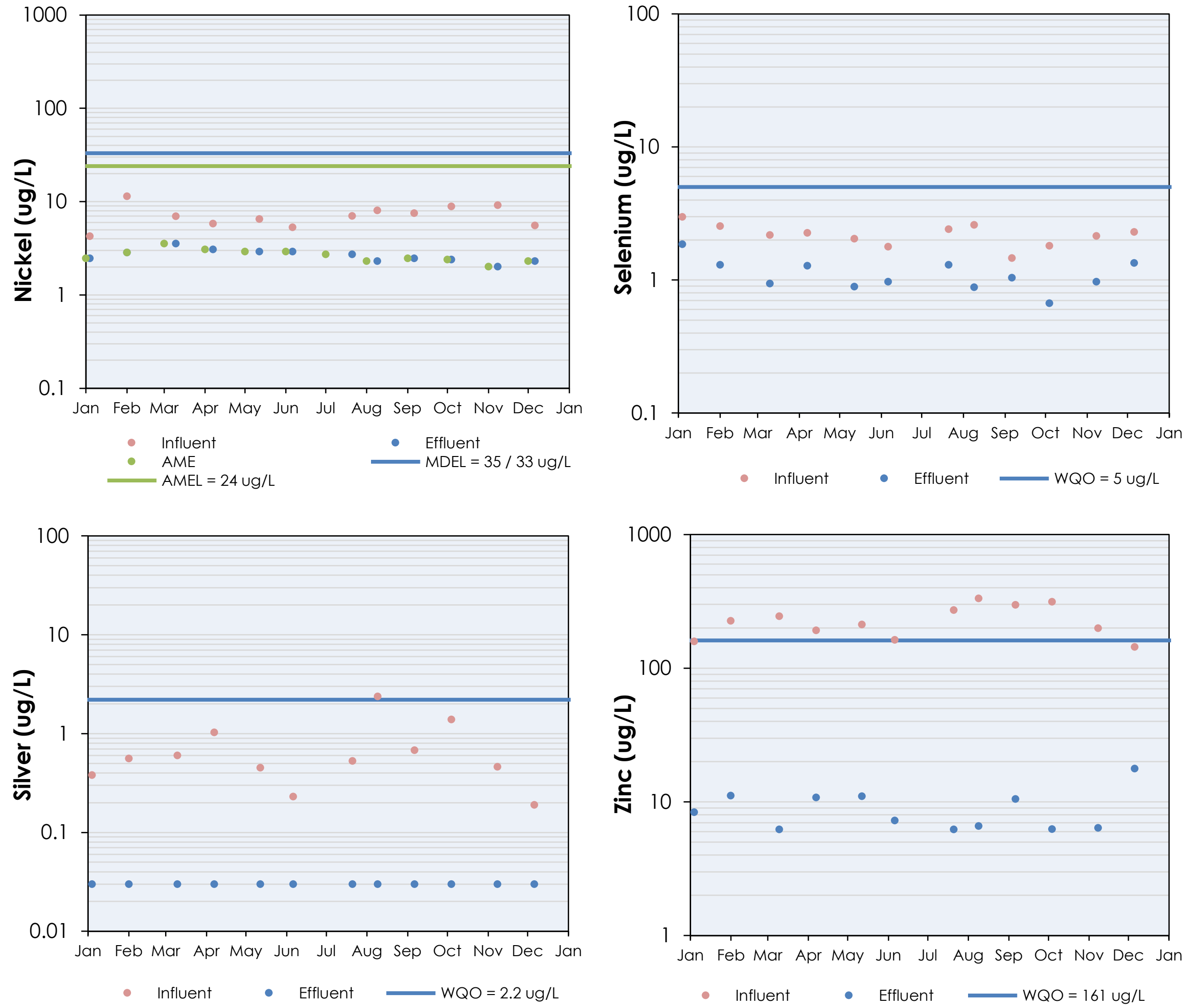


Figure 27: Select Metal Pollutants measured during 2022. Total Chromium WQO is for Chromium (III)

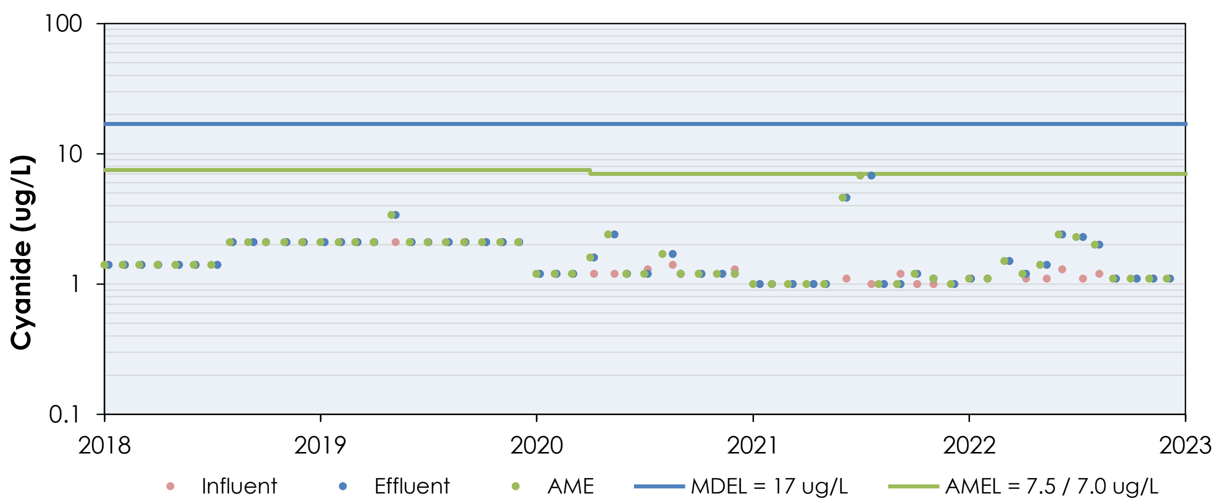


Figure 28: Cyanide trends from 2018 to 2022

As shown in **Table 3,** the single sample maximum of 2.0 TUc and three-sample median of 1.0 TUc were not exceeded in any given quarter during the 2022 reporting period. Toxicity was detected at very low levels during the month of August at 1.1 TUc which did not exceed the permit triggers. The subsequent test conducted in November did not detect toxicity, maintaining the 3-sample median below 1.0 TUC.

Table 3: Summary of Chronic Toxicity Testing Results for WPCP Effluent during 2022

Test #	Sample Date	Growth TU_c	3-Sample Median (Growth TU_c)
1	2/16/2022	<1.0	<1.0
2	5/9/2022	<1.0	<1.0
3	8/11/2022	1.1	<1.0
4	11/10/2022	<1.0	<1.0

2.1.3. *Effluent Residual Chlorine*

There were no "on-the-hour" residual chlorine excursions of the IMEL during the 2022 reporting period.

2.1.4. *Mercury Effluent Limitations and Trigger*

The WPCP continues to be an active member of BACWA and participates in the annual submittal of water quality data pertaining to mercury discharge. During the reporting period, the monitoring frequency for mercury changed from monthly to quarterly in accordance with the *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges*, (Order No. R2-2021-0028) as depicted in **Figure** . Effluent mercury concentrations in **Figure A** remained below the average monthly trigger (0.011 ug/L) and limit (0.025 ug/L) and were significantly lower than influent concentrations. Similarly, the cumulative annual effluent mercury load of 0.008 kg/yr in **Figure B** is well below the permit limit of 0.12 kg/yr and significantly lower than influent loads. Overall, influent and effluent mercury concentrations and loads have been trending downward over the last 5-years.

2.1.5. *PCB Effluent Limitations*

In accordance with the Mercury and PCBs Watershed Permit, the WPCP is also required to measure and report total PCBs as congeners semi-annually using EPA Proposed Method 1668c. Results from this method are provided to the RWQCB for informational purposes and are used to verify assumptions and evaluate the need to refine wasteload allocations. The requirement for monitoring of PCBs as Aroclors for compliance with effluent limitations is set to once per permit cycle by the *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges* (Order No. R2-2021-0028). PCBs as Aroclor data were submitted in March 2022 to satisfy the once-per-permit-cycle requirement. The results from this monitoring effort are presented in **Attachment C** for comparison with the results from the 2014 and 2015 monitoring events. PCB's continue to be below detection limits.

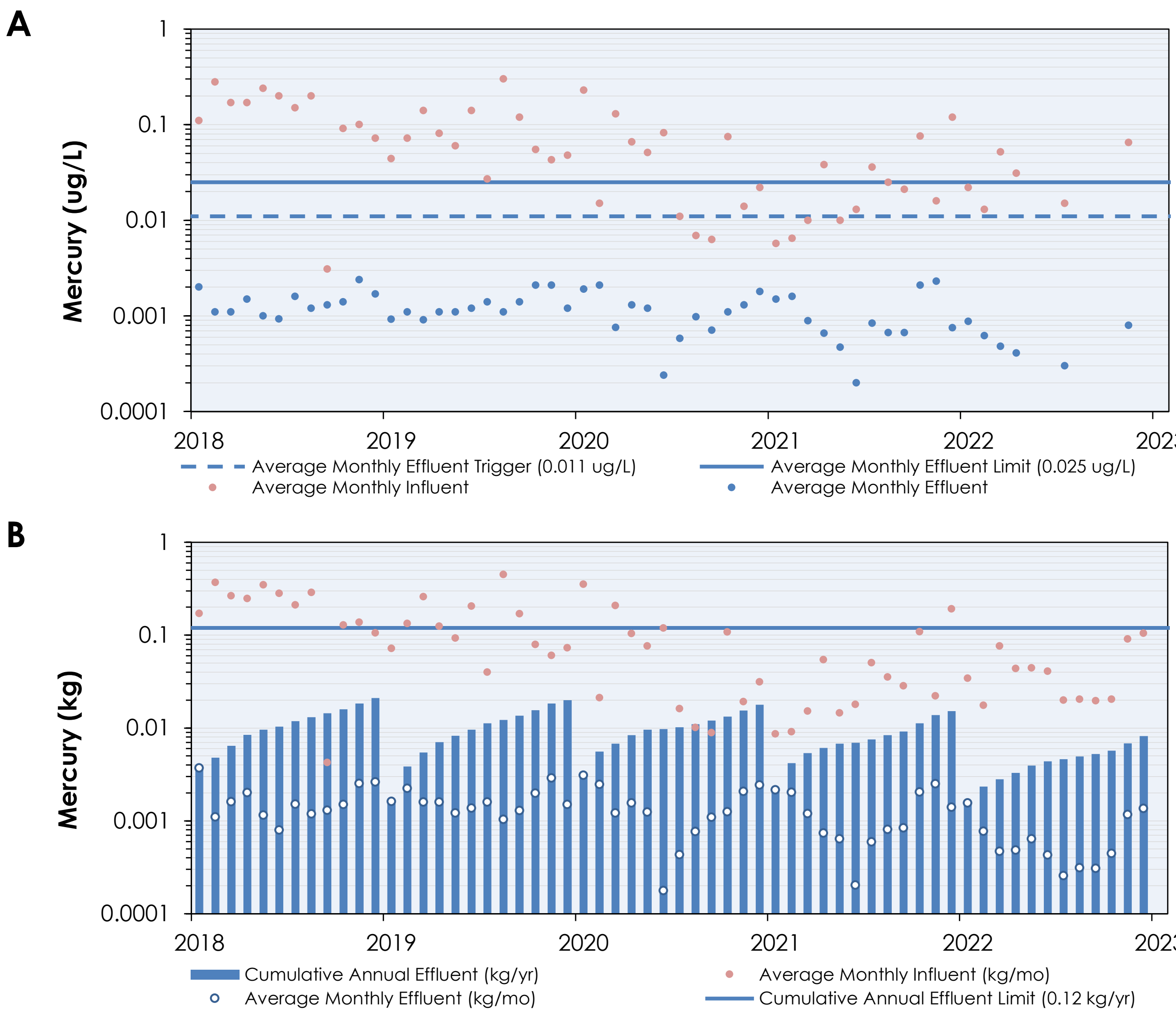


Figure 29: Influent and Effluent Mercury A) Concentration and B) Loading Rate Trends from 2018 to 2022

2.2. Unauthorized Discharge

California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system. Per Section V.E.2 of Attachment G, the WPCP is required to notify various agencies in the event of an unauthorized wastewater treatment plant discharge.

During routine observations of the WPCP's Oxidation Ponds conducted on May 7, 2022, Operations staff observed what appeared to be seepage from the large pond (Pond 2) into an isolated U.S. Fish and Wildlife Service (USFWS) pond formerly used as an evaporative salt pond by Cargill, Inc. The operating level in WPCP Pond 2 was approximately 4.7 feet, which is higher than typical and the result of the aforementioned flow constraints. Sunnyvale speculates that the seepage is partially related to the water surface elevation (operating level) within the Oxidation Ponds. When the operating level was returned to its typical range of 3.5-4.0 feet, and with repairs made to levee segments showing signs of burrowing or undermining and subsidence, the seepage appeared to stop.

This incident is related to the process impacts brought about by *Synechocystis sp.* and the resultant effluent flow restrictions. Due to the size (<2 um) and solitary nature of this species, coupled with a significant drop in performance of the incumbent polymer, a large fraction of the total mass of phytoplankton was not being removed by the DAFTs despite adjustments in chemical dosing rates. This in turn resulted in higher solids loading rates on the DMFs, necessitating more frequent and prolonged backwash cycles. During backwash cycles, final effluent flow is temporarily halted and backwash water is returned to the Oxidation Ponds, thereby reducing the total daily volume that can be treated and discharged. Ultimately, the accumulation of influent and return flows within the Oxidation Ponds, coupled with lower total effluent flows, were the primary contributing factors to the high operating level and unauthorized discharge.

The WPCP is in the process of developing a scope for a thorough geotechnical assessment of the levee system and prescribed needed repairs to prevent a similar future occurrence.

2.3. Secondary Effluent Pipeline Rupture

On July 30, 2020, the City confirmed that a rupture in the Secondary Effluent Pipeline resulted in the unauthorized discharge of approximately 293,000 gallons of substantially treated secondary effluent into a U.S. Fish and Wildlife conveyance channel (FWS Channel). In response, Sunnyvale constructed an intermediate solution under emergency authorizations from various regulatory agencies that was completed in April 2021. The intermediate solution consists of dual 24-inch HDPE pipelines across the FWS Channel and a new utility bridge across Moffett Channel. The intermediate solution is expected to be in place for approximately 2-4 years to provide enough time for Sunnyvale to design, permit, and construct a permanent solution that also fits into planned facility upgrades within the SCWP.

2.3.1. Pipeline Replacement Project Update

During the reporting period, the City decided on a conceptual design for the permanent solution that is incorporated into the *Existing Plant Rehabilitation Project* (**Chapter IV, Section 5.0**). The existing dual 24-inch floating pipelines will be replaced with a single 36-inch pipeline configured in the same orientation as the damaged, inoperable pipeline. Sunnyvale will also be replacing the Pond Return Pipeline, a 48-inch line used for routing return flows to the Oxidation Ponds that is buried in the same trench as the Pond Effluent Pipeline and is of the same vintage (**Figure 30**). This project involves multiple jurisdictions and stakeholders given its location within Cargill Channel and Moffett Channel, both of which are considered Waters of the U.S. During this reporting period, Sunnyvale engaged stakeholders in support of permitting the project and is currently revising application materials based on their feedback. Project design is ongoing. The current construction timeline estimates project completion in early 2025.

Figure 30: Pipeline Replacement Project configurations and alignments

2.3.2. Settlement Agreement Update

In February 2021, the City entered into a Settlement Agreement with the RWQCB (Order No. R2-2021-1002) to resolve the violation alleged due the secondary effluent line break and to address the imposition of financial penalties. As stipulated in the Order, the City paid half of the $187,000 penalty to the State Water Resources Control Board in March 2021 and has allocated the remaining $93,500 to a Supplemental Environmental Project (SEP) for the *Green Stormwater Infrastructure at Wolfe/Stewart Intersection* project. The SEP will integrate green stormwater infrastructure into a planned traffic improvement project to reduce vehicular speed by changing a right-hand-turn slip lane to a traditional intersection right turn. Stormwater runoff from adjacent streets will flow into a landscaped area for treatment prior to discharge into the subsurface storm drain system. The outcome will be approximately 2,000 square feet of treatment area (serving to disconnect approximately 15,000 square feet of impervious area). Quarterly progress reports are required to be reported to the RWQCB through the WPCP's SMRs in accordance with the schedule shown in **Table 4**. The SEP is part of a larger project that is being largely funded by a federal grant. The City rejected all four (4) of the bids it received due in part to the inability of two of the contractors to meet a Disadvantaged Business Enterprise (DBE) participation goal of 21% required by Caltrans and demonstrate that at least 50% of the work would be self-performed. During the review and analysis of the apparent low bids for the project, the bids subsequently expired and could not be guaranteed to be held at the bid amount due to changes in prevailing wages and uncertainty due to the impact of inflation. The City reopened the project to bid at the end of December 2022 and plans to submit a written request to modify the project schedule closer to the bid award, currently projected for the first quarter of 2023.

Table 4: SEP Reports due to RWQCB under Order No. R2-2021-1002

Due Date	Report Description	Status
7/30/21	Quarterly Report 1 – Description of SEP activities from the start of the project through June 2021.	Completed
11/1/21	Quarterly Report 2 – Description of SEP activities during July through September 2021.	Completed
1/31/22	Quarterly Report 3 – Description of SEP activities during October through December 2021, including assessment of Final Design Completion milestone.	Completed
5/2/22	Quarterly Report 4 – Description of SEP activities during January through March 2022, including assessment of Construction Award milestone.	Completed
8/1/22	Quarterly Report 5 – Description of SEP activities during April through June 2022.	Completed
10/31/22	Quarterly Report 6 – Description of SEP activities during July through August 2022.	Completed
1/31/23	Quarterly Report 7 – Description of SEP activities during October through December 2022.	In Progress
5/1/23	Final Completion Report –Description of SEP activities during January through March 2023, including assessment of Construction Completion milestone. Report shall also include a summary of all completed tasks, final project implementation costs, an evaluation of the project's success criteria (amount of impervious surface area treated), photographs documenting the completed project, and a certified statement of SEP completion as required in section III, paragraph 6, of the Stipulated Order approving this project as a SEP.	Pending

2.4. Avian Botulism Control Program

In accordance with Provision VI.C.5.A of the current NPDES permit, Sunnyvale submits an annual *Avian Botulism Control Program Report* by February 28 for the preceding year. The program consists of monitoring for the occurrence of avian botulism and the collection of sick or dead birds and other dead vertebrates found along Guadalupe Slough, Moffett Channel, and the Oxidation Ponds and levees. Controls to limit the outbreak and spread of this disease consist primarily of the collection and proper disposal of sick and dead birds. The San Francisco Bay Bird Observatory was contracted by the City to locate and collect sick birds and dead vertebrates from June through November of 2022 when the potential for outbreak is the highest. WPCP Operations and Laboratory staff also conduct weekly surveys throughout the year around the Oxidation Ponds and collect sick, injured, or dead birds and mammals. No cases of avian botulism were identified during the 2022 reporting period.

2.5. Stormwater Management

All stormwater collected from within the WPCP, as well as from storm inlets on Carl Road just outside WPCP boundaries and the Sunnyvale biosolids monofill, is directed to the Headworks. Therefore, coverage under the statewide permit for discharges of stormwater associated with industrial activities (NPDES General Permit No. CAS000001) is not required.

2.6. Facility Condition Assessment and Ongoing Plant Rehabilitation

Due to the overall age of facilities at the WPCP, critical elements of the existing treatment processes need to be rehabilitated or replaced to maintain their operation until they are fully replaced with the final plant build-out (2035±). The WPCP completed design of the Existing Plant Rehabilitation Project and is currently in procurement efforts. Refer to **Chapter IV, Section 5.0** for additional information on the project.

III. FACILITY REPORTS

1.0. OPERATION AND MAINTENANCE MANUAL

During the 2022 reporting period, the WPCP continued to add content to its electronic O&M Manual (EOMM). The EOMM is hosted by Atlassian Confluence, a cloud-based knowledge management application that seamlessly links to supporting information on the City's SharePoint network or other external web sites. The EOMM is an intuitive, centralized interface that provides easy access to all relevant O&M Materials, including content from the earlier manual, SOPs, record drawings, equipment information and manuals, and permits etc., in an electronic format.

Similar to the previous hard copy manual, the EOMM is organized into sections (pages) that correspond to individual treatment unit processes and plant-wide utilities. There are multiple pages dedicated to Operator trainings and an overview page that provides general information about the WPCP and its programs. The unit process pages share a common template organized by headings that when selected expand to reveal detailed content, including an Introduction (Purpose & Goals and Theory of Operation), Description of Process (including design criteria), Process Control, Operating Procedures, and Other Reference Materials.

EOMM pages for the existing secondary and tertiary processes and plant utilities were originally developed with content from the previous manual, with additional features supported by the Confluence application. However, the previous O&M Manual's headworks, influent pumping, and primary treatment sections have not been incorporated into the EOMM as those facilities were originally scheduled for demolition in 2019. The Headworks and Primary Treatment Facilities Project has experienced unforeseen and significant commissioning delays due to compounding factors that range from acquisition of a new PG&E power connection to faulty equipment that has required replacement and reprogramming. Earlier sections will remain accessible in the previous manual until the new facilities are commissioned, which is currently scheduled for mid-2023. Development of EOMM pages for the new Headworks and Primary Facilities continued in 2022, as well as updating of pages for existing processes. Additional content related to operating procedures for the new facilities will be added to the above pages as those procedures are finalized. The following pages were updated with new or more current information:

- Influent Pumping
- Screenings Facility
- Standby Generator
- Air Flotation Thickening
- Recycled Water Production and SCADA
- Anaerobic Digestion
- WPCP Overview

In addition to the EOMM, the WPCP maintains an Operator in Training (OIT) Manual on a local network drive. This manual includes 32 “Ops Tasks” that address specific tasks in a highly detailed manner. New Operators must demonstrate proficiency in each Ops Task before being allowed to perform the task independently. These Ops Tasks are reviewed annually and updated as needed. No substantial updates were made to the Ops Tasks during the 2022 reporting period.

The WPCP also maintains a series of Standard Operating Procedures (SOPs), which contain detailed instructions for certain operational and administrative tasks not limited to Operations and Maintenance staff. Updating of SOPs is an ongoing process that is tracked by support staff. Updates are made on an as-needed basis, and in general are triggered by changes in protocols and business practices in response to safety concerns, an ever-changing regulatory climate, new equipment, and process changes. Electronic versions of the WPCP SOPs are kept on a local network drive. There were no revisions made to SOPs during the 2022 reporting period.

2.0. PLANT MAINTENANCE PROGRAM

The Plant Maintenance Program utilizes the Infor Enterprise Asset Management System (EAMS). Infor EAMS provides the functions of a computerized maintenance system (CMMS), including work order generation/tracking and other maintenance data management functions, advanced features for asset tracking and life-cycle management, proactive and condition-based maintenance, materials and supplies purchasing, and other features. Maintenance and Operations staff use iPad handheld tablets with the Infor EAM Mobile app to interface with the Asset Management System. The tablets provide a field interface to work orders for corrective maintenance (CM) and preventative maintenance (PM) procedures, equipment information (via a bar-code reader), and expedited data entry for work orders and other maintenance/process control measurements. The tablets continue to be used by the Maintenance staff for on-line trainings and meetings due to the COVID-19 pandemic gathering limitations.

Operations and Maintenance staff continues to review and develop the Preventative Maintenance program to provide improved reporting on asset condition and work history. The WPCP places a strong emphasis on preventative maintenance to achieve high mechanical reliability. Staff members from both Operations and Maintenance sections perform preventative maintenance functions. As shown in **Table 5**, the WPCP maintained a high level of efficiency by completing the vast majority of the work orders issued in 2022.

Table 5: 2022 Work Orders Issued and Completed

Work Order Designation	PM (Maintenance)	CM (Maintenance)	PM (Operations)
Completed	1,126	629	5,189
Released/On Hold/Waiting for Parts	26	65	80
Total Work Orders	1,152	694	5,269
% Completed	97%	90%	99%

During the 2022 reporting period, the Maintenance group generated approximately 1,846 corrective and preventative maintenance related work orders, of which 1,755 were completed in the same year (95%). In addition, the Operations group completed 5,189 PMs of the 5,269 that were generated (99%). The remaining work orders will be carried over into 2023 and completed according to schedule.

The WPCP also uses an on-line system (D-A Lube) for tracking results from laboratory analysis of lubricating oil removed from WPCP equipment under the preventative maintenance program. D-A Lube provides rapid reporting of analytical results, and flags high contaminant levels and other conditions that may indicate mechanical problems (e.g. excessive wear, presence of moisture, etc.).

The more significant maintenance and upgrades to WPCP equipment in 2022 included:

- Major overhaul of the #1 Power Generator Unit
- Top End overhaul of the #2 Power Generation Unit
- Rehabilitation of #4 Digester Mix pump
- Rehabilitation of #4 Digester coatings and Tank Lid seal.
- Rehabilitation #3 Pond Effluent Motor
- Plant transformer PM's
- Vegetation cleanup of the WPCP Oxidation Pond Channel
- Laboratory vacuum pump system replacement
- Alum Tank system installation

3.0. WASTEWATER FACILITIES REVIEW AND EVALUATION

Provision VI.C.4.a requires that the City regularly review and evaluate its wastewater facilities and operational practices to ensure that the wastewater collection, treatment, and disposal facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the City's service responsibilities.

The responsibility to conduct reviews of the WPCP, to develop goals, objectives and priorities, to formulate rules and procedures, and to maintain budgetary control are explicitly listed as duties of the ESD Division Managers (WPCP, Water and Sewer Services, Solid Waste Programs, and Regulatory Programs) and section managers within these Divisions. In some cases, assistance for the review and evaluation process is provided through special studies conducted by outside consultants, such as the WPCP's Master Planning and Condition Assessment efforts. These efforts are described elsewhere in this annual report. The Environmental Management Chapter of the City's General Plan also plays a role by establishing long-term goals and policies and providing action statements designed to ensure their implementation. For the sewer system, metrics used to assess the effectiveness of collection system operations are described in the City's Sewer System Management Plan, which is audited on a biennial basis. Results of the current evaluation are summarized below, in other sections of this annual report, and in other regulatory and planning documents. The City believes that current staff allocation and supervision are sufficient to perform its mission and meet the requirements listed above.

3.1.1. System Upgrades

Numerous WPCP upgrade projects, as well as the City's current Master Plan for the WPCP rebuild, are currently in progress as described in **Chapter IV**.

In response to the extensive process and regulatory challenges presented by *Synechocystis sp.*, and the significant drop in efficiency of the incumbent polymer, the WPCP completed a competitive bidding process and established contracts with three vendors offering an array of chemical solutions. The bidding process was comprised of a systematic study that applied vendor-recommended products at the bench- and then full-scale level in a series of trails. Process parameters, namely turbidity and TSS, as well as filter runtimes, were measured during each trial run and used to evaluate product performance. Vendors whose product consistently achieved water quality and process operational targets were invited to submit a competitive bid.

Complimentary to this bidding process, the City designed and constructed an Alum Tank System near the DAFTs. Alum was tested separately from the procurement process and was identified as one of the products that, when applied in appropriate doses, significantly reduced turbidity and greatly extended filter runtimes without significantly impairing water quality.

Physical modifications were also completed to a pair of DAFTs to provide the flexibility for in-series treatment as an alternative to the normal parallel operation of the system. The concept is relatively straightforward, wherein effluent from the first DAFT unit in-series is routed to a second DAFT unit for additional chemical treatment before blending with effluent from the remaining DAFT units and filtration in the DMFs. While modifications were completed during this reporting cycle, the in-series operation was placed on hold until 2023 so the WPCP could prioritize higher effluent flows during wet weather conditions that are more feasible under a parallel configuration of the DAFT system.

3.1.2. Financing

The WPCP and associated collection system are financed by revenues generated from fees collected from users of the sanitary sewer system. Sewer rates are evaluated periodically by a financial consultant to determine if revenues are sufficient to support current and future operations and maintenance, equipment replacement, and planned capital improvements. The City also uses State Revolving Funds (SRF) and Water Infrastructure Finance and Innovation Act (WIFIA) loans to finance elements of the SCWP.

Utility rates are typically adjusted by the City Council each fiscal year to keep revenues and expenditures in balance. The Council adopted new utility rates effective on July 1, 2022, approving an overall 3% increase in the sewer service rate for Fiscal Year 2022-2023. The actual rate increases vary by customer class and reflect needed improvements to the City's aging infrastructure and increases in operating and regulatory compliance costs. This translates into a monthly increase of $1.67 ($57.19 per month total) for an average single-family residence and $1.15 ($39.59 per month total) for multi-family residences. Capital and operating budgets are projected over a 20-year horizon and are updated on an alternating biennial cycle. The current capital budget projections include funding for major WPCP reconstruction and/or rehabilitation projects. City budgets also provide for ongoing rehabilitation of the sewer system.

3.1.3. *Staffing and Supervision*

The WPCP is operated and maintained by the WPCP Division, with laboratory, pretreatment, regulatory, and technical support from the Regulatory Programs Division of ESD. Staffing is as follows:

Division Managers	The WPCP Division Manager is responsible for the overall operation and maintenance of the WPCP. The Regulatory Programs Division Manager supports the WPCP Division on regulatory issues, and has responsibility for the Laboratory, Pretreatment Program, and WPCP Compliance Program. Both Managers report to the ESD Director.
WPCP Managers	The WPCP Operations Manager (who also serves as the Chief Plant Operator) and WPCP Maintenance Manager report to the WPCP Division Manager. The Lab Manager reports to the Regulatory Programs Division Manager.
Operations Staff	25 full-time Operators, including two Principal Operators, four Senior Operators, and 19 Operators. In addition, there is one Utility Worker.
Maintenance Staff	One Senior Mechanic, eight Mechanics, and one Senior Storekeeper.
Laboratory Staff	Two Senior Environmental Chemists, three Chemists, and three Lab/Field Technicians.
Pretreatment/Compliance Inspection Staff	One Senior Inspector, five Environmental Compliance Inspectors, and two Lab/Field Technicians.
Compliance and Technical Support Staff	Three Environmental Engineering Coordinators and one WPCP Control Systems Integrator.

3.1.4. *Operations*

The WPCP daily operations are performed by a highly skilled group of State Water Resources Control Board-certified Wastewater Operators organized into five shifts (Days I, Days II, Graves I, Graves II shifts). The WPCP Operations group is organized to have six Operators of various levels of certification and training assigned to cover each of the four 12-hour shift schedules. Each shift includes one Principal Operator and Senior (both the Senior and Principal Operators are Shift Supervisors as defined by the SWRCB), and the remaining four operator positions are filled by an Operator II, Operator I, or Operator in training. These shifts are designed for self-coverage, meaning that if any supervisor or operator is on PTO or absent, there are enough remaining operators to cover the minimum daily duties.

The WPCP places major emphasis on training new and existing Operators to develop and maintain a high level of operational skill. The Operator in Training (OIT) Program provides mentoring and rigorous training in all areas of WPCP operations. The WPCP Operation & Maintenance (O&M) Manual and OIT Training Manual are key elements of the OIT Program. In addition to demonstrating an understanding of the concepts and practices in the O&M Manual, OITs must also be familiar with all applicable Standard Operating Procedures (SOPs) and be trained by veteran operators, and then be signed off by a shift supervisor in 32 task-specific SOPs before being allowed to perform those tasks independently. All OITs work with highly trained veteran operators that provide direct supervision as defined by the SWRCB.

Safety training is an ongoing and mandatory practice for all Operators, and numerous elective training and career advancement opportunities are also offered. Operators perform all routine WPCP operational tasks and any assigned special assignments and are responsible for the majority of preventative maintenance, as described under the Plant Maintenance Program in **Section 2.0** of this Chapter. Operators receive a wide range of ongoing support from the WPCP Chief Plant Operator, Division Manager, Support Services staff, and outside consultants.

3.1.5. Maintenance

WPCP maintenance is performed by a skilled crew of eight journey-level Maintenance Mechanics under the supervision of one Senior Mechanic with the direction of the WPCP Maintenance Manager. Maintenance staff is responsible for the corrective maintenance and major preventive maintenance tasks, with certain specialty maintenance functions (such as PGF engine overhauls) performed by outside contractors. Maintenance staff has mandatory training requirements in addition to opportunities for elective trainings. The Maintenance section currently uses the Infor EAMS CMMS, as described under the Plant Maintenance Program. WPCP Maintenance staff work collaboratively with the Water and Sewer Systems Division to maintain the wastewater and stormwater sewer systems. The WPCP Division also utilizes outside contractors for specialty services and receives engineering and regulatory support from other City work units and consultants.

3.1.6. Collection System

The sanitary sewer collection system is operated and maintained by the ESD Water and Sewer Systems Division whose offices are located at the City's Corporation Yard. WPCP and Water and Sewer services are supported by administrative staff at the WPCP and Corporation Yard, the ESD Director, the ESD Regulatory Programs Division, the Department of Public Works Engineering Division (providing engineering support for CIP projects), and staff from other City Departments. The City also has contracts with various consultant firms for technical and regulatory support, planning studies, engineering design for CIP projects, and other needs. Staffing is as follows (wastewater-related positions only):

Division Managers	The Water and Sewer Systems Division Manager is responsible for the overall operation and maintenance of the potable water distribution, sanitary sewer and storm water collection systems, and shares responsibility with the WPCP Division Manager for the production of recycled water. The Division Manager reports to the ESD Director.
Managers	The Wastewater Operations Manager reports to the Water and Sewer Systems Division Manager and is supported by the Senior Environmental Engineer.

Operations and Maintenance Staff	13 full-time workers, including a Wastewater Collections Supervisor, two Wastewater Collections Crew Leaders, three Senior Wastewater Collections Workers, and seven Maintenance Worker I/II.
Shared Technical Support and Maintenance Staff	Several positions in the Water Program and at the WPCP provide shared support services to the Wastewater Collections program. These include: one Senior Mechanic, eight Mechanics, and one Senior Storekeeper who are shared between the WPCP and the Wastewater Operations program. In addition, one Senior Environmental Engineer, one Water Distribution Supervisor, one Water Distribution Crew Leader, one Senior Water Distribution Worker, and two water distribution Workers are shared between the Water Program and Wastewater Operations program.

A series of prioritized CIP projects have been developed for the sewer system in addition to allocating funding annually for ongoing emergency or incidental sewer repair and rehabilitation. In 2022, the City completed construction of 9,900 feet of sewer main replacement at a construction contract cost of $2.7 million. In addition, the City solicited bids for the Storm Pump Station No. 1 upgrade project which is addressing the immediate needs identified in a previous condition assessment project. The project includes seismic upgrades, the replacement of discharge piping and inlet grating to protect wet wells. In 2022, the City also completed the Lawrence Expressway Sanitary Sewer Rehabilitation Initial Project. Although the winning bid was $4.1 million, the scope of work and cost were significantly reduced due to an unexpected conflict with a PG&E gas transmission pipeline. PG&E is in the process of relocating the gas main so that a future phase of the Lawrence project can proceed.

In December 2022, the City completed a competitive Request for Proposals (RFP) process to begin design of the next Sanitary Sewer Rehabilitation and Replacement Project. This project will rehabilitate or replace approximately 10,500 lineal feet of sewer main for an estimated construction cost of $3.5 million. In 2019, the City completed the Sanitary Sewer Siphon Cleaning & Inspection Phase I Project at a construction cost of $220,000. Phase 2 of the Siphon Cleaning & Inspection Project, with an estimated construction cost of $624,000 is awaiting City approval for advertisement. In late December 2022 or early January 2023, the City will complete an upgrade and expansion its sanitary sewer hydraulic model. This effort will identify proposed capital improvement projects to improve carrying capacity of the collection system.

The City also manages its own construction crews and performs point repairs regularly, as well as manhole and lateral repairs.

4.0. CONTINGENCY PLAN

During the 2021 reporting period, the City made significant revisions to the Contingency Plan to reflect current operational practices and equipment at the WPCP. The update was originally planned to be completed as part of the Headworks and Primary Treatment Facilities Project[3] commissioning packet

[3] The Headworks and Primary Treatment Facilities Project will enhance overall treatment reliability through new influent pumping facilities, use of influent screens, a new electrical distribution system (initially for the primary facilities and later to be expanded to the entire plant), and a permanently installed 2 MW back-up power system that will be able to service all the WPCP's electrical loads.

submitted to the RWQCB per Provision VI.C.5.d of the current permit. However, due to construction delays primarily associated with difficulties in PG&E negotiations, necessary updates to the existing facilities were completed in 2021 that do not reflect the new facilities. The City will perform a similar update following the commissioning process and operational experience with the new facilities in 2023. The WPCP will continue its practice of reviewing the Contingency Plan annually and updating to reflect substantive changes to operational practices and equipment.

5.0. SPILL PREVENTION CONTROL AND COUNTERMEASURE

The Spill Prevention Control and Countermeasure (SPCC) Plan is documented in the Contingency Plan and has not changed. The SPCC Plan also addresses spill response for non-wastewater spills at the WPCP.

IV. CAPITAL IMPROVEMENT PROGRAM

The original components of the WPCP were completed in 1956 and many are still in service. Most of the other major components of the WPCP were completed over the subsequent 15-20 years. Based on a 2006 Asset Condition Assessment Report, the City began implementing several rehabilitation projects and developed a long-term Strategic Infrastructure Plan to serve as a road map for the physical improvements and process enhancements needed to maintain a high level of treatment and to meet current and expected regulatory requirements and stewardship objectives. To help implement the Strategic Infrastructure Plan, in 2013, the City secured the professional services of an engineering design team of consultants to develop a Capital Improvement Program (CIP) and comprehensive Master Plan, which included the "basis of design" development for the various process areas to be rebuilt and a Programmatic Environmental Impact Report.

The City Council approved the WPCP's Master Plan and PEIR in August 2016, thereby authorizing the City to begin implementing the design and construction of the various components necessary to complete the massive 20-year reconstruction project, also known as the Sunnyvale Cleanwater Program (SCWP). With an updated cost estimate of approximately $900 million, the CWP will replace the WPCP's aging infrastructure and operation. **Table 6** lists current major projects within the CIP, including several from the CWP. Key projects currently underway and recently completed are highlighted in the table and presented in Fact Sheets[4].

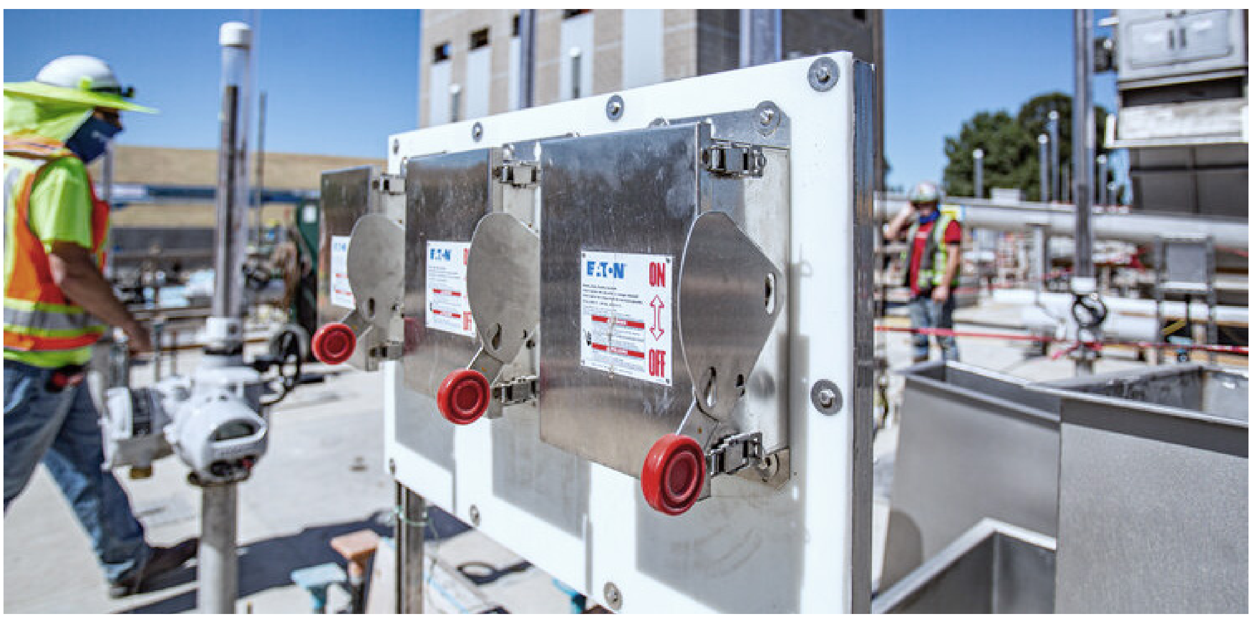


Figure 31: Construction of new Headworks and Primary Treatment Facilities

[4] CIP information from the *Adopted Budget and Resource Allocation Plan for the City of Sunnyvale Fiscal Year 2022-23, Volume I & II*

Table 6: Summary of select CIP Projects at the WPCP

CIP Project Name	Estimated Project Life Total Cost	Program	Status	Estimated Completion Date	Treatment Process Improvements					
					Headworks	Primary	Secondary	Tertiary	Solids Handling	PGF
Master Plan Update	$ 3,500,000	SCWP	A	2025	X	X	X	X	X	X
Headworks and Primary Treatment Facilities	$ 123,182,399	SCWP	A	2023	X	X				
Secondary Treatment and Dewatering Facilities	$ 274,259,177	SCWP	A	2026			X	X	X	
Existing Plant Rehabilitation (Main Package)	$ 73,420,308	SCWP	A	2026			X	X		
Cogeneration Upgrade	$ 20,859,963	SCWP	A	2027						X
Levee Rehabilitation	$ 9,768,635	CIP	A	2032			X			
Program Management	$ 68,591,009	SCWP	A	2032	X	X	X	X	X	X
Construction Management	$ 35,566,001	SCWP	A	2032	X	X				
Cleanwater Center (Stage 1)	$ 4,553,092	SCWP	H	NA	X	X	X	X	X	X
Waste Gas Burner Replacement	$ 3,396,134	SCWP	A	2026						X
Biosolids Processing	$ 24,156,144	CIP	A	2027		X	X		X	
Solids/Dewatering Repairs	$ 575,000	CIP	A	2023					X	
Primary Process Repairs	$ 562,441	CIP	A	2023		X				
Secondary Process Repairs	$ 844,809	CIP	A	2024			X			
Tertiary Process Repairs	$ 2,987,585	CIP	A	2024				X		
Support Facilities Repairs	$ 942,833	CIP	A	2025	X	X	X	X	X	X
CIP Total	***$ 647,165,530***									

Notes:

1) Rows highlighted indicate key projects presented in Fact Sheets in the following section.
2) Definitions: SCWP = Sunnyvale Cleanwater Program; CIP = Capital Improvement Program; A = Active; C = Completed; H = On-Hold.

1.0. MASTER PLAN UPDATE

SUNNYVALE
CLEANWATER
PROGRAM

DESIGN FIRM
Hazen & Sawyer
Associated with HDR

START DATE
April 2021

PROJECT STATUS
Under procurement

Master Plan Update

WHAT IS IT?

The original Master Plan was completed in 2016 and an update is needed that reflects the most recent information about regulatory outlook, technology, policy decisions, and future development in the City. Key elements that will be considered by the update include:

- Anticipated changes to nitrogen and phosphorous effluent limits
- New land use plans within the City that are estimated to contribute an additional 30% more influent flows and loads
- Changes to imported food waste and co-digestion strategies, including new and evolving air permitting requirements and associated co-generation system upgrades
- Changes to flow and energy projections for biogas, treatment system energy demands, and equipment type and size and O&M cost estimates

WHY?

The City is committed to reassessing and updating the Master Plan every 5 to 10 years to provide a roadmap for future projects that reflects the most recent information about City policy, state and federal regulations, operating conditions, state of technology, market conditions, and decisions made during earlier phases.

PROJECT AREAS

Sunnyvale

2.0. HEADWORKS AND PRIMARY TREATMENT FACILITIES

SUNNYVALE
CLEANWATER
PROGRAM

DESIGN FIRM

Carollo Engineers

CONSTRUCTION FIRMS

Anderson Pacific (P1)
OVERAA (P2)

START DATE

July 2016

PROJECT STATUS

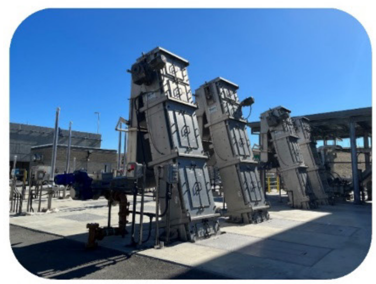
Package 1
Completed
October 2017

Package 2
In Progress
Start-up & Commissioning

Sunnyvale

Headworks and Primary Treatment Facilities

WHAT IS IT?



The Headworks and Primary Treatment Facilities project includes the phased design and construction of new headworks, primary sedimentation tanks, influent pump station, grit removal facilities, and associated electrical, mechanical, and control systems. Along with the use of modern sedimentation tank design for solids removal, the new facilities will improve protection of downstream processes and biosolids quality through use of bar screens and high-efficiency grit basins. This project also includes the construction of the first phase of a flood wall that will ulti-

WHY?

Much of these facilities were part of the original plant built in 1956 and do not meet current seismic requirements, leaving them vulnerable to earthquake damage. The concrete in these tanks is eroding and exposing the reinforced steel inside the structures. Full replacement and relocation of these facilities as recommended in the WPCP's Strategic Infrastructure Plan (2010) is currently underway and expected to be complete in summer 2023.

3.0. SECONDARY TREATMENT AND DEWATERING FACILITIES

SUNNYVALE
CLEANWATER
PROGRAM

DESIGN FIRM
Carollo Engineers

CONSTRUCTION FIRM
Ranger Pipelines
Walsh Group

START DATE
Aug 2016

PROJECT STATUS
Design
Completed
Nov 2021

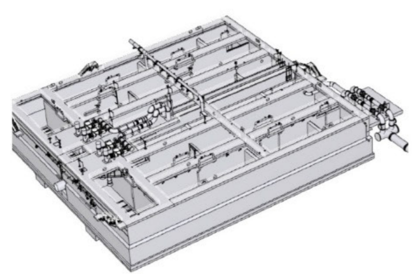
Site Preparation Package
Under Construction

Main Package
Contract Awarded
Fall 2022

Sunnyvale

Secondary Treatment and Dewatering Facilities

WHAT IS IT?



This project will be split into two Packages due to its size, complexity, and space constraints. The Site Preparation Package includes the demolition of the existing primary facilities and construction of temporary offices and Maintenance Building. The Main Package will include construction of a Conventional Activated Sludge (CAS) system and Thickening and Dewatering Facility. This project will also include the construction of a DEMON sidestream treatment system, digested sludge storage tank, 2 MW emergency generator, odor control facility, and associated appurtenances. The remaining segments of the flood wall will are also part of this Project.

WHY?

This project will improve the reliability and performance of secondary treatment while also providing contingencies for meeting future regulatory requirements. The CAS system will be operated in parallel with the existing system in a split flow configuration.

4.0. EXISTING PLANT REHABILITATION

SUNNYVALE

CLEANWATER

PROGRAM

REHABILITATION DESIGN

Carollo Engineers

Brown and Caldwell

START DATE

May 2017

PROJECT STATUS

Rehabilitation Design

Completed

Nov 2021

Facilities Rehabilitation

Under procurement

Sunnyvale

Existing Plant Rehabilitation (Main Package)

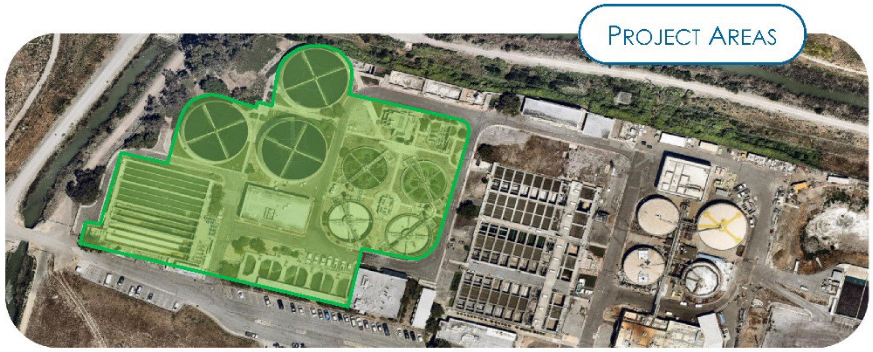
WHAT IS IT?

The City of Sunnyvale completed a detailed condition assessment of the Plant in 2017 and has determined that due to the age of the facilities many of them need to be rehabilitated or replaced to maintain permit compliance and Plant reliability. This project will ensure the plant facilities remain functional until Stage 2 of the Secondary Treatment Facilities are complete or through 2036±. Improvements associated with the project include replacing equipment (such as pumps, valves, and motors), restoring deteriorated concrete, and modernizing the automation system on associated with the tertiary treatment facilities.

WHY?

Due to the age of many essential facilities, critical elements of the existing treatment processes need to be rehabilitated or replaced to maintain operational functionality and permit compliance until they are fully replaced with the final build-out in 2036±.

PROJECT AREAS



5.0. COGEN UPGRADE

SUNNYVALE
CLEANWATER
PROGRAM

DESIGN FIRM
Hazen and Sawyer
Associated with HDR

CONSTRUCTION FIRM
TBD

START DATE
October 2023

PROJECT STATUS
Under procurement

Cogeneration Upgrade

WHAT IS IT?

This Cogeneration Upgrade will replace the existing Power Generation Facilities while maintaining operation of at least one cogeneration unit. The project includes installing two new power generation engines in the existing PGF building and replacing all related controls and heat recovery equipment. It also includes installing gas cleaning equipment outside the PGF building. Key project elements include:

- A new biogas treatment and conditioning system
- New power generation engines and emissions control equipment
- Electrical, instrumentation and control equipment for new facilities
- Structural and architectural modifications and upgrades

WHY?

Replacement of the existing cogeneration facilities is planned for 2027 and will address increased power demands and take advantage of new technologies that are cleaner, more efficient, more reliable, and require less maintenance.

Sunnyvale

6.0. LEVEE MAINTENANCE PROGRAM

SUNNYVALE

CAPITAL IMPROVEMENT

PROGRAM

ASSESSMENT FIRM

Cal Engineering & Geology, Inc. and NVS

DEVELOPMENT FIRM

HDR

START DATE

April 2016

PROJECT STATUS

O&M Manual

Completed

November 2018

Levee Repairs

Under Construction

Sunnyvale

Levee Rehabilitation

WHAT IS IT?

The City has developed the Operation and Maintenance Manual of Oxidation Pond Levees (O&M) to assist in managing repairs and maintenance efforts for the existing levees surrounding the Water Pollution Control Plant (WPCP) ponds. The 440 acres of Oxidation Ponds at the WPCP are enclosed by inner and outer levee roads that are in various stages of erosion. The inner levees form the pond distribution and recirculation channels, and the outer levees are responsible for containing the wastewater and preventing its release into the environment. In 2016, contractors completed the Levee Asset Management Plan (LAMP), a comprehensive condition assessment of the city roads and bridges, which included the WPCP pond levees. The City has used the results to complete a corresponding digital GIS mapping and O&M to successfully monitor and maintain the levees for the next 20 plus years.

WHY?

The levee roads are critical to the successful operation of the WPCP for the next 20 plus years. These levees are in various stages of erosion and require immediate attention to safeguard public and WPCP staff safety.

PROJECT AREAS

V. PERMIT SPECIAL STUDIES

Neither the current Order (R2-2020-0002) nor the most previous Order (R2-2014-0035) contained requirements for the City to conduct any special studies.

VI. OTHER STUDIES AND PROGRAMS

1.0. EFFLUENT CHARACTERIZATION STUDY AND REPORT

The WPCP is required under Provision VI.C.2 of its current NPDES permit to continue to characterize and evaluate the final effluent to verify that the reasonable potential analysis conclusions of the current Order remain valid and to inform the next permit issuance. The *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges* (Order No. R2-2021-0028) continued the monitoring frequency to once-per-permit set in the previous Order in exchange for diverting the analytical costs to the Regional Monitoring Program. The City performed priority pollutant monitoring in March 2022 and submitted the results to CIWQS. The results from this monitoring effort are presented in **Attachment C** for comparison with the results from the 2014 and 2015 monitoring events. The majority of the results were not-detected and the remainder were below WQOs.

2.0. NUTRIENT MONITORING FOR REGIONAL NUTRIENT PERMIT

In 2022, the City continued to collect influent and effluent samples for analysis of nutrients in accordance with the Order R2-2019-0017. As required by that Order, results from the WPCP's ongoing monitoring are submitted electronically to CIWQS in monthly SMRs. These results are compiled by BACWA into a group annual report and submitted to the RWQCB. In addition, the WPCP has included nutrient data in **Chapter II, Section 1.5** of this report.

3.0. REGIONAL WATER MONITORING PROGRAM

Provision VI in Attachment E of the WPCP's current NPDES permit requires the City to continue its participation in the Regional Water Monitoring Program (RMP), which was formally established in 1993 and is the only comprehensive environmental monitoring program to measure pollutants and trends in the SF Bay. The goal of the RMP is to collect data and communicate information about water quality in the SF Bay in support of management decisions. The accomplishments of the RMP over the past two years are summarized in The Pulse of the Bay report.

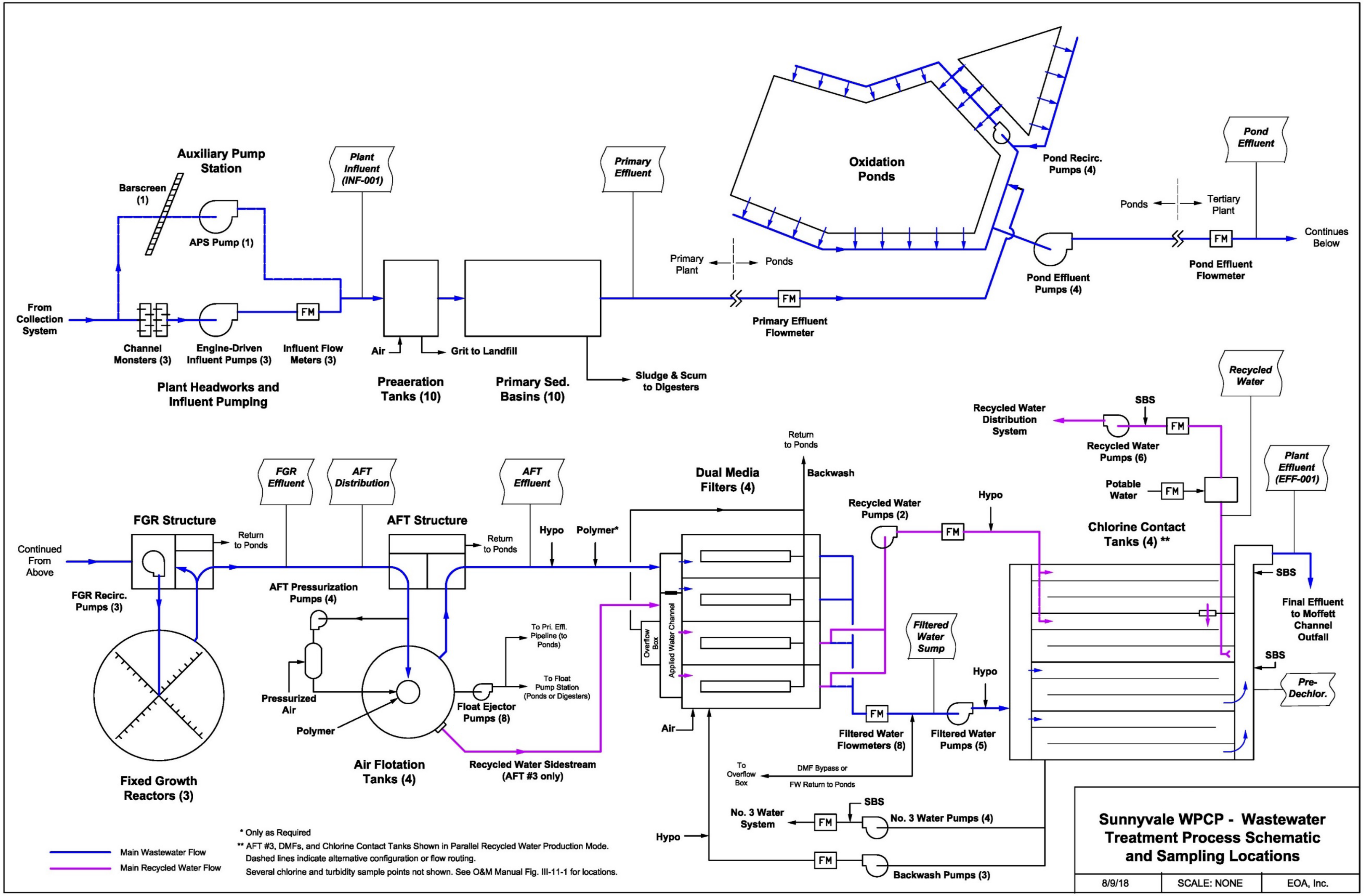
In March 2016, the Water Board adopted Order R2-2016-0008, establishing an alternative monitoring requirement (AMR) for municipal wastewater discharges to San Francisco Bay and its tributaries, in exchange for a set schedule of increased payments to the RMP. This Order was amended and renewed in 2021 as Order R2-2021-0028, thereby granting wastewater agencies the opportunity to reduce their effluent monitoring costs for most organic priority pollutants and chronic toxicity species rescreening. In exchange for the reduced monitoring requirements, facilities make supplemental payments to the RMP for regional studies to inform management decisions about water quality in the Bay. Through these financial contributions, the RMP is able to conduct regional monitoring to assess the cumulative impact of multiple sources of pollutants to the SF Bay. The City's RMP participation is documented in an annual BACWA letter.

ATTACHMENTS

ATTACHMENT A

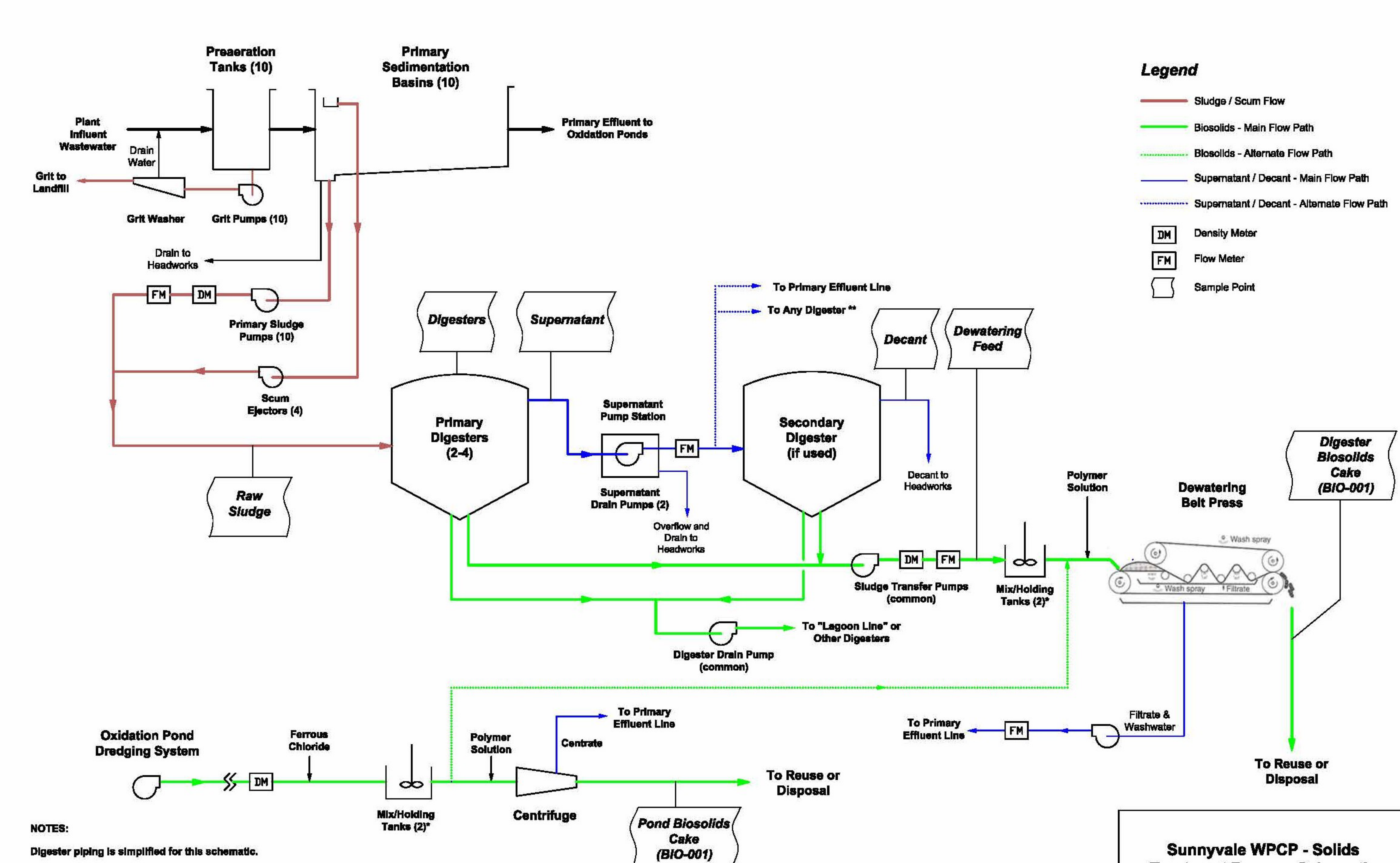
Wastewater Treatment Process Schematic

Solids Treatment Process Schematic



Sunnyvale WPCP - Wastewater Treatment Process Schematic and Sampling Locations

8/9/18	SCALE: NONE	EOA, Inc.



NOTES:

Digester piping is simplified for this schematic.

* Mix/Holding tanks for pond and digester solids are shown separate for clarity, but are actually the same tanks.

** Any digester can be configured as either a primary or secondary digester.

Sunnyvale WPCP - Solids Treatment Process Schematic and Sampling Locations

1/28/20	Scale: None	EOA, Inc.

ATTACHMENT B

WPCP Certificate of Environmental Accreditation

WPCP Approved Analyses

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

City of Sunnyvale Environmental Laboratory

Regulatory Programs Division

1444 Borregas Avenue

Sunnyvale, CA 94088

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.: **1340**

Effective Date: **11/1/2022**

Expiration Date: **10/31/2024**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Program Manager
Environmental Laboratory Accreditation Program

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Fields of Accreditation

City of Sunnyvale Environmental Laboratory
Regulatory Programs Division
1444 Borregas Avenue
Sunnyvale, CA 94088
Phone: 4087307704

Certificate Number: 1340
Expiration Date: 10/31/2024

Field of Accreditation: 101 - Microbiology of Drinking Water			
101.050	001	Total Coliform P/A	SM 9223 B Colilert
101.050	002	E. coli P/A	SM 9223 B Colilert
101.050	003	Total Coliform (Enumeration)	SM 9223 B Colilert
101.050	004	E. coli (Enumeration)	SM 9223 B Colilert
www	002	Heterotrophic Bacteria	SimPlate
Field of Accreditation: 102 - Inorganic Chemistry of Drinking Water			
102.030	003	Chloride	EPA 300.0
102.030	006	Nitrate (as N)	EPA 300.0
102.030	008	Phosphate,Ortho (as P)	EPA 300.0
102.030	009	Sulfate (as SO4)	EPA 300.0
102.095	001	Turbidity	SM 2130 B-2001
102.100	001	Alkalinity	SM 2320 B-1997
102.121	001	Hardness	SM 2340 C-1997
102.130	001	Specific Conductance	SM 2510 B-1997
102.148	001	Calcium	SM 3500-Ca B-1997
102.175	002	Chlorine, Total Residual	SM 4500-Cl G-2000
102.200	001	Fluoride	SM 4500-F C-1997
102.203	001	Hydrogen Ion (pH)	SM 4500-H+ B-2000
102.220	001	Nitrite (as N)	SM 4500-NO2 B-2000
Field of Accreditation: 103 - Toxic Chemical Elements of Drinking Water			
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8

103.140	015	Thallium	EPA 200.8	
103.140	016	Zinc	EPA 200.8	
103.140	017	Boron	EPA 200.8	
103.140	018	Vanadium	EPA 200.8	

Field of Accreditation: 104 - Volatile Organic Chemistry of Drinking Water

104.200	201	Bromodichloromethane	EPA 524.2	
104.200	202	Bromoform	EPA 524.2	
104.200	203	Chloroform	EPA 524.2	
104.200	204	Dibromochloromethane (Chlorodibromomethane)	EPA 524.2	

Field of Accreditation: 107 - Microbiological Methods for Non-Potable Water and Sewage Sludge

107.017	001	Enterococci	Enterolert	

Field of Accreditation: 108 - Inorganic Constituents in Non-Potable Water

108.007	001	Residue, Volatile	EPA 160.4	
108.015	001	Calcium	EPA 200.8	
108.015	002	Magnesium	EPA 200.8	
108.015	003	Potassium	EPA 200.8	
108.015	005	Sodium	EPA 200.8	
108.017	002	Chloride	EPA 300.0	
108.017	004	Nitrate (as N)	EPA 300.0	
108.017	008	Sulfate (as SO4)	EPA 300.0	
108.059	001	Turbidity	SM 2130 B-2011	
108.063	001	Alkalinity	SM 2320 B-2011	
108.067	001	Hardness	SM 2340 C-2011	
108.069	001	Specific Conductance	SM 2510 B-2011	
108.071	001	Residue, Total	SM 2540 B-2011	Interim
108.073	001	Residue, Filterable TDS	SM 2540 C-2011	
108.075	001	Residue, Non-filterable TSS	SM 2540 D-2011	
108.087	001	Calcium	SM 3500-Ca B-2011	
108.105	001	Chlorine, Total Residual	SM 4500-Cl C-2011	
108.125	001	Cyanide, Total	SM 4500-CN E-2011	
108.131	001	Fluoride	SM 4500-F C-2011	
108.137	001	Hydrogen Ion (pH)	SM 4500-H+ B-2011	
108.140	001	Ammonia (as N)	SM 4500-NH3 D-2011	
108.153	001	Nitrite (as N)	SM 4500-NO2 B-2011	
108.165	001	Oxygen, Dissolved	SM 4500-O C-2011	
108.173	001	Oxygen, Dissolved	SM 4500-O G-2011	
108.175	001	Phosphate,Ortho (as P)	SM 4500-P E-2011	
108.175	002	Phosphorus,Total	SM 4500-P E-2011	
108.207	001	Biochemical Oxygen Demand	SM 5210 B-2011	
108.207	002	Carbonaceous BOD	SM 5210 B-2011	
108.215	001	Organic Carbon-Total (TOC)	SM 5310 B-2011	
108.251	001	Oxygen, Dissolved	ASTM D888-09C	Interim

108.325	001	Chemical Oxygen Demand	Hach 8000
108.331	001	Kjeldahl Nitrogen,Total (as N)	Hach 10242

Field of Accreditation:109 - Metals and Trace Elements in Non-Potable Water

109.625	001	Aluminum	EPA 200.8
109.625	002	Antimony	EPA 200.8
109.625	003	Arsenic	EPA 200.8
109.625	004	Barium	EPA 200.8
109.625	005	Beryllium	EPA 200.8
109.625	006	Boron	EPA 200.8
109.625	007	Cadmium	EPA 200.8
109.625	008	Chromium	EPA 200.8
109.625	009	Cobalt	EPA 200.8
109.625	010	Copper	EPA 200.8
109.625	012	Iron	EPA 200.8
109.625	013	Lead	EPA 200.8
109.625	014	Manganese	EPA 200.8
109.625	015	Molybdenum	EPA 200.8
109.625	016	Nickel	EPA 200.8
109.625	017	Selenium	EPA 200.8
109.625	018	Silver	EPA 200.8
109.625	019	Thallium	EPA 200.8
109.625	022	Vanadium	EPA 200.8
109.625	023	Zinc	EPA 200.8

Field of Accreditation:110 - Volatile Organic Constituents in Non-Potable Water

110.040	005	Benzene	EPA 624.1
110.040	006	Bromodichloromethane	EPA 624.1
110.040	007	Bromoform	EPA 624.1
110.040	008	Bromomethane (Methyl Bromide)	EPA 624.1
110.040	010	Carbon Tetrachloride	EPA 624.1
110.040	011	Chlorobenzene	EPA 624.1
110.040	012	Chloroethane	EPA 624.1
110.040	013	2-Chloroethyl vinyl Ether	EPA 624.1
110.040	014	Chloroform	EPA 624.1
110.040	015	Chloromethane (Methyl Chloride)	EPA 624.1
110.040	016	Dibromochloromethane (Chlorodibromomethane)	EPA 624.1
110.040	017	1,2-Dichlorobenzene	EPA 624.1
110.040	018	1,3-Dichlorobenzene	EPA 624.1
110.040	019	1,4-Dichlorobenzene	EPA 624.1
110.040	020	1,1-Dichloroethane	EPA 624.1
110.040	021	1,2-Dichloroethane (Ethylene Dichloride)	EPA 624.1
110.040	022	1,1-Dichloroethylene (1,1-Dichloroethene)	EPA 624.1
110.040	023	trans-1,2-Dichloroethylene (trans- 1,2 Dichloroethene)	EPA 624.1

110.040	024	1,2-Dichloropropane	EPA 624.1	
110.040	025	cis-1,3-Dichloropropylene (cis 1,3 Dichloropropene)	EPA 624.1	
110.040	026	trans-1,3-Dichloropropylene (trans-1,3 Dichloropropen	EPA 624.1	
110.040	029	Ethylbenzene	EPA 624.1	
110.040	031	Methylene Chloride (Dichloromethane)	EPA 624.1	
110.040	034	1,1,2,2-Tetrachloroethane	EPA 624.1	
110.040	035	Tetrachloroethylene (Tetrachloroethene)	EPA 624.1	
110.040	037	Toluene	EPA 624.1	
110.040	038	1,1,1-Trichloroethane	EPA 624.1	
110.040	039	1,1,2-Trichloroethane	EPA 624.1	
110.040	040	Trichloroethylene (Trichloroethene)	EPA 624.1	
110.040	041	Vinyl Chloride	EPA 624.1	
110.040	045	Trichlorofluoromethane	EPA 624.1	
Field of Accreditation:113 - Environmental Toxicity Methods				
113.013	003C	Rainbow trout (O. mykiss)	EPA 2019.0, Continuous Flow	Interim
Field of Accreditation:126 - Microbiological Methods for Ambient Water				
126.015	001	E. coli (Enumeration)	SM 9223 B-2004 Colilert	
126.019	001	Enterococci	Enterolert	
Field of Accreditation:131 - Leaching/Extraction, Physical Chacterstics in Hazardous Waste (Matrix Aqueous)				
131.060	001	Ignitability	EPA 1010	

ATTACHMENT C

Priority Pollutant Monitoring Results

CTR No.	Priority Pollutant	WQO (ug/L)	Ambient Background (ug/L)	2014 Results (ug/L)	2015 Results (ug/L)	2022 Results (ug/L)
1	Antimony	4,300	1.30	0.36 DNQ	0.21 DNQ	0.30 DNQ
2	Arsenic	36	5.10	1.03 DNQ	0.89 DNQ	0.71
3	Beryllium	No Criteria	0.11	ND	ND	ND
4	Cadmium	2.3	0.17	ND	ND	ND
5a	Chromium (III)	424	0.00	ND	ND	0.24 DNQ
5b	Chromium (VI)	11	14.7	ND	ND	0.24 DNQ
6	**Copper**	**13.0**	**8.6**	**2.27**	**1.94**	**2.11**
7	Lead	8.5	4.2	0.41 DNQ	0.32 DNQ	ND
8	Mercury [3]	---	0.068	0.0024	0.0014	4.8E-4 DNQ
9	**Nickel**	**27**	**16**	**3.86**	**4.02**	**3.54**
10	Selenium	5	0.63	0.71 DNQ	0.61 DNQ	0.94 DNQ
11	Silver	2.2	0.12	ND	ND	ND
12	Thallium	6.3	0.16	ND	ND	0.5 DNQ
13	Zinc	113	21	7.44 DNQ	7.44 DNQ	6.22
14	**Cyanide**	**2.9**	**0.6**	**2.8**	**1.72**	**1.5 DNQ**
15	Asbestos	No Criteria	---	---	---	---
16	2,3,7,8-TCDD	1.4E-08	4.2E-08	ND	ND	ND
	Dioxin-TEQ	**1.4E-08**	2.6E-07	**ND**	**ND**	**ND**
17	Acrolein	780	**5.0E-01**	ND	ND	ND
18	Acrylonitrile	0.66	0.020	ND	ND	ND
19	Benzene	71	0.050	ND	ND	ND
20	Bromoform	360	0.50	26.8	5.65	0.17 DNQ
21	Carbon Tetrachloride	4.4	0.070	0.18 DNQ	0.58	ND
22	Chlorobenzene	21,000	0.50	ND	ND	ND
23	Chlorodibromomethane	34	0.057	11.8	16.2	ND
24	Chloroethane	No Criteria	0.50	ND	ND	ND
25	2-Chloroethylvinyl ether	No Criteria	0.50	ND	ND	ND
26	Chloroform	No Criteria	0.50	9.15	8.45	2.1
27	Dichlorobromomethane	46	0.050	8.7	16.6	ND
28	1,1-Dichloroethane	No Criteria	0.050	ND	ND	ND
29	1,2-Dichloroethane	99	0.040	ND	ND	ND
30	1,1-Dichloroethylene	3.2	0.50	ND	ND	ND
31	1,2-Dichloropropane	39	0.050	ND	ND	ND
32	1,3-Dichloropropylene	1,700	---	ND	ND	ND
33	Ethylbenzene	29,000	0.50	ND	ND	ND
34	Methyl Bromide	4,000	0.50	ND	ND	ND
35	Methyl Chloride	No Criteria	0.50	ND	ND	ND
36	Methylene Chloride	1,600	0.50	ND	ND	ND
37	1,1,2,2-Tetrachloroethane	11	0.05	ND	ND	ND
38	Tetrachloroethylene	8.85	0.05	ND	ND	ND
39	Toluene	200,000	0.30	ND	ND	ND

CTR No.	Priority Pollutant	WQO (ug/L)	Ambient Background (ug/L)	2014 Results (ug/L)	2015 Results (ug/L)	2022 Results (ug/L)
40	1,2-Trans-Dichloroethylene	140,000	0.50	ND	ND	ND
41	1,1,1-Trichloroethane	No Criteria	0.50	ND	ND	ND
42	1,1,2-Trichloroethane	42	0.05	ND	ND	ND
43	Trichloroethylene	81	0.50	ND	ND	ND
44	Vinyl Chloride	525	0.50	ND	ND	ND
45	2-Chlorophenol	400	1.20	ND	ND	ND
46	2,4-Dichlorophenol	790	1.50	ND	ND	ND
47	2,4-Dimethylphenol	2,300	1.30	ND	ND	ND
48	2-Methyl- 4,6-Dinitrophenol	765	1.20	ND	ND	ND
49	2,4-Dinitrophenol	14,000	0.70	ND	ND	ND
50	2-Nitrophenol	No Criteria	1.30	ND	ND	ND
51	4-Nitrophenol	No Criteria	1.60	ND	ND	ND
52	3-Methyl 4-Chlorophenol	No Criteria	1.10	ND	ND	ND
53	Pentachlorophenol	7.9	1.00	ND	ND	ND
54	Phenol	4.6E+06	1.30	ND	ND	ND
55	2,4,6-Trichlorophenol	6.5	1.30	ND	ND	ND
56	Acenaphthene	2,700	0.0026	ND	ND	ND
57	Acenaphthylene	No Criteria	0.0026	ND	ND	ND
58	Anthracene	110,000	0.0023	ND	ND	ND
59	Benzidine	0.00054	0.0015	ND	ND	ND
60	Benzo(a)Anthracene	0.049	0.011	ND	ND	ND
61	Benzo(a)Pyrene	0.049	0.045	ND	ND	ND
62	Benzo(b)Fluoranthene	0.049	0.057	ND	ND	ND
63	Benzo(ghi)Perylene	No Criteria	0.015	ND	ND	ND
64	Benzo(k)Fluoranthene	0.049	0.021	ND	ND	ND
65	Bis(2- Chloroethoxy)Methane	No Criteria	0.30	ND	ND	ND
66	Bis(2-Chloroethyl)Ether	1.4	0.32	ND	ND	ND
67	Bis(2- Chloroisopropyl)Ether	170,000	---	ND	ND	ND
68	Bis(2-Ethylhexyl)Phthalate	5.9	0.93	ND	ND	ND
69	4-Bromophenyl Phenyl Ether	No Criteria	0.23	ND	ND	ND
70	Butylbenzyl Phthalate	5,200	0.0055	ND	ND	ND
71	2-Chloronaphthalene	4,300	0.30	ND	ND	ND
72	4-Chlorophenyl Phenyl Ether	No Criteria	0.30	ND	ND	ND
73	Chrysene	0.049	0.022	ND	ND	ND
74	Dibenzo(a,h)Anthracene	0.049	0.0088	ND	ND	ND
75	1,2-Dichlorobenzene	17,000	0.30	ND	ND	ND
76	1,3-Dichlorobenzene	2,600	0.30	ND	ND	ND
77	1,4-Dichlorobenzene	2,600	0.30	ND	ND	ND
78	3,3 Dichlorobenzidine	0.077	0.0010	ND	ND	ND
79	Diethyl Phthalate	120,000	0.30	ND	ND	ND
80	Dimethyl Phthalate	2.9E+06	0.21	ND	ND	ND

CTR No.	Priority Pollutant	WQO (ug/L)	Ambient Background (ug/L)	2014 Results (ug/L)	2015 Results (ug/L)	2022 Results (ug/L)
81	Di-n-Butyl Phthalate	12,000	2.20	ND	ND	ND
82	2,4-Dinitrotoluene	9.1	0.27	ND	ND	ND
83	2,6-Dinitrotoluene	No Criteria	0.29	ND	ND	ND
84	Di-n-Octyl Phthalate	No Criteria	0.38	ND	0.835 DNQ	ND
85	1,2-Diphenyhydrazine	0.54	0.0053	ND	ND	ND
86	Fluoranthene	370	0.039	ND	ND	ND
87	Fluorene	14,000	0.0055	ND	ND	ND
88	Hexachlorobenzene	0.00077	0.00048	ND	ND	ND
89	Hexachlorobutadiene	50	0.30	ND	ND	ND
90	Hexachlorocyclopentadiene	17,000	0.30	ND	ND	ND
91	Hexachloroethane	8.9	0.20	ND	ND	ND
92	Indeno(1,2,3-cd)Pyrene	0.049	0.078	ND	ND	ND
93	Isophorone	600	0.30	ND	ND	ND
94	Naphthalene	No Criteria	0.011	ND	ND	ND
95	Nitrobenzene	1900	0.25	ND	ND	ND
96	N-Nitrosodimethylamine	8.1	0.30	ND	ND	ND
97	N-Nitrosodi-n-Propylamine	1.4	0.0010	ND	ND	ND
98	N-Nitrosodiphenylamine	16	0.19	ND	ND	ND
99	Phenanthrene	No Criteria	0.014	ND	ND	ND
100	Pyrene	11,000	0.056	ND	ND	ND
101	1,2,4-Trichlorobenzene	No Criteria	0.30	ND	ND	ND
102	Aldrin	0.00014	0.000016	ND	ND	ND
103	Alpha-BHC	0.013	0.00066	ND	ND	ND
104	Beta-BHC	0.046	0.00061	ND	ND	ND
105	Gamma-BHC	0.063	0.0017	ND	ND	ND
106	Delta-BHC	No Criteria	0.00013	ND	ND	ND
107	Chlordane	0.00059	0.00057	ND	ND	ND
108	4,4'-DDT	0.00059	0.00020	ND	ND	ND
109	4,4'-DDE	0.00059	0.00068	ND	ND	ND
110	4,4'-DDD	0.00084	0.00077	ND	ND	ND
111	Dieldrin	0.00014	0.00029	ND	ND	ND
112	Alpha-Endosulfan	0.0087	0.000027	ND	ND	ND
113	beta-Endosulfan	0.0087	0.000046	ND	ND	ND
114	Endosulfan Sulfate	240	0.00016	ND	ND	ND
115	Endrin	0.0023	0.00012	ND	ND	ND
116	Endrin Aldehyde	0.81	---	ND	ND	ND
117	Heptachlor	0.00021	0.000022	ND	ND	ND
118	Heptachlor Epoxide	0.00011	0.00017	ND	ND	ND
119-125	PCBs sum [3]	0.00017	0.0040	ND	ND	ND
126	Toxaphene	0.0002	---	ND	ND	ND