City of Greenfield

WASTEWATER TREATMENT PLANT MASTER PLAN

FINAL | May 2021

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John R. Witter

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Abbreviations

ºC	degrees Celsius
ºF	degrees Fahrenheit
%	percent
AACE	Advancement of Cost Engineering
AAF	average annual flow
ADF	average daily flow
ADWF	average dry weather flow
ADMMF	average day maximum month flow
AF	acre-feet
AMBAG	Association of Monterey Bay Area Governments
AOB	ammonium oxidizing bacteria
ATCM	airborne toxic control measure
Basin Plan	Water Quality Control Plan for the Central Coastal Basin
BFE	base flood elevation
BOD	biochemical oxygen demand
BOD_5	5-day biochemical oxygen demand
CAA	Clean Air Act
CARB	California Air Resources Board
Carollo	Carollo Engineers, Inc.
CBD	cannabidiol
CCI	Construction Cost Index
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
cf	cubic feet
cfd	cubic feet per day
CFR	Code of Federal Regulations
CI	compression ignition
CIMIS	California Irrigation Management Information System
City	City of Greenfield
CO	carbon monoxide
CPO	Chief Plant Operator
CWC	California Water Code
CWSRF	Clean Water State Revolving Fund
DBPs	disnfection byproducts
DDW	Division of Drinking Water
DO	dissolved oxygen

DOE	Department of Energy
DOIC	Designed Operator-in-Charge
DWR	Department of Water Resources
EC	electrical conductivity
EDA	Department of Commerce Economic Development Administration
EI&C	electrical, instrumentation, and controls
EIR	environmental impact report
ENR	Engineering News Record
FEMA	Federal Emergency Management Agency
FIRM	flood insurance rate maps
FOG	fats, oils, and grease
ft	feet
FTE	full time employee
g/bhp-hr	gram per brake horsepower-hour
g/kW-hr	gram per kilowatt-hour
General Permit	General WDR Order No. R3-2020-0020
gsfd	gallons per square foot per day
GO	general obligation
gpcd	gallons per capita day
gpd	gallons per day
gpm	gallons per minute
GPR	Green Project Reserve
GSA	groundwater sustainability agency
GSI	GSI Water Solutions Inc.
GSP	groundwater sustainability plan
HC	hydrocarbon
hp	horsepower
IBank	State of California's Infrastructure SRF Program
I&I	inflow and infiltration
kW	kilowatt
lbs/acre/d	pounds per acre per day
MAD	Mesophilic Anaerobic Digestion
MBR	membrane bioreactor
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MCL	maximum contaminant level
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day

mJ/cm^2	millijoule per square centimeter
mL/L	milliliters per liter
mmol/L	millimoles per liter
µS/cm	microsiemens per centimeter
MLE	Modified Ludzack-Ettinger
MLR	mixed liquor return
MLSS	mixed liquor suspended solids
MPN	most probably number
MRP	monitoring and reporting program
mV	millivolts
NEC	National Electrical Code
NFIP	National Flood Insurance Program
NMHC+NOx	non-methane hydrocarbon plus nitrogen oxides
NOA	notice of applicability
NOB	nitrite oxidizing bacteria
NOI	notice of intent
NOV	notice of violation
NSPS	New Source Performance Standards
NWRI	National Water Research Institute
O&M	operations and maintenance
ORP	oxidation reduction potential
OSHA	Occupational Safety and Health Administration
PAYGO	pay-as-you-go
pcfd	pounds per cubic per day
psfy	pounds per square per year
PHD	peak hour demand
PHF	peak hourly flow
PLC	programmable logic controllers
PM	particulate matter
ppd	pounds per day
PPE	personal protective equipment
psi	pounds per square inch
RAS	return activated sludge
Region 3	Central Coast RWQCB
RNG	renewable natural gas
RO	reverse osmosis
ROWD	report of waste discharge
RWQCB	Regional Water Quality Control Board

S.U.	standard units
SCADA	supervisory control and data acquisition
SGMA	Sustainable Groundwater Management Act
SIP	state implementation plan
SMP	salt management program
SMR	self-monitoring report
SNMP	salt and nutrient management plan
SP	Surface Preparation
sq ft	square foot
SRF	state revolving fund
SRT	solids residence time
SSMP	sewer system management plan
SSPC	Society of Protective Coating
S.U.	standard unit
SVI	sludge volume index
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
THC	tetrahydrocannabinol
TKN	total kjeldahl nitrogen
TMDL	total maximum daily load
TN	total nitrogen
TSS	total suspended solids
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UV	ultraviolet
UVT	UV Transmittance
VSS	volatile suspended solids
WAS	waste activated sludge
WDR	waste discharge requirements
WIFIA	Water Innovation Finance
WQO	water quality objective
WRF	water reclamation facility
WT	wet ton
WTP	water treatment plant
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

ES.1 Background

The City of Greenfield (City) retained Carollo Engineers, Inc. (Carollo) in 2019 to develop a wastewater treatment plant (WWTP) master plan to identify performance and capacity constraints at the existing WWTP, compliance with current and future regulations, and evaluate alternative treatment and effluent end-use alternatives to arrive at recommended improvements. This analysis considers a planning horizon through 2040.

The City owns and operates the wastewater collection, treatment, and disposal facilities that serve a population of approximately 18,000 residents. The existing WWTP was originally constructed in 1978 and has since been upgraded and expanded several times. It consists of a headworks, primary clarifiers, secondary biological treatment provided by aerated ponds, and effluent disposal provided by percolation ponds and effluent disposal fields. Sludge and scum from the primary clarifiers are aerated in a sludge holding tank and sent to air drying beds. Dried sludge and headworks screenings are periodically hauled to the landfill.

ES.2 Current and Future Regulatory Requirements

The City is currently regulated by Waste Discharge Requirements (WDR) Order No. R3-2002-0062, adopted by the Central Coast (Region 3) Regional Water Quality Control Board (RWQCB) in 2002. The WDR does not list limits for effluent water quality, rather, the discharge of treated wastewater shall not cause groundwater measured downgradient of the disposal area to exceed certain constituent limits.

Historically, there have been issues with the percolation capacity of the effluent disposal fields caused by performance limitations of the primary clarifiers and overloading of the aerated ponds. This has caused the ponds and disposal fields to operate without sufficient freeboard. In May 2018, the berm of a disposal field was compromised, and effluent spilled onto adjacent City-owned property. The City was issued a Notice of Violation and has since performed additional studies and monitoring, developed a work plan, and initiated this WWTP master plan.

In September 2020, the RWQCB adopted General WDR Order No. R3-2020-0020 (General Permit), which applies to most domestic wastewater systems within the Region with effluent flows greater than 100,000 gallons per day. In addition to defining regulations around recycled water, pretreatment programs, and climate change, among others, detailed extensively in Chapter 2, the most significant change will be to the discharge limits. The General Permit defines discharge limits that need to be met depending on the wastewater process utilized. Table ES.1 compares the discharge limits for pond-based treatment versus an activated sludge process.

Table ES.1 General Permit Effluent Limits Based on Treatment Technology

Parameter	Units	Treatment Pond			Activated Sludge		
		30-Day Average	7-Day Average	Sample Maximum	30-Day Average	7-Day Average	Sample Maximum
BOD_5	mg/L	45	65	NA	30	45	NA
TSS	mg/L	45	65	NA	30	45	NA
Settleable Solids	mL/L	0.3	NA	0.5	0.1	0.3	0.5
pH	NA	6.5 - 8.4	NA	NA	6.5 – 8.4	NA	NA

Abbreviations:
mg/L = milligrams per liter; mL/L = milliliters per liter.

The General Permit identifies additional limits based on the location of the WWTP. The City's WWTP overlies the Lower Forebay Aquifer. The corresponding limits, based on Water Quality Objectives (WQO) from the Water Quality Control Plan for the Central Coastal Basin (Basin Plan), are presented in Table ES.2. There are two options for complying with location-based limits. Option 1 requires dischargers to meet limits in the effluent from the treatment process. Option 2 allows the discharger to implement a groundwater monitoring program to demonstrate the groundwater complies with the WQO.

Table ES.2 General Permit Limits for the Lower Forebay Aquifer

Parameter	Units	25-Month Rolling Median
Total Dissolved Solids	mg/L	1,500
Chloride	mg/L	250
Sulfate	mg/L	850
Boron	mg/L	0.5
Sodium	mg/L	150
Total Nitrogen	mg/L	10

ES.3 Flows and Loads Analysis

The performance and capacity of the WWTP processes are determined based on historical and projected influent flows and loads. The City provided quarterly Self-Monitoring Reports (SMR) submitted to the RWQCB from January 2016 through March 2020. The flows and loads analysis was based on average daily flows and quarterly samples for biochemical oxygen demand (BOD), total suspended solids (TSS), and total nitrogen (TN), as well as a comparison to previous WWTP analysis efforts.

Historical flows and population are used to calculate average annual wastewater generation in gallons per capita day (gpcd). Future wastewater flows are predicted using population projections and a fixed wastewater generation factor. Population projections came from a combination of work done by Wallace Group as part of the Sewer System Master Plan Update (2019) and the Association of Monterey Bay Area Governments (AMBAG). Table ES.3 summarizes the historical and projected influent flows.

Table ES.3 Historical and Projected Influent Flow

Year	AAF (mgd)	ADMMF (mgd)	PHF (mgd)(1)	Peaking Factor (ADMMF/AAF)	AMBAG Population Plus Recent Annexations	AAF Wastewater Generation per Capita (gpcd)
HISTORICAL						
2016	0.91	0.99	---	1.09	17,300	52.4
2017	0.97	1.05	---	1.08	17,517	55.4
2018	1.00	1.05	---	1.05	17,648	56.8
2019	0.99	1.05	---	1.06	17,924	55.3
PROJECTED						
2025	1.29	1.40	3.53	1.09(2)	21,420	60(3)
2030	1.44	1.57	3.95	1.09	23,935	60
2035	1.63	1.78	4.48	1.09	27,145	60
2040	1.80	1.97	4.96	1.09	30,050	60

Notes:
(1) Historical peak hour flow data was not available. Projected peak hour flow is based on a peaking factor of 2.75, as identified in the Preliminary Findings Memorandum for the 2019 Water and Wastewater System Master Plan Updates (Wallace Group; 2020).
(2) Based on peaking factors between 2016 and 2019, the largest peaking factor of 1.09 was selected to estimate future max month flows.
(3) Based on wastewater generation factors between 2016 and 2019, a wastewater generation factor of 60 gpcd was selected to estimate future average annual flows.

Variability in the influent BOD and TSS concentrations brought to question the validity of the data. Quarterly samples do not capture seasonal variability or maximum month conditions. More frequent sampling would help improve consistency and allow for the distinction between anomalies and trends. Given the variability in influent samples, the wastewater characterization was compared to previous studies and typical design values to refine the data analysis. Based on the comparison with previous studies and discussion with the City, the BOD and TSS concentrations are estimated to be 350 and 325 milligrams per liter (mg/L), respectively, throughout the planning study. These concentrations are higher than the average concentrations calculated from the self-monitoring reports (SMRs) for the last few years but they are consistent with the City's previous wastewater studies and reflect the trend in historical water conservation efforts. Table ES.4 presents the projected influent loads through 2040.

Table ES.4 Projected Loads

Year	AAF (mgd)	ADMMF (mgd)	Average Annual Load (lb/d)(1)			Max Month Load (lb/d)(2)		
			BOD(3)	TSS(4)	TKN(5)	BOD(3)	TSS(4)	TKN(5)
2025	1.29	1.40	3,751	3,484	707	4,089	3,797	771
2030	1.44	1.57	4,192	3,893	790	4,569	4,243	862
2035	1.63	1.78	4,754	4,415	897	5,182	4,812	977
2040	1.80	1.97	5,263	4,887	992	5,737	5,327	1,082

Notes:
(1) The average annual projected load is based on the projected AAF and a constant average annual concentration.
(2) The maximum month projected load is based on the projected ADMMF and a constant average annual concentration.
(3) Projected BOD load based on a constant influent concentration of 350 mg/L.
(4) Projected TSS load based on a constant influent concentration of 325 mg/L.
(5) Projected total kjeldahl nitrogen (TKN) load based on a constant influent concentration of 66 mg/L.

ES.4 Existing Wastewater Treatment Plant Assessment

ES.4.1 Process Performance and Capacity Evaluation

The WWTP was originally designed and permitted for an AAF capacity of 1.0 million gallons per day (mgd), with a peak hydraulic capacity of 5.0 mgd. Various consultants have evaluated the WWTP capacity and in 2013, a WWTP Evaluation (KJ and Wallace 2013) was submitted to the RWQCB in an effort to increase the permitted AAF capacity to 2.0 mgd with a peak hydraulic capacity of 10 mgd.

The performance evaluation includes review of available data from 2016 through 2019 and assesses whether unit processes are operating as intended and meeting expected removal rates and treatment objectives. The capacity evaluation is limited to process capacity and whether the existing facilities have sufficient capacity to accommodate a future flow of 2.0 mgd. This was performed by estimating loading rates for key design criteria at the permitted future flow of 2.0 mgd. Performance evaluation also relied on previous WWTP analysis by others. The following sections outline the performance and capacity of each unit process. Figures ES.1 and ES.2 show the WWTP.

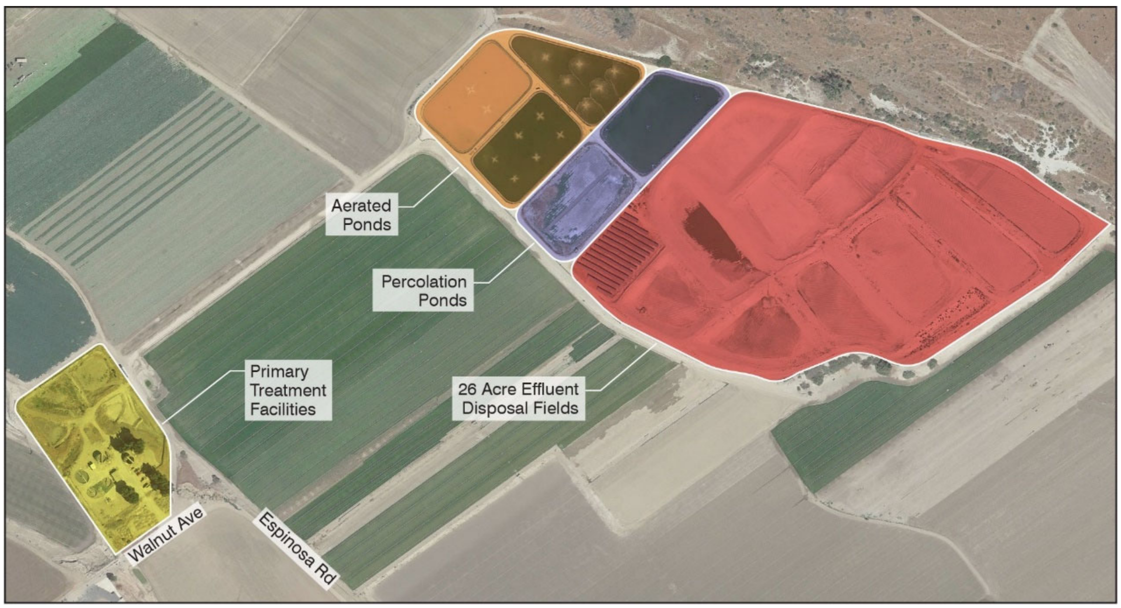

Figure ES.1 Existing WWTP Overview

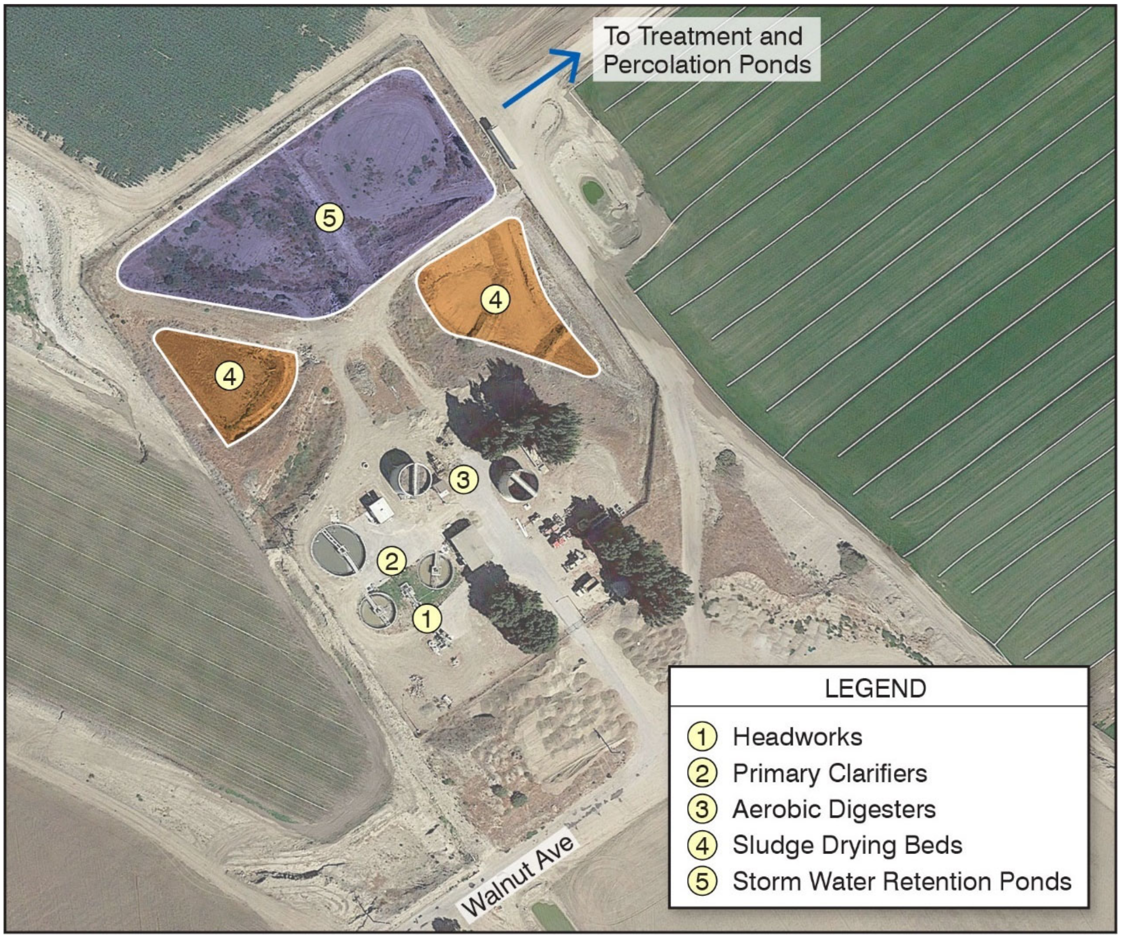

Figure ES.2 Primary Treatment and Solids Handling Site Layout

ES.4.1.1 Headworks

The headworks includes an open channel Parshall flume and ultrasonic level sensor to provide flow monitoring. The headworks also serves as a hydraulic structure to evenly split flow to downstream processes. In Spring 2020, a new 2 mm spacing mechanical bar screen was installed, replacing a manual bar screen and grinder. Since the new screen was installed, the amount of time it takes to fill the screening dumpster has decreased from one month to one week. Improved debris removal in the headworks improves downstream process performance and mitigates maintenance issues. Plant staff have not observed any hydraulic limitations at the headworks.

ES.4.1.2 Primary Clarifiers

The primary clarifiers reduce the velocity of flow and allow heavier solids to settle to the bottom while lighter scum floats on the surface. Scraper arms rotate around the clarifier and collect the sludge and scum in a sump and pump it to the aerobic digester. The clarifiers are operating within typical design overflow ranges for current and future flow conditions. This indicates that the clarifiers should be able to hydraulically pass the anticipated future flows. However, the performance of the clarifiers is well below expected removal rates for BOD and TSS. The cause for the poor performance is not known, although there are several possibilities, including sampling errors, sludge blanket operating depth, or influence from decant return flows from the aerobic digester. Additional sampling and analysis are needed to determine the cause for poor clarifier performance.

ES.4.1.3 Aerated Ponds

The secondary process consists of three aerated ponds that provide biological treatment. In 2016, 18 five horsepower (hp) surface aerators were added to the three treatment ponds, providing a total capacity of 90 hp. Table ES.5 compares the pond capacity and performance to typical design ranges.

Table ES.5 Aerated Pond Capacity and Performance

Parameter	Units	Existing Conditions	Future Conditions	Typical Design Range(1)
Average Daily Flow	mgd	1.0	2.0	
Primary Effluent BOD	mg/L	320	320	
Primary Effluent TSS	mg/L	145	145	100 – 400
Number of Aerated Ponds	---	3	3	
Surface Area, total	acres	6.25	6.25	
Depth	ft	5	5	5 – 15
Pond Volume, total	MG	10.2		
Installed Aeration Capacity	hp	90		
Unit Aeration Capacity	hp/MG	8.8		25 – 40
Detention Time	days	10.2	5.1	3 – 30
BOD Loading Rate	lbs/acre/d	262	524	35 – 125(2)
Effluent BOD Concentration	mg/L	100		20 – 40
Effluent TSS Concentrations	mg/L	85		20 – 60

Notes:
(1) Values taken from Wastewater Engineering: Treatment and Reuse (Metcalf and Eddy; Fourth Edition), unless otherwise noted.
(2) Design range from Natural Systems for Waste Management and Treatment (Reed et al.)

Typical design range for the detention time varies significantly because performance depends on several factors, such as local temperature, organic loading (upstream process performance), pond mixing and aeration characteristics, kinetic growth rate, and effluent quality requirements. The poor primary clarifier performance contributes to the biological overloading of the aerated ponds. However, even if the primary clarifiers were achieving typical removal rates, the existing pond volume would not provide sufficient treatment capacity.

Calculations from a previous study showed a required aeration capacity of 90 hp to maintain a dissolved oxygen (DO) concentration in the ponds of 2.0 mg/L for buildout flows of 2 mgd. However, these calculations assumed a primary effluent BOD concentration of 170 mg/L, which is much lower than the current primary effluent concentration of around 320 mg/L. Additionally, the reported DO concentration in the ponds is usually less than 0.5 mg/L. If the primary clarifier performance does not improve, an estimated additional 100 hp of aeration capacity is needed.

The following summarizes potential issues inhibiting the ponds treatment performance:

- Pond influent concentrations higher than design values (primary clarifiers and aerobic digester not operating properly).
- Detention time is insufficient
- Flow path through the ponds results in short-circuiting and dead zones.
- Sludge accumulation, which would reduce detention times and contribute to dead zones. In addition, accumulated sludge could be undergoing anaerobic degradation, which would increase effluent BOD and ammonia.
- Lack of aeration capacity for the given primary effluent quality.

ES.4.1.4 Effluent Discharge

Effluent from the treatment plant is discharged via percolation either in Ponds 4 and 5 adjacent to the treatment ponds or in the 26 acres of effluent disposal fields. Previous efforts included an analysis of the percolation capacity in the area adjacent to the effluent disposal fields based on infiltration rate tests performed in April 2018. The discharge capacity of the percolation ponds and effluent disposal fields is nearly sufficient to percolate the rated capacity of 2 mgd. This assumes proper dredging and disposal of accumulated solids and typical effluent quality. However, upstream process performance needs to be improved and ponds and disposal fields need to be routinely dredged to allow for adequate percolation.

ES.4.1.5 Aerobic Digester

Sludge from the primary clarifiers is pumped to an aerobic digester where it undergoes stabilization. It is uncommon to stabilize primary sludge using aerobic digestion. Because primary sludge has not undergone biological treatment, the composition of the solids is similar to raw sewage and can have significant odor issues. Primary sludge is usually stabilized using anaerobic digestion, which results in a more consistent sludge quality, improved sludge stabilization, reduced power usage, and reduction in odors. Although the energy balance and recovery opportunities for anaerobic digestion is attractive, it is much more complex and capital intensive when compared to aerobic digestion.

Previous reports determined that the aerobic digester is severely over loaded and additional stabilization capacity is needed. Presumably, high solids concentrations in the digester decant returned to the clarifiers are negatively affecting the performance of the primary clarifiers. Previous analysis shows that the digester is loaded above the design criteria, even when the primary clarifiers are not removing sufficient solids. If the clarifiers were achieving design removal rates, the digester would be severely overloaded. Additional digestion capacity is needed to improve digestion and the primary clarifier performance.

ES.4.1.6 Sludge Drying Beds

After digestion, primary sludge is sent to the sludge drying beds to reduce moisture via evaporation. The City is charged on a wet ton basis for solids to be periodically hauled offsite. The dryer the solids, the cheaper the hauling cost. Previous reports indicate that the sludge drying beds have sloped sides, which makes it difficult to thinly spread biosolids and achieve satisfactory drying. Typical design criteria indicate that additional sludge drying bed area may be needed if the City continues to dewater biosolids through the use of sludge drying beds. The City could investigate the possibility of repurposing the adjacent storm water retention ponds for sludge drying, which would likely provide sufficient space through projected influent flows

ES.4.2 Compliance with the General permit

The General Permit requires compliance based on the treatment technology utilized and the underlying groundwater sub-basin. Table ES.6 compares the City's effluent quality with the discharge limits for treatment ponds.

Table ES.6 Comparison of Effluent Quality to General Permit Discharge Limits for Treatment Ponds

Parameter	Units	30-Day Average Limit(1)	Average City WWTP Effluent(2)	Sample Max Limit	Sample Max Effluent
BOD	mg/L	45	118	N/A	408
TSS	mg/L	45	81	N/A	162
Settleable Solids	mL/L	0.3	0.1	0.5	1.5
pH	S.U.	6.5 – 8.4	7.9	N/A	---

Notes:
(1) The General Permit also proposes a 7-day average limit of 65 mg/L for BOD and TSS. The City does not currently sample frequently enough to calculate a 7-day average.
(2) The City samples effluent quality on a quarterly basis, so a 30-day average cannot be calculated. Reported values are average annual. The 30-day average concentration (or max month) would be higher than the listed average annual.

Based on the performance data reviewed, the City's WWTP would not be able to meet the proposed discharge limits in Table ES.6. The constraints identified in the capacity and performance evaluation sections would need to be overcome with significant modifications to the treatment process to improve the effluent quality. Modifications would likely require a significant increase in pond volume, detention time, and aeration capacity. Then, with more frequent maintenance and careful operation of the pond process, the treatment plant may be able to meet the BOD and TSS limits laid out in the General Permit. However, it should also be noted that the performance of treatment ponds in general is highly variable and sensitive to flow, load, and ambient temperature and other factors. At lower temperatures the biological kinetics slow down and the performance capacity of the ponds decreases. With stricter discharge limits, it will be very difficult for treatment ponds to reliably meet effluent requirements.

There are two options for complying with the groundwater sub-basin based limits:

- Option 1: The Discharger complies with specified effluent limitations based on the underlying designated groundwater basin. The RWQCB may still require groundwater monitoring if it is determined that the discharge may impact beneficial uses.
- Option 2: The Discharger does not comply with effluent limitations but is required to implement a groundwater monitoring program to demonstrate compliance with the water quality objectives specified in the Basin Plan.

Table ES.7 provides a comparison between the City's historical effluent quality and the proposed discharge limits for dischargers overlying the Lower Forebay Aquifer.

Table ES.7 Comparison of Effluent Quality to General Permit Discharge Limits for the Lower Forebay Aquifer

Parameter	Units	25-Month Rolling Median	City WWTP Effluent
Total Dissolved Solids(1)	mg/L	1,500	984
Chloride(1)	mg/L	250	202
Sulfate(1)	mg/L	850	161
Boron(1)	mg/L	0.5	0.40
Sodium(1)	mg/L	150	147
Total Nitrogen(2)	mg/L	10	65

Notes:
(1) A limited dataset of mineral concentrations was available as a result of supplemental sampling that occurred in August 2020. Listed values are the average of 7 samples taken over a two-week period.
(2) The City samples influent TKN, which is assumed to be equal to influent total nitrogen. The listed value is the median from the last six influent TKN concentrations reported in the quarterly SMRs submitted to the RWQCB.

In general, it appears the WWTP would be able to meet the requirements in Table ES.7 for all constituents except nitrogen. Meeting the nitrogen limit with the current treatment processes poses additional challenges.

The WWTP effluent TN concentration is currently 65 mg/L. Meeting a discharge TN limit of 10 mg/L would require an 85 percent nitrogen reduction. It might be possible to achieve this level of reduction during warm weather periods if substantial modifications are made to the pond (including expansion). However, during colder months, the ability to nitrify is severely diminished and not feasible with a pond-based system. Treatment pond processes are not typically designed to be able to achieve nitrogen removal and reliably meeting an effluent TN concentration of 10 mg/L year-round for a pond-based process is not possible.

The other option for complying with the sub-basin based limits in the General Permit is by proving the effluent quality does not degrade underlying groundwater through the use of a groundwater monitoring program. The City has a groundwater monitoring well network that includes upgradient and downgradient wells to be able to identify the influence that the WWTP has on the groundwater quality.

Table ES.8 compares the City's historical groundwater concentrations to the groundwater objectives for the Lower Forebay groundwater basin.

Table ES.8 Comparison of Groundwater Objectives and Monitoring Well Data

Constituent(1)	Lower Forebay Median Groundwater Objectives	Average of Upgradient Monitoring Wells(2)	Average of Downgradient Monitoring Wells(2)
Total Dissolved Solids	1,500	774	847
Chloride	250	74	117
Sulfate	850	162	93
Boron	0.50	0.40	0.46
Sodium	150	98	134
Total Nitrogen	8.0	4.6	23

Notes:
(1) All values are expressed in mg/L
(2) Monitoring well data is reported twice per year. Values are an average of available data from March 2004 to March 2019.

The groundwater concentration meets the water quality objectives for all constituents outlined in the Basin Plan with the exception of total nitrogen. The RWQCB is increasingly focusing on developing nitrogen management strategies. Given the effluent nitrogen concentration from the WWTP and the corresponding downgradient groundwater concentration, the RWQCB will likely require the City to make significant strides to improve the groundwater quality through WWTP improvements. Because the downgradient groundwater nitrogen concentration is above the groundwater objective, the City would not be able to comply with Option 2 of the General Permit.

Given the performance and capacity issues of the existing treatment processes and the inability of the processes to comply with forthcoming limits, it is recommended that the City construct a new WWTP that utilizes a more modern secondary treatment process. The new process should be designed to achieve consistent effluent quality within the effluent limits defined in Option 1 of the General Permit. The City should still carry out the near-term recommendations provided in the 2018 Effluent Disposal Study to maintain operation of the existing facilities until a new WWTP can be constructed.

ES.4.3 Site Visit and Visual Observation of Existing Facilities

In November 2020, a structural, electrical, and process engineer from Carollo visited the WWTP to assess the condition of existing infrastructure. The purpose of the site visit was to identify near-term improvements and asses the suitability of existing infrastructure for continued use and integration with a new treatment plant.

Observation of electrical facilities determined that the main utility switchboard enclosures and various terminal boxes are rusted. Further investigation is needed to determine extent of internal damage. A walkthrough with a certified electrician is recommended to bring to code miscellaneous electrical systems. An arc flash study should be completed to comply with code requirements. The design of a new wastewater treatment plant will require an upgraded service connection to utility power and a standby diesel generator for backup power as well as a new switchboard and motor control center.

Observation of structural facilities determined corrosion on the drive mechanism and bridge members of Clarifier 3. It is recommended that affected metallic assets be recoated with an epoxy coating system. Additionally, kick plates should be added to the perimeter railing of the clarifiers. Some minor damage was observed in the headworks bypass structure, Administration Building roof members, and railing post baseplates. However, the extent of damage does not warrant improvements at this time.

During the site visit, influent wastewater was bypassing the headworks screen so plant staff could service the screen. Grease buildup has caused the brushes to wear out, which require replacing. Clarifier 1 had significant foam buildup on the water surface, which impaired the ability of the scraper arm to remove it from the system. Liquid in the primary clarifiers appeared cloudy, indicating poor settleability. Bubbles were observed on the clarifier liquid surface, which could be a result of dissolved organic compounds coming out of solution. These factors indicate that the fats, oils, and grease (FOG) coming into the plant are potentially causing a significant burden on the treatment processes and resulting in decreased performance. The high influent FOG load could explain the poor performance of the primary clarifiers and aerobic digester. The dissolved organic content in FOG can cause foaming events and inhibit settling in the primary clarifier, which reduces the scum and sludge that is removed and sent to the digester. Aerating the FOG in the digester can further produce foam and inhibit settling. It is recommended to further develop the recently adopted FOG program. A successfully implemented FOG program will reduce the maintenance requirements in the collection system and at the treatment plant and improve the process performance.

Table ES.9 summarizes the significant recommended improvements outlined above and provides an estimate of the associated capitals cost. Less substantial improvements can likely be handled by City staff.

Table ES.9 Short-term Site Improvement Recommendations

Improvement	Estimated Capital Cost
Investigate the extent of damage to the switchboard enclosure and internal components.	$10,000
Miscellaneous Electrical Code Compliance Modifications	$5,000
Perform arc flash study	$30,000
Recoat Clarifier 3 metallic surfaces	$50,000
Add kick-plates to the hand rails around clarifier structures and bridges	$5,000
Total:	**$100,000**

Notes:
(1) The budgetary quote of $3,200 was provided for the initial investigation of the switchboard. Additional cost to replace internal components depends on the result of the initial investigation and could be much higher or lower than the cost listed. After initial investigation, it should be determined whether the switchboard can function until a new treatment plant is brought online, or if it needs to be replaced/repaired sooner.

ES.5 Effluent Reuse and Disposal

ES.5.1 Recycled Water

Historically, the WWTP effluent has been disposed of onsite via percolation ponds and disposal fields. The effluent quality has precluded the City from pursuing recycled water. However, as forthcoming regulations prompt upgrades to the WWTP, the City can evaluate potential recycled water opportunities. Recycled water helps reduce demands on potable water supplies and can provide additional funding opportunities for future projects.

The primary regulation governing recycled water use is Title 22 of the California Code of Regulations. It specifies four categories of recycled water based on the treatment level and application use. This analysis considers the impact of pursuing disinfected tertiary effluent for unrestricted reuse.

The recycled water demands were calculated based on local hydrologic properties and an estimation of the irrigable area of potentially viable turf grass areas within the City. Potential recycled water users include parks, schools, and cemeteries, as well as Greenfields Turf sod farm adjacent to the WWTP. Additional recycled water users can be explored beyond turf grass irrigation, such as cannabis cultivation facilities, transit facility washdown (car washes, fire engines, municipal buses, etc.), or nearby industrial applications. Further discussions would be needed with relevant stakeholders to identify water quality and quantity demands and seasonal variability. Figure ES.3 presents a potential recycled water distribution system to identified users. Figure ES.4 presents the water balance that was calculated to determine the portion of wastewater effluent used to produce recycled water and diverted from effluent disposal fields.

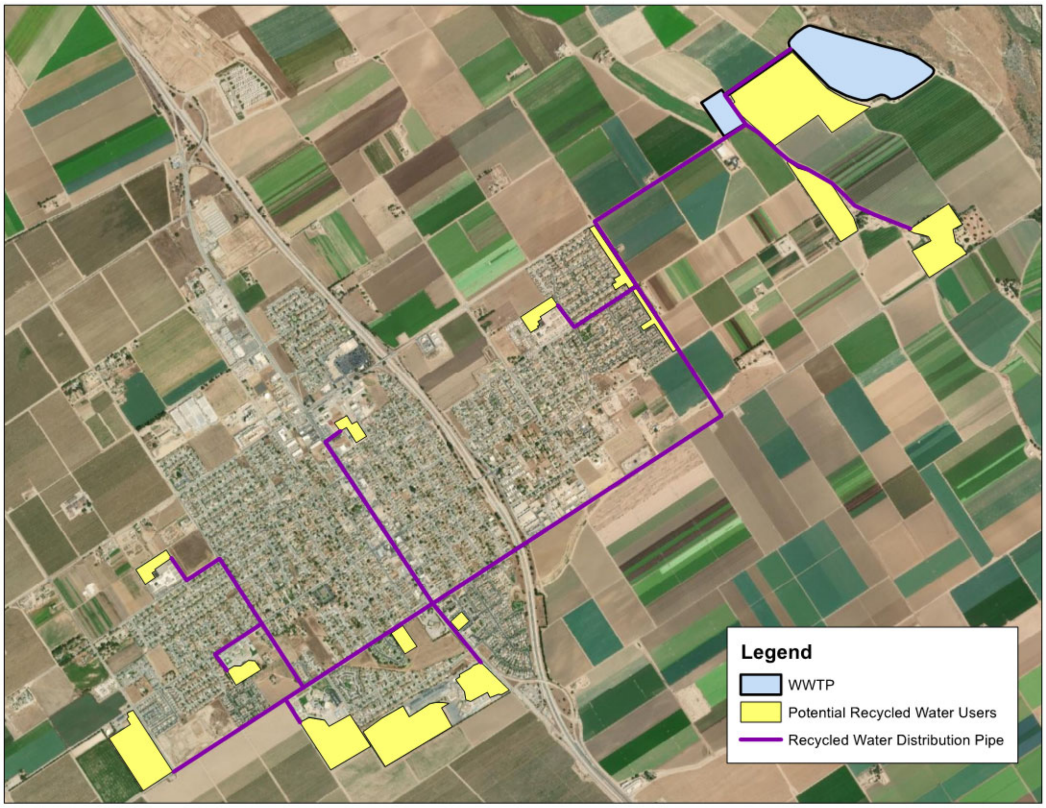

Figure ES.3 Potential Recycled Water Users and Distribution System

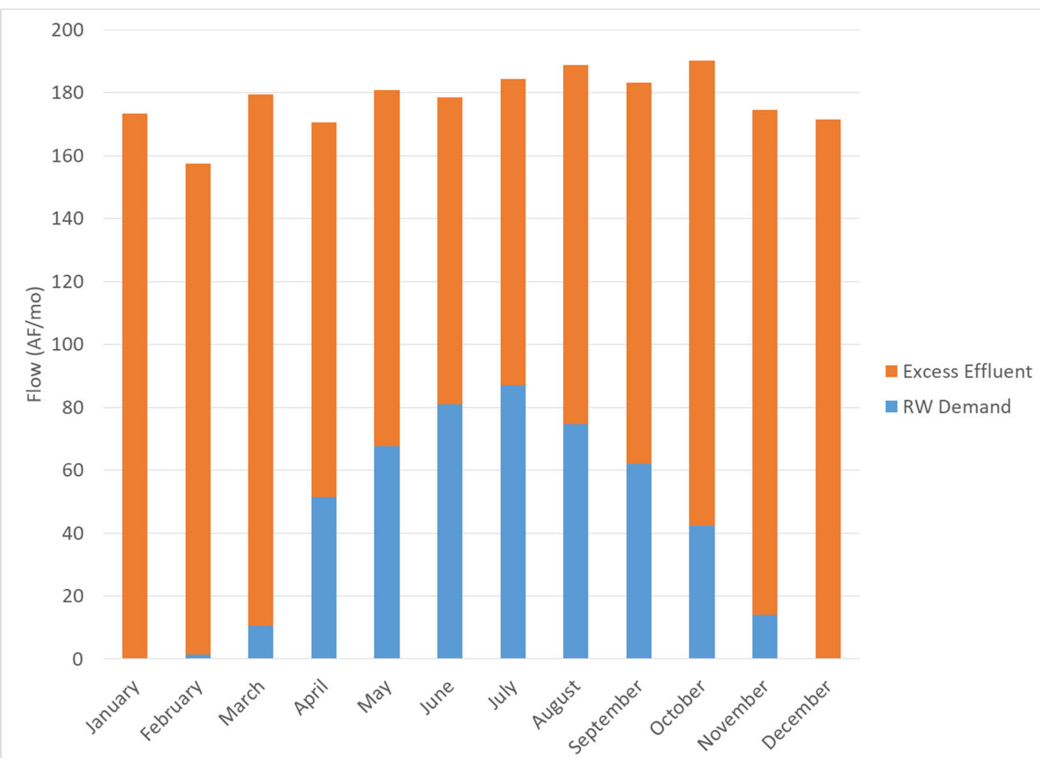

Figure ES.4 Monthly Recycled Water Balance

Beyond the regulatory requirements for recycled water effluent quality, additional water quality objectives need to be considered. Although mineral compounds are not commonly regulated in recycled water, high mineral concentrations and EC can have a detrimental effect on crops. Because traditional secondary and tertiary treatment processes do not remove inorganic ions, such as dissolved salts or minerals, future effluent concentrations are assumed to be the same as current effluent concentrations. A comparison between the City's wastewater effluent and degree of use restriction guidelines for recycled water indicate the need for a moderate level of use restriction to prevent detrimental effects to landscape crops. It is not apparent that a mineral removal treatment process is necessary for a successful recycled water system. Rather, pilot tests and salinity control measures can be taken to determine the success of recycled water implementation. Use restrictions can include more frequent irrigation to flush salts, selection of salt tolerant plant species, blending with non-recycled water, and direction of spray irrigation to avoid foliar adsorption.

ES.5.2 Effluent Disposal Alternatives

The City has the option to maintain an effluent disposal strategy similar to their existing operations, or to develop a recycled water system for effluent reuse. Even with recycled water, on-site effluent disposal capacity is needed during times when effluent flows exceed recycled water demands. It was assumed that the existing effluent disposal fields would be disked and conditioned to improve the percolation capacity. Also, new berms would be constructed to convert the fields into percolation ponds. Earthwork would improve the soil stability of the pond embankment and allow the ponds to accumulate water within the necessary freeboard requirements. It was determined the existing effluent fields provide sufficient capacity to percolate projected wastewater flows from a new treatment process.

If the City decides to pursue a recycled water system, the identified recycled water demands only comprises a portion of the wastewater effluent flows. The sizing of a recycled water system size depends not only on the demands of the identified users but also the irrigation schedule. More frequent watering reduces the equipment and infrastructure sizing by extending demands over longer durations. In addition to tertiary treatment processes at the WWTP, a recycled water system consists of storage, pumping, and distribution infrastructure. Table ES.10 presents the approximate recycled water system capital costs, excluding treatment.

Table ES.10 Approximate Recycled Water System Capital Costs

Component	Unit Cost[1]	Approximate Value	Project Cost
Recycled Water Storage			
Existing Pond Dredging and Solids Hauling	$50/WT	4,700 WT[2]	$235,000
Pond Lining	$2.50/sf	187,000 sf[3]	$467,500
Pump Station	$3,500/hp	250 hp[4]	$875,000
Distribution Piping			
Open Trench Pipe Construction (12” PVC)[5]	$250/ft	36,000 ft	$9,000,000
Jack and Bore (under Highway 101)	$1,500/ft	400 ft	$600,000
Total:			**$11,177,500**

Notes:
(1) Unit costs are developed from history of industry experience planning, modeling, and constructing recycled water and various pipeline projects.
(2) The approximate sludge hauling volume assumes the ponds can be drained to a depth of one foot and routed through the treatment process. The remaining one foot of sludge would be hauled offsite. This value could be reduced if the sludge is dewatered or allowed to dry in place for several weeks or months after the ponds are drained and prior to disposal.
(3) The liner area assumes both existing pond footprints of 230 feet by 380 feet at a depth of 5 feet.
(4) The pump station horsepower is based on the following equation: hp = headloss * flow / 3960. The headloss was calculated using the Hazen Williams equation for a four mile, 16 inch diameter pipe, a flow rate of 6.5 mgd, and a roughness factor of 130.
(5) The distribution pipeline network will vary from 16 inches in diameter down to approximately 6 inches in diameter. In order to calculate the approximate distribution system cost without developing a recycled water model, the average pipe diameter across the entire distribution system was assumed to be 12 inches.

The configuration of the treatment ponds and effluent disposal fields will be modified with the development of a recycled water system. Treatment Ponds 1 and 2 will be converted to recycled water storage, Pond 3 can be abandoned, while additional ponds will provide sufficient percolation capacity for excess effluent not used for recycled water. Figure ES.5 presents the pond configuration with recycled water.

With Recycled Water:

1. Dredge Ponds 1, 2, and 3.
2. Install a new liner in Ponds 1 and 2.
3. Abandon Pond 3.
4. Dredge and disc Ponds 4 and 5.
5. Construct new percolation ponds (6 and 7 at startup, 8 by 2035, 9 and 10 after 2040).

Figure ES.5 Effluent Pond Configuration with Recycled Water

If the City does not develop a recycled water system, all effluent from the WWTP would be sent to percolation ponds. A water balance excluding recycled water demands was developed to determine the percolation area needed. At the 2040 projected flows, 32 acres would be needed to dispose of the effluent during the worst-case month. The City has 26 acres of existing effluent disposal fields. However, based on the water balance, the City does not need additional percolation capacity until the maximum month effluent flows surpass 1.6 mgd, which based on the flows and loads analysis is not expected to occur until after 2030. Furthermore, the percolation rate assumed for the water balance may be overly conservative. With a percolation rate of 4.5 inches per day, the existing 26 acres is sufficient to dispose of the projected 2040 flows. With higher quality effluent from a new treatment process, the percolation rate may be even higher than 4.5 inches per day. Once the new treatment process is operational, studies should be done to determine the actual percolation rate and determine a more accurate water balance. If necessary, the City could convert the existing treatment ponds to percolation ponds to provide another 10 acres of percolation area.

Figure ES.6 presents a possible pond configuration without recycled water.

Without Recycled Water:

1. Dredge Ponds 1, 2, and 3 and abandon.
2. Dredge and disc Ponds 4 and 5.
3. Construction of new percolation ponds (6, 7, 8 at startup; 9 by 2035, 10 after 2040).

Figure ES.6 Effluent Pond Configuration without Recycled Water

ES.6 Treatment Alternatives Analysis

The previous chapters identified limitations with the existing pond-based treatment processes and their inability to comply with effluent standards presented in the General Permit. A new treatment plant is needed to overcome these constraints. Chapter 6 presents a financial and non-financial evaluation of treatment process alternatives capable of complying with the General Permit effluent limits. The comparison of treatment alternatives and subsequent recommended project and implementation plan present a long-term strategy to meet forthcoming regulations. The City may be investigating interim improvements, which are not considered in this report.

ES.6.1 Description of Wastewater Treatment Plant Process Elements

Regardless of the recommended treatment alternative, several common site modifications and process elements are needed to support a new treatment plant. Common improvements include an operations building, utility service, standby power, headworks, non-potable water supply, site work and existing infrastructure demolition, and decommissioning of the existing treatment ponds.

Suspended growth treatment processes are the only ones capable of reliably meeting organic and nitrogen treatment objectives. Attached growth and land-based treatment systems, , such as trickling filters and aerated ponds, are unable to meeting stringent nitrogen treatment objectives. The most common suspended growth alternatives, which are considered here, are conventional activated sludge, oxidation ditch, and membrane bioreactor (MBR).

ES.6.1.1 Secondary Treatment Alternatives

One configuration of the conventional activated sludge process is the Modified Ludzack-Ettinger (MLE). This option typically consists of rectangular, concrete, open basins, which include a smaller anoxic zone followed by larger aerobic zones. Process air is supplied in the aerobic zones by an aeration system consisting of mechanical blowers and submerged fine bubble membrane diffusers. The bubbles produced from the diffusers provide an oxygen source to achieve organics and ammonia removal, while keeping the solids in suspension. Nitrate in the mixed liquor produced during the nitrification step is then pumped from the last aerobic zone to the front of the anoxic zone by a mixed liquor return (MLR) pump where it is mixed with screened influent. The anoxic zone is unaerated and requires mixers to keep the mixed liquor in suspension. The typical conventional activated sludge process includes secondary clarifiers, which allow mixed liquor flocs to settle from the main liquid stream via gravity. Pumps send RAS and WAS to the MLE basin and solids handling processes, respectively.

Oxidation ditches are typically oval-shaped concrete, open basins consisting of one or more concentric rings. Flow is recirculated in a racetrack configuration with a smaller anoxic volume upstream to facilitate denitrification, similar to the MLE process. As the flow circulates around the basin, a mechanical arm pivots to control the flow from the aerobic zone back through the anoxic zone, similar to the function of the MLR pumps in the MLE process. The oxidation ditch basins are much larger than the MLE or MBR basins, resulting in a longer solids residence time (SRT). Since they are operated at a long SRT, they are commonly used at treatment plants that do not have primary clarifiers. The long SRT in an oxidation ditch is capable of oxidizing the volatile solids in raw sewage. Organics removal and nitrification occurs in the larger aerobic volume. The anoxic zone typically includes mixers to keep the mixed liquor in suspension.

Oxygen in the aerobic zone is supplied by vertical impeller mixers that agitate the surface of the water to introduce oxygen. The typical oxidation ditch process includes secondary clarifiers, which allow activated sludge flocs to settle from the main liquid stream. The RAS and WAS flows from the secondary clarifier are operated similarly as they are for the MLE process.

The membrane bioreactor (MBR) process is similar to MLE, except another basin housing porous hollow fiber membrane cassettes replace the need for secondary clarifiers. Because solids separation is performed with membranes instead of gravity settling, the mixed liquor suspended solids (MLSS) concentration can be much higher, up to 12,000 mg/L, compared to that of MLE or oxidation ditch, which is around 3,000 mg/L. The higher MLSS concentration results in reduced aerobic and anoxic basin volume compared to the other two processes. The membranes are capable of reducing turbidity to the levels required by Title 22 for unrestricted reuse quality effluent. Therefore, no filter is required downstream of an MBR process to produce tertiary treated effluent. Since secondary clarifiers and tertiary filters are not required with the MBR process, the overall secondary treatment facility footprint is smaller compared to other suspended growth processes. There are several considerations unique to the MBR process, including additional influent perforated screening requirements, higher blower capacity, chemical dosing, permeate pumps, and additional facilities to support required infrastructure.

ES.6.1.2 Solids Handling Alternatives

Solids handling processes include thickening, stabilization, and digestion. The level of solids treatment depends on the intended biosolids end-use. Federal regulations governing land application (40 CFR 503) vary for pathogen and vector attraction reduction requirements in the stabilization process depending on the end-product.

A dedicated thickening process is not proposed for the alternatives but can be included as part of the operation of the stabilization process. Stabilization processes considered include aerobic digestion and anaerobic digestion.

Aerobic digestion aerates the waste sludge for 40 to 60 days through the use of blowers and diffusers to achieve stabilization. Aerobic digestion is not typically used with primary sludge due to the risk of odors.

Mesophilic anaerobic digestion receives primary sludge and thickened waste activated sludge into a heated, mixed reactor. In the absence of oxygen, organic matter is degraded and volatile solids are converted to methane and carbon dioxide gases.

Dewatering processes reduces the moisture content of biosolids prior to truck hauling and disposal. This significantly reduces the hauling and tipping costs associated with biosolids disposal or reuse. Air drying is not recommended because of the area of concrete slab required, potential for significant odors, and inconsistency of biosolids quality throughout the year. The mechanical dewatering alternatives considered are screw press and centrifuge.

A screw press consists of a horizontally mounted screw conveyor that moves biosolids down a reduced diameter bowl, thereby increasing pressure along the length of the screw press, squeezing water out of the biosolids. The dewatering feed is dosed with polymer and activated in a flocculation tank to bind solids together and improve separability in the screw press. As liquid is pressed out, it separates and drains from the biosolids and flows back to the headworks to be treated. A screw press also requires high pressure wash water to periodically wash down the internal components to prevent buildup of biosolids and to maintain performance.

A decanter centrifuge is a mechanical process that operates similarly to a screw press. Biosolids are fed into an enclosed horizontal bowl and conveyor, which rotate at a high rate of speed. The centrifugal force physically separates the solids from the liquids. A tapered conveyor transports biosolids into higher pressure zones, further separating the water, or centrate. The centrate flows in the opposite direction of the solids and is sent back to the headworks. Centrifuges require polymer addition, similar to screw presses, however, they do not require washwater. The mechanical components of a centrifuge are more complicated than a screw press and therefore require additional operator attention and maintenance. Unattended extended operation is not recommended. The equipment also results in higher power costs and polymer consumption. One of the main advantages of centrifuges are their ability to produce a consistently drier cake product, around 20 to 24 percent total solids.

ES.6.1.3 Tertiary Treatment Alternatives

Tertiary treatment alternatives are identified here to address potential future facility objectives and permit compliance requirements for producing recycled water. If the City does not implement recycled water, tertiary treatment is not needed. Tertiary treatment consists of filtration and disinfection.

Filtration processes are designed to remove turbidity. Alternatives considered include MBR, cloth media disks and continuous backwash sand vessels.

Cloth media disk filters remove solids by sedimentation as well as filtration. The heavier solids settle out before reaching the filter cloth and an intermittent sludge pump removes the settled solids from the bottom of the tank. As secondary effluent flows through the filters, solids accumulate on and within the depth of the filter cloth forming a mat across the surface. As the mat forms, headloss through the cloth increases, causing the liquid level in the tank to rise. Automatic filter backwash is typically initiated based on liquid level. Flow is reversed which removes the majority of particles accumulates on the surface of the filter cloth. Depending on the filter media type, automated cleaning can also be achieved through high-pressure spray wash or chemical cleaning.

For the continuous backwash sand filter, secondary effluent is fed into a reactor halfway up the height of the sand bed depth. Water travels up through the sand bed, which filters out the solids, and filtered effluent overflows a weir. An airlift pump at the bottom of the reactor continuously lifts the solids and media into a sand washer box within the reactor near the water surface. The upflow of the filtered water separates the solids from the sand. The heavier sand falls back into the media bed and the solids collect within the wash box and overflow a separate adjustable weir. The solids in the wash water stream is sent to solids handling to be processed with the WAS.

Disinfection processes are designed to inactivate pathogens. Alternatives considered include ultraviolet light (UV) and chlorination.

Wastewater chlorination can be achieved through open concrete basin or in-pipe configurations using chlorine gas, delivered sodium hypochlorite, or onsite-generated sodium hypochlorite. For the size of this facility, an open concrete basin using delivered sodium hypochlorite is recommended. The major components of a sodium hypochlorite disinfection system are a chlorine contact basin, chemical storage tanks for bulk deliveries, chemical metering pumps, chemical piping, chemical mixing and/or injector units, and a chemical feed control system.

UV disinfection most commonly utilizes mercury amalgam to power lamps enclosed within quartz sleeves arranged in modules. When the lamps are energized, they emit UV light at a specific wavelength that inactivates pathogens by disrupting the bacteria's ability to reproduce and infect. Several configurations of UV disinfection exist for recycled water including open channel, in-vessel, and microwave. Open channel is the most common and was the only UV configuration analyzed for this report. UV design criteria is based primarily on UV transmittance (UVT) and UV dose. UVT is a measure of the quantity of UV light transmittable through wastewater, which could be reduced by color, turbidity, certain metals, TDS, TSS, and other factors. UV dose is determined for each target organism, bacteria and/or virus, according to Title 22 regulations.

ES.6.2 Evaluation of Potential Treatment Configurations

Table ES.11 presents a list of potential treatment configurations capable of meetin General Permit discharge limits, producing recycled water, and complying with Class B biosolids regulations.

Table ES.11 Initial List of Potential Treatment Configurations

Process	Element	Secondary Process				
		MLE w/o PC	MLE Exist PC	MLE New PC	Ox Ditch	MBR
Preliminary	Screening	✓	✓	✓	✓	✓
	Grit Removal	✓	✓	✓		✓
Primary	Existing Clarifiers		✓			
	New Clarifiers			✓		
Solids Stabilization	Aerobic	✓				✓
	Anaerobic		✓	✓		
	None (Sludge Holding)				✓	
Dewatering	Centrifuge	✓	✓	✓		
	Screw Press				✓	✓
Filtration	Cloth Media				✓	
	Sand	✓	✓	✓		
Disinfection	Sodium Hypochlorite				✓	
	UV	✓	✓	✓		✓

A secondary treatment biological process model was developed to determine the viability of the alternative treatment configurations, estimate effluent quality and sludge production, and determine preliminary basin sizing and return flow rates.

Alternatives with primary clarifiers and anaerobic digestion were not deemed viable. The process model indicated that BOD removal in the primary clarifiers cause carbon deficiency in the secondary process. To overcome this, a carbon source, usually in the form of methanol or acetic acid, is dosed into the secondary process. This requires routine chemical deliveries, chemical storage and metering systems, and safety certification and protocols, which adds unwanted operational complexity. Furthermore, anaerobic digestion is the only stabilization process considered to handle primary sludge. Anaerobic digestion is not considered a good fit for the

City because of it is a much more complicated process due to the additional equipment, emissions reporting, and safety procedures associated with gas handling equipment.

ES.6.3 Evaluation of Viable Treatment Configurations

Table ES.12 presents the viable treatment configurations that are evaluated in detail.

Table ES.12 Short-List of Viable Treatment Configurations

Process	Element	Secondary Process		
		MLE	Ox Ditch	MBR
Preliminary	Screening	✓	✓	✓
	Grit Removal	✓		✓
Solids Stabilization	Aerobic	✓		✓
	None (Sludge Holding)		✓	
Dewatering	Centrifuge	✓		
	Screw Press		✓	✓
Filtration	Cloth Media		✓	
	Sand	✓		
Disinfection	Sodium Hypochlorite		✓	
	UV	✓		✓

Process element sizing was developed based on results of the biological process modeling, a state-point clarifier analysis, and typical design criteria. Table ES.13 presents the unit process design criteria and sizing.

Site layouts and process flow diagrams were developed for the three viable alternatives and are presented in Chapter 6.

Table ES.13 Unit Process Design Criteria

Parameter	Units	MLE	Ox Ditch	MBR
Secondary Process				
Number of Bioreactor Basins	#	3	2	3
Total Bioreactor Volume(1)	MG	1.8	3.6	0.85
Number of Secondary Clarifiers(2)	#	3	3	0
Secondary Clarifier Diameter	ft	50	50	N/A
Solids Stabilization				
Basin Volume	MG	1.5	0.5	1.5
Dewatering				
Cake Volume	WT/d	7.5	11.8	8.8
Dewatering Structure Footprint(3)	sq ft	3,000	4,000	4,000
Filtration				
Number of Filtration Modules(4)	#	6+2	1+1	N/A
Filtration Area Footprint	sq ft	1,250	900	N/A
Disinfection				
UV Transmittance	%	55	N/A	65
UV Dose	mJ/cm^2	104	N/A	83
Chlorine Dose	mg-min/L	N/A	450	N/A
Disinfection Area Footprint	sq ft	1,250	3,000	1,250

Notes:
(1) Anoxic volume accounts for 25% of the total bioreactor volume.
(2) At 2025 projected peak flow conditions, two clarifiers are in service and one is in standby. At 2040 projected peak flow conditions, three clarifiers are in service with no standby clarifiers. Operation assumes a RAS flow rate of 50% of the influent flow rate and an SVI of 150 mL/g.
(1) The dewatering structure footprint provides for a few weeks of cake storage. A smaller footprint was provided for the centrifuge because it produces less cake. The size of the facility can be revisited after determining the desired cake storage needs.
(2) Filtration elements are sized based on a loading rate of 5 gallons per minute per square foot (gpm/sq ft). Sand filtration requires six duty and two standby 8-ft diameter filter vessels. Cloth media filtration requires one duty and one standby channel. Each channel contains ten cloth media filter disks.

ES.6.3.1 Financial Evaluation

The financial evaluation of alternatives considered the capital project cost and the annual operations and maintenance (O&M) cost to develop the 20-year life cycle costs.

Direct capital costs are based on a combination of quantity take-offs, vendor proposals, percent allowances, and lump sum values depending on the complexity of the process. Indirect cost factors include percent allowances for contingency, general conditions, contractor overhead, profit, and risk, and sales tax. The sum of direct and indirect costs is the construction cost. Design legal, administrative, and construction management costs are added to obtain the total project costs.

O&M costs summarize costs associated with electricity consumption, chemical consumption, equipment replacement and maintenance, O&M labor, and biosolids hauling. Electricity consumption is calculated based on the estimated equipment horsepower and expected operating hours. Equipment maintenance and O&M labor were estimated based on the complexity of the process. Biosolids hauling volumes were determined from the biological process model. Figures ES.7, ES.8, and ES.9 present the capital, O&M, and life cycle costs of the viable alternatives.

The oxidation ditch configuration has the lowest capital cost, followed by MBR. Although the oxidation ditch requires larger basin volumes resulting in more earthwork and concrete, there is less mechanical equipment. Although the MBR basins are smaller than the other alternatives and don't require clarifiers or downstream filtration, it has a higher secondary cost because of additional components, such as the membranes, chemical system, permeate pumps, and dedicated blowers.

The oxidation ditch configuration has the lowest O&M cost, largely because it has the least amount of mechanical equipment and the simplicity of the process compared to other alternatives requires the least operator attention. MBR has the highest O&M cost because of the system complexity and required operator attention.

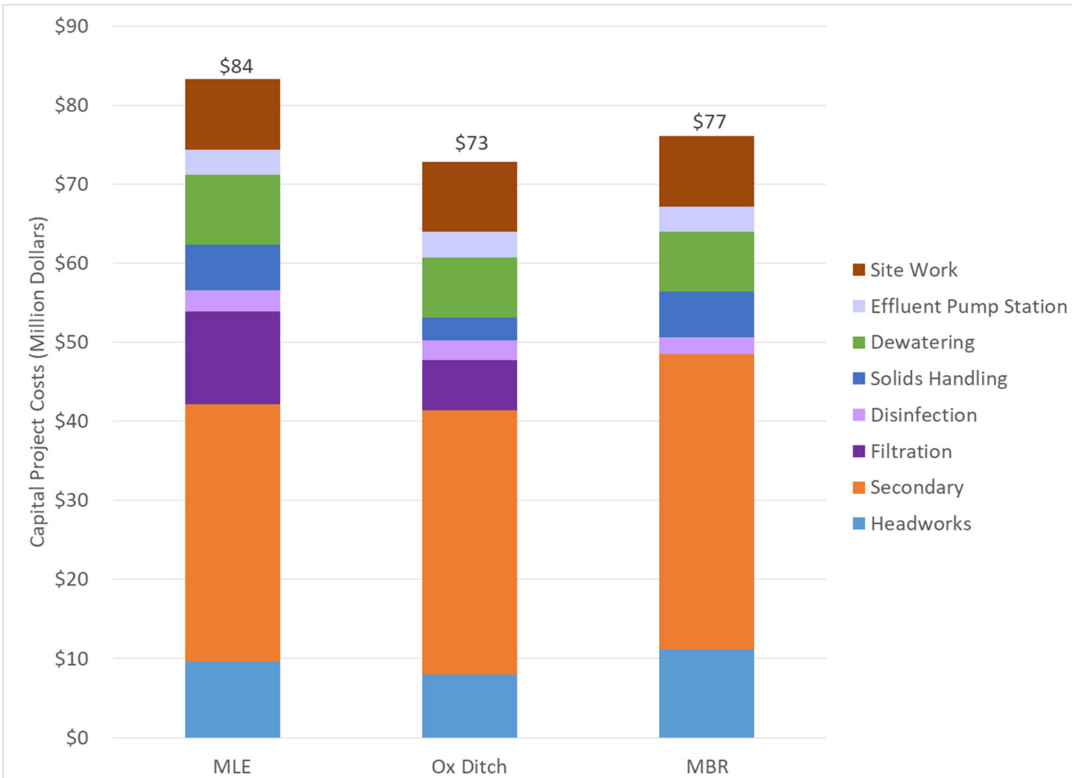

Figure ES.7 Comparison of Alternative Capital Project Costs

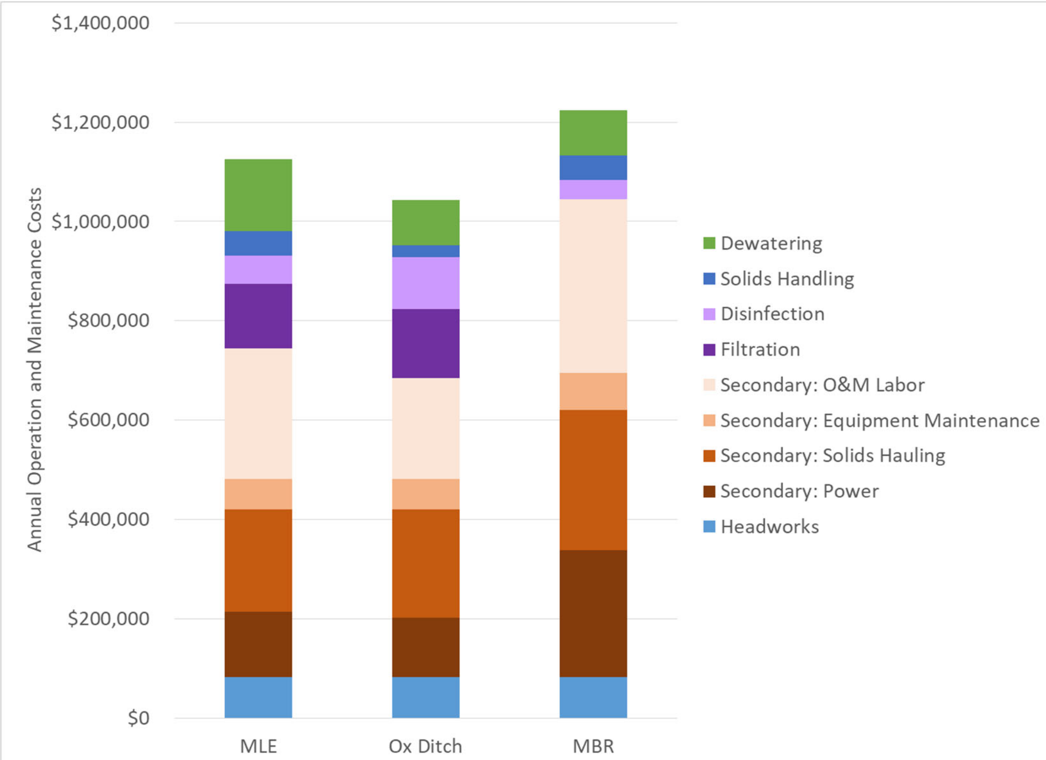

Figure ES.8 Comparison of Alternative Annual Operations and Maintenance Costs

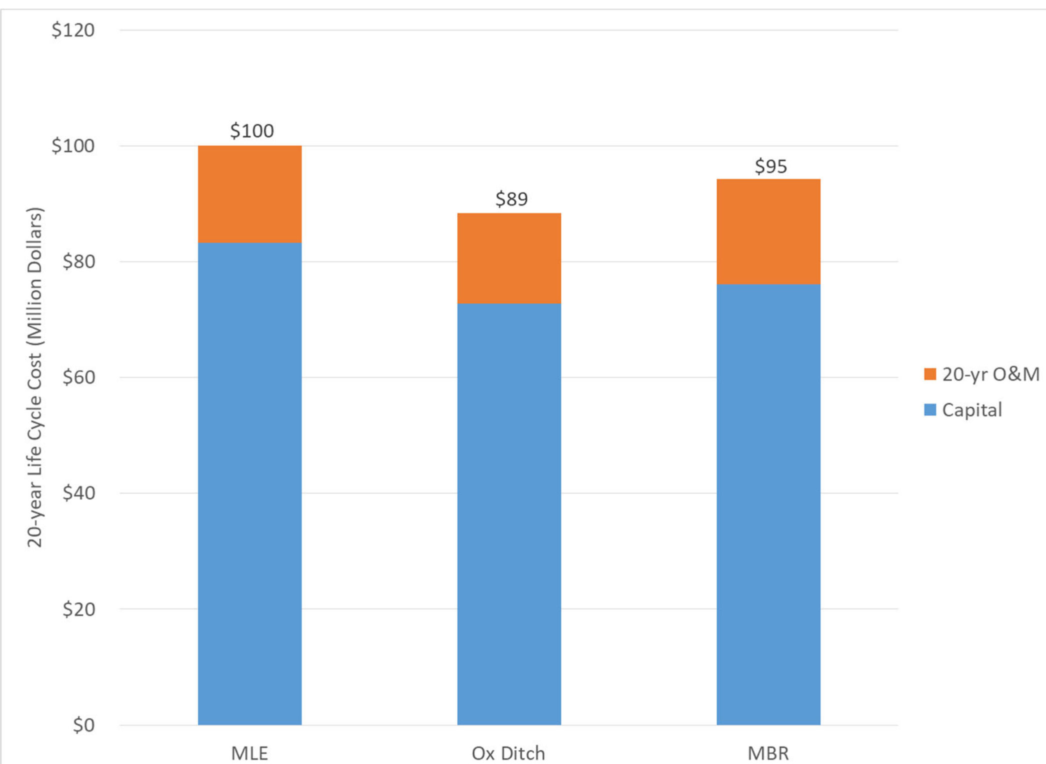

Figure ES.9 Comparison of Alternative Life Cycle Costs

ES.6.3.2 Non-Financial Evaluation

The non-financial evaluation of alternatives undergoes the following process:

1. Develop a list of criteria and weight based on relative importance.
2. Score each alternative from 1 to 3 based on the performance relative to each criteria.
3. Multiply criteria weight by alternative's score to develop total score for each alternative.

Table ES.14 presents the non-financial evaluation criteria and their relative importance.

Table ES.14 Non-Financial Evaluation Criteria Weights

Evaluation Criteria	Importance (1-3)	Weight (%)	Notes
Simplicity/ Ease of O&M	3	20	Transitioning to a new treatment process will require new skills and certification. A process without a steep learning curve is needed to ensure success.
Process Impacts and Risks	3	20	It is important to consider how each process interacts with one another and that there is flexibility to meet discharge limits even if there is a process upset.
Community Acceptability	3	20	Complaints regarding odors have been submitted in the past. It is important to address past problems and minimize their future impacts.
Facility Safety	2	13	It is important to maintain safe working conditions and not introduce avoidable risks. Site conditions with inherent risks will include risk prevention and safety measures.
Flexibility to Meet Future Regulations	2	13	Alternatives will comply with the General Permit limits. Although it is important to adapt to future conditions, stricter regulations aren't anticipated anytime soon.
Impacts on Facility Infrastructure/ Footprint	1	7	The existing site is not constrained for space and has room to expand.
Ease of Construction/ Permitting	1	7	Constructability and permitting should not be a concern with a competent design engineer and construction manager.
Total	**15**	**100**	

The three viable alternatives were scored based on their ability to meet the objectives of the non-financial evaluation criteria. Figure ES.10 presents the results of the non-financial evaluation. The oxidation ditch process is the highest ranked alternative for the non-financial evaluation because it is much simpler to operate than MLE and MBR and the larger basin volume insulates the system from upsets. MBR scored highly on the analysis for its small footprint, and flexibility to meet recycled water requirements, if that is a future driver.

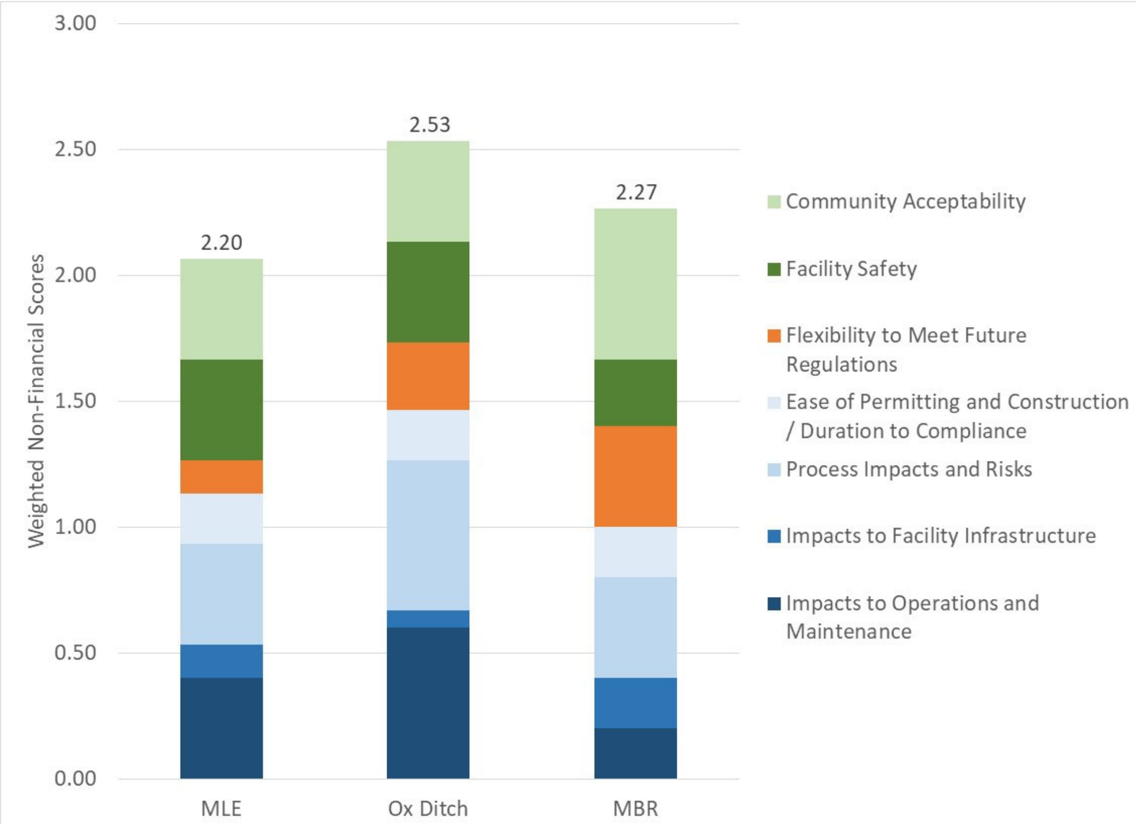

Figure ES.10 Non-Financial Evaluation Results

ES.7 Implementation Plan

ES.7.1 Recommended Project

The recommended project is the oxidation ditch process and solids handling facilities, while maintaining the existing percolation ponds for effluent disposal. Transitioning from a pond-based treatment plant to a mechanical plant will require operator training to not only achieve higher certification, but to better understand the biological process and associated mechanical equipment. The simplicity of the oxidation ditch process compared to the other alternatives is a key consideration. Based on discussions with the City, there is not a strong driver to develop a recycled water system. The analysis in Chapter 5 shows that the anticipated recycled water demands for landscape irrigation in the area would only account for roughly one quarter of the annual projected effluent flows. Furthermore, the estimated capital cost for a recycled water system is around $20M, including tertiary treatment, recycled water storage, pumping, and distribution. Additionally, annual O&M costs for recycled water system components are expected to be hundreds of thousands of dollars, when including labor costs. It is not recommended to move forward with a recycled water system at this time. Figure ES.11 presents the site layout of the recommended project.

Figure ES.11 Recommended Project Site Layout

There are a few opportunities for cost saving measures, most notably the reuse of the existing headworks structure. The alternatives analysis included a new headworks structure to provide grit removal and new flow metering. The oxidation ditch process does not require grit removal because of the size of the basin and type of secondary equipment. The viability of the existing flow metering should be evaluated and modifications can be made if necessary. An extensive hydraulic model was developed, which determined that the headloss from the furthest effluent percolation pond to the headworks is less than the elevation difference between the two elements. This means that the existing headworks structure can be integrated into the new treatment process.

Converting the primary clarifiers to secondary clarifiers is not recommended because the shallow depth of the existing structures would likely inhibit the performance of the secondary clarifiers. Additionally, phasing construction of the secondary clarifiers or aerobic digester is not recommended. Although phased construction can reduce the initial capital cost, the overall cost is higher because it requires multiple projects, which increases costs for things such as design, construction management, contractor mobilization, testing, etc.

ES.7.2 Funding Opportunities

An extensive review of potential financing mechanisms and funding opportunities is presented in Chapter 7. Financing options include Pay-as-you-go, debt financing, grants and loans, and market based programs. Based on the purpose of the WWTP Project, the following federal programs are likely viable funding sources for the future WWTP upgrades:

- EPA's WIFIA Program.
- EDA' Public Works and Economic Adjustment Assistance Programs.
- USBR's WaterSMART Water and Energy Efficiency Grant Program.

In addition, the following State funding programs are likely viable funding sources for the WWTP upgrades project:

- State Water Resources Control Board (SWRCB's) Clean Water State Revolving Fund (CWSRF) Program.
- SWRCB's Small Community Clean Water/Wastewater Funding.
- SWRCB's Proposition 1, Groundwater Grant Program (if there are groundwater impacts).
- Department of Water Resources Proposition 68, Sustainable Groundwater Management Grant Program.
- State of California's Infrastructure SRF Program (IBank).

ES.7.3 Implementation Schedule

Table ES.15 provides a breakdown of the total project cost by process area.

Table ES.15 Breakdown of Recommended Project Capital Costs

Process	Capital Project Cost ($ Millions)
Oxidation Ditch	$23.2
Secondary Clarifiers	$10.2
Solids Handling	$2.9
Dewatering	$7.6
Site Work(1)	$8.9
Total	**$52.8**

Notes:
(1) Site work includes demolition of existing infrastructure, earthwork needed to regrade around new infrastructure, dredging, and hauling of solids in the treatment ponds, and earthwork to convert the existing effluent disposal fields to percolation ponds.

Figure ES.12 presents the implementation schedule for the recommended project.

	PROJECTED IMPLEMENTATION SCHEDULE Projects	Cost (Millions)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Cost (Millions)
			Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	
	Recommended Treatment Project	$52.8												$52.8
1	Rate Study/Proposition 218	$0.3												
2	Environmental Analysis	$0.6												
3	Designer Procurement	$0.3												
4	Preliminary Design	$0.6												
5	Final Design	$2.2												
6	Bidding and Award	$0.6												
7	Mobilization	$0.6												
8	Construction	$40.7												
9	Testing and Commissioning	$1.1												
10	Construction Management	$4.8												
11	Engineering Services during Construction	$1.1												
12	Project Closeout	$0.6												

LEGEND	Planning	Procurement	Design	Bidding and Award	Construction	Project Closeout

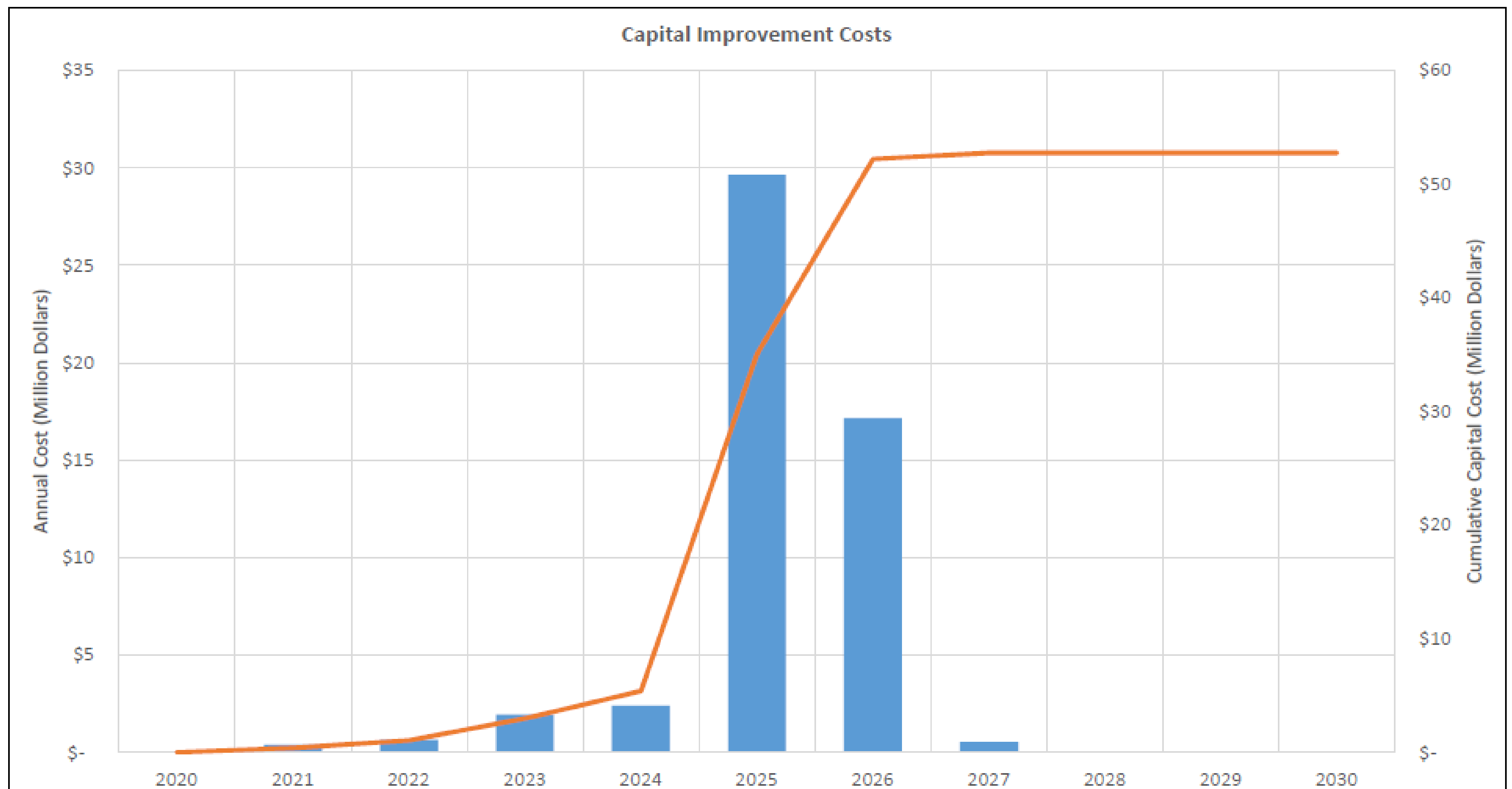

Figure ES.12 Implementation Schedule

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Chapter 1

BACKGROUND AND STUDY AREA DESCRIPTION

The City of Greenfield (City) is located in the Salinas Valley of Monterey County, California, between the Gabilan mountain range and the Salinas River to the east and the Santa Lucia mountain range to the west. Agriculture is very predominant in the area, which produces the majority of the lettuce in the country as well as various other fruits and vegetables. The area has also recently experienced a rapid expansion in cannabis cultivation.

The City retained Carollo Engineers, Inc. (Carollo) in 2019 to develop a wastewater treatment plant (WWTP) Master Plan. The City has undergone WWTP evaluations but has not previously developed a WWTP Master Plan. Recognizing the importance of developing an integrated approach to prioritizing wastewater treatment upgrades, this Master Plan will identify performance and capacity constraints at the existing WWTP, compliance with current and future regulations, and evaluate alternatives to arrive at recommended improvements. Wallace Group developed a Draft Wastewater Collection System Master Plan in January 2020 that will be leveraged for this WWTP Master Plan. This analysis considers a planning horizon through 2040.

The City owns and operates the wastewater collection, treatment, and disposal facilities that serve a population of approximately 18,000 residents. The collection system has nearly 4,000 sewer connections, most of which are residential. There are about 150 commercial connections and around ten industrial connections. The City's existing WWTP was originally constructed in 1978 and has since been upgraded and expanded several times. The WWTP consists of a headworks that includes flow metering and a bar screen to remove large debris, three primary clarifiers to remove settleable solids by gravity, and a series of aerated ponds, percolation ponds, and effluent disposal fields. Aerated ponds or treatment ponds refers to Ponds 1, 2, and 3, where the biological treatment process takes place. Percolation ponds refer exclusively to Ponds 4 and 5. Effluent from Ponds 4 and 5 is pumped from the effluent pump station to 26 acres of shallow percolation beds, referred to as effluent disposal fields. Sludge and scum from the primary clarifiers are pumped to an aerobic digester. Digested sludge is sent to sludge drying beds where the moisture evaporates. After about a year, the dried sludge is hauled offsite to a landfill. Screenings removed at the headworks are also hauled to the landfill on a weekly basis.

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Chapter 2

CURRENT AND FUTURE REGULATORY REQUIREMENTS

2.1 Current Waste Discharge Requirements (WDR)

Prior to 2002, the City's WWTP was regulated by WDR Order No. 89-19, which was adopted by the Central Coast (Region 3) Regional Water Quality Control Board (RWQCB) in February 1989. The City is currently regulated under WDR Order No. R3-2002-0062, which was adopted by the RWQCB in June 2002. WDR Order No. R3-2002-0062 is included in Appendix A. This section highlights the City's current WDR.

2.1.1 Water Quality Control Plan for the Central Coastal Basin (Basin Plan)

Because the WWTP discharges effluent within the Salinas Valley Basin, it is regulated by the Basin Plan. The Basin Plan is the RWQCB's master water quality control planning document. It designates beneficial uses and water quality objectives (WQOs) for waters of the State including surface water and groundwater. The City's current WDR lists historical, present, and anticipated beneficial uses for both groundwater and the Salinas River.

2.1.2 Monitoring and Reporting Program (MRP)

The City is currently required to comply with MRP No. R3- 2002-0062 and to submit quarterly reports in January, April, July, and October. The MRP is included in Appendix A. Required monitoring includes:

- Sampling in each aerated pond (Ponds 1, 2, and 3) and percolation pond (Ponds 4 and 5).
- Sampling of wastewater being discharged to the effluent disposal fields.
- Sampling of biosolids prior to offsite disposal.
- Sampling of receiving water (groundwater) in monitoring wells upgradient and downgradient of the disposal areas.
- Inspections of the treatment and disposal systems.
- Inflow/infiltration monitoring.
- Monitoring activities listed in the City's Salt Management Program (SMP), which is discussed in further detail in Section 2.1.6.

2.1.3 Effluent and Receiving Water Limitations

The WDR limits the monthly average wastewater flow not to exceed 1.0 million gallons per day (mgd) until facility improvements are complete. The WWTP has since installed additional pond aeration and converted the spray fields to effluent disposal fields, and now has an updated wastewater flow limit not to exceed 2.0 mgd.

Although the current WDR does not list limits for effluent water quality, there are groundwater protection requirements. The discharge of treated wastewater shall not cause groundwater measured downgradient of the disposal area to exceed the limits shown in Table 2.1.

Table 2.1 Downgradient Groundwater Limits in Current WDR

Parameter	Limit
pH	6.5 – 8.4
Total Dissolved Solids (TDS)	1,500 milligrams per liter (mg/L)
Sodium	150 mg/L
Chloride	250 mg/L
Sulfate	850 mg/L
Boron	0.5 mg/L
Nitrate (as N)	8 mg/L
Nitrite (as N)	No significant increase(1)
Total Kjeldahl Nitrogen (as N)	No significant increase(1)
Total Nitrogen (TN) (as N)	No significant increase(1)
Mineral Constituents	No significant increase(1)
Title 22 Constituents	Title 22 Maximum Contaminant Levels (MCLs)(2)

Notes:
(1) Discharge shall not cause a significant increase in the concentration of these constituents as determined by comparison of samples collected from wells upgradient and downgradient of disposal area.
(2) MCLs for chemicals and radionuclides listed in California Code of Regulations (CCR) Title 22, Division 4, Chapter 15, Articles 4 and 5. Constituents are listed in Tables 64431-A, 64442, and 64443 of the CCR.

2.1.4 Total Maximum Daily Load (TMDL)

TMDL allocations were not yet developed at the time that the current WDR was adopted, but were anticipated for siltation, nutrients, pesticides, and salinity for impaired surface waters in the Salinas River Basin. The City lies outside of any current Region 3 TMDL project areas, which indicates that the anticipated TMDLs do not impact the City. Figure 2.1 shows a map of the current Region 3 TMDL Project Areas in the vicinity of the City of Greenfield.

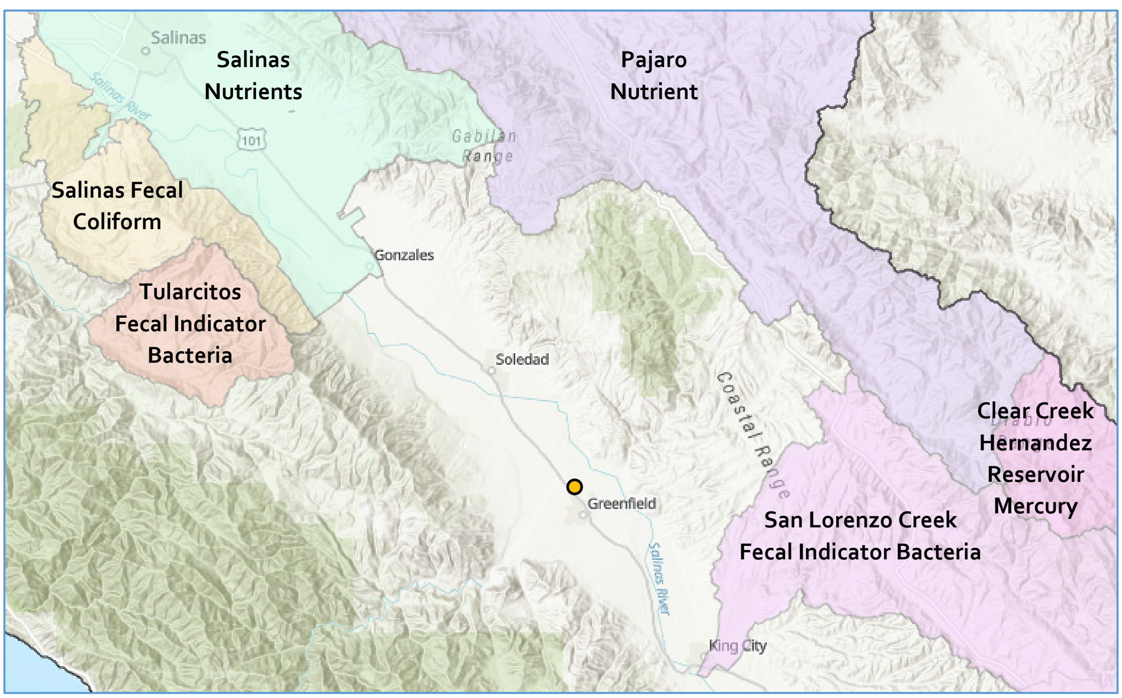

Figure 2.1 Region 3 TMDL Project Areas

2.1.5 California Environmental Quality Act (CEQA)

The City's existing facilities are currently exempt from provisions of the CEQA in accordance with CCR Section 15321, Article 19, Chapter 3, Division 6, Title 14. New or expanded wastewater systems will likely not be exempt from CEQA requirements, as detailed in Section 2.3.8.

2.1.6 SMP/Engineering Report

Pursuant to Provisions 5 and 6 of the current WDR, the City was required to submit an SMP Report that contains recommendations for managing salts and an Engineering Report that addresses whether the existing monitoring wells adequately represent the groundwater upgradient and downgradient of the WWTP and disposal areas. The City's Wastewater Disposal Report submitted in September 2003 addressed these requirements.

2.1.7 Other Key Prohibitions and Specifications in the Current WDR

The current WDR lists prohibitions and specifications that protect the public, adjacent property, drainage-ways, surface water, and groundwater from the discharge of treated, partially treated, or untreated wastewater. Specifications for the proper handling of solids, storm water, and inflow and infiltration are also included. Some key points are listed below:

- The aerated ponds and percolation ponds must have a freeboard of two feet (ft) or greater at all times.
- Discharge to the effluent disposal fields shall be alternated to permit emptying for maintenance purposes, and percolation ponds shall be dried and disked at least annually.
- Discharging to the effluent disposal fields shall not occur during rain events and shall not cause ponding or runoff beyond the property boundary. Discharge to effluent disposal fields shall be rotated at least weekly to allow fields to dry.

2.2 Past Concerns and Instances of Non-Compliance

- In June 2003, a RWQCB inspector noted inadequate pond freeboard and the accumulation of pond vegetation. It was noted that these concerns stem mainly from plant operational issues and organic overloading of the aerated ponds.
- In a March 2004 letter, the Regional Board expressed concerns that the organic loading criteria used for the aerated ponds exceeded typical design values and that the effluent disposal capacity was not adequately addressed.
- In November 2004, the City was cited for significant ponding in the lower disposal area.
- In February 2006, a RWQCB inspector noted standing water and noticeable odor in the disposal fields.

- In an August 2013 letter to the RWQCB, the City requested that their WDR be changed to reflect the conversion of their 26 acres of spray fields into effluent disposal fields via shallow percolation beds. Due to a lack of proper operations and maintenance of the percolation ponds and the effluent disposal fields, percolation rates and resulting disposal capacity have greatly reduced in all of the disposal areas. To increase capacity, the City has modified the disposal fields by building berms and forming nine individual fields. The City also disked and conditioned the bottom of the 26 acres of disposal fields to improve percolation rates. The RWQCB has not revised the WDR to reflect these upgrades.
- A May 2018 report submitted to the RWQCB by the City describes an instance of non-compliance in which treated effluent in disposal field 7 discharged into both disposal fields 5 and 6, compromising a berm and causing effluent to spill onto an adjacent City-owned property. The RWQCB issued a Notice of Violation (NOV) for this incident. In response, the City has performed additional studies and monitoring, developed a work plan, and has initiated this WWTP master plan.

2.3 General WDR Order No. R3-2020-0020 (General Permit)

The General WDR Order No. R3-2020-0020 (General Permit), included in Appendix B of this regulatory overview, was adopted by the Central Coast Water Board on September 25, 2020. Many domestic wastewater systems with flows greater than 100,000 gallons per day (gpd) will be eligible for coverage under the General Permit. (Wastewater systems with average flow rates of 100,000 gallons per minute (gpm) or less may be regulated by State Water Resources Control Board [SWRCB] Order WQ 2014-0153-DWQ.) Although seeking coverage under the General Permit is not compulsory at this time, it is the goal of the RWQCB to enroll as many facilities as possible via a phased schedule.

Discharges to land from wastewater systems that are currently regulated through individual permits often share common characteristics such as constituents of concern, concentrations, disposal techniques, flows, and treatment methods. The General Permit is intended to reduce the need for individual permits for wastewater systems with common characteristics.

To enroll under the General Permit, a wastewater system must submit a Form 200 Report of Waste Discharge (ROWD) or Notice of Intent (NOI) to the RWQCB (as well as a Title 22 Engineering Report if the wastewater system intends to implement water recycling). The RWQCB will then issue a Notice of Applicability (NOA) to any wastewater systems that qualify for authorization under the General Permit. The NOA provides notice of authorization of wastewater discharge under the General Permit and conditional acceptance of the Title 22 Engineering Report (if applicable). The NOA specifies compliance criteria and monitoring and reporting requirements. To avoid multiple permits with overlapping requirements on the same discharge, an existing individual permit will be terminated upon issuance of the NOA.

Table 2.2 lists a summary of typical domestic wastewater and treated wastewater characteristics as shown under Finding 11 in the General Permit and a comparison to the City's wastewater.

Table 2.2 Summary of Domestic Wastewater Characteristics(1)

Parameter	Typical Domestic Wastewater (mg/L)	Greenfield WWTP Influent (mg/L)(2)	Typical Secondary Treatment Effluent (mg/L)	Greenfield WWTP Effluent (mg/L)(2)
Biochemical Oxygen Demand (BOD)	200-290	350	30-45	100
Total Suspended Solids (TSS)	200-290	325	30-45	80
Ammonia (as N)	6-18	(3)	0-65	(3)
Nitrite and Nitrate (as N)	<1	<1	0-65	<1
TN	35-100	65	5-35	65
Total Phosphorus (as P)	6-12	(3)	0-10	(3)

Notes:
(1) Source: modified from Table 1 of the Central Coast RWQCB, General Waste Discharge Requirements Order No. R3-2020-0020, adopted September 2020.
(2) Average City influent and effluent data from 2016 through 2019.
(3) Data not available.

2.3.1 Basin Plan

The General Permit implements the Basin Plan and requires permitted wastewater systems to comply with all requirements, prohibitions, and WQOs of the Basin Plan.

The Basin Plan offers guidance on the management of surface and groundwater in the Central Coast Region to provide the highest water quality possible for its many beneficial uses. Major pieces of the Basin Plan (June 2019 Edition) include:

- **Present and Potential Beneficial Uses** – Once beneficial uses are identified, compatible water quality standards and necessary level of treatment can be established to protect these beneficial uses. Municipal/domestic supply, industrial service supply, and agricultural supply are the three beneficial uses for groundwater listed in the General Permit.
- **WQOs** – WQOs are established to satisfy State and federal requirements to protect beneficial uses and prevent nuisance. General and specific objectives for different uses and different waters are included.
- **Implementation Plan** – The program of implementation includes a description of actions which are necessary to achieve objectives, a time schedule for these actions, and a description of monitoring and surveillance to determine compliance. Waste Discharge Requirements (WDRs) are included as part of the implementation plan.
- **Plans and Policies** – Many plans and policies direct actions or clarify the intent of the SWRCB and RWQCB. These include the Anti-degradation Policy, Reclamation Policy, Sources of Drinking Water Policy, Ocean Plan, Discharges of Municipal Solid Waste Policy, and several others.
- **Monitoring and Assessment** – A comprehensive and systematic monitoring and assessment program provides scientific information on water quality and offers a way to evaluate the effectiveness of a water quality control program.

2.3.2 TMDLs

Although the 2019 Basin Plan includes several new TMDLs that were approved and adopted since the City's current individual WDR was adopted, these TMDLs are for impacted waters and waterbodies outside of the immediate influence of the City's WWTP discharge. As described in Section 2.1.4, the City does not lie within any of the Region 3 TMDL project areas.

2.3.3 Treated Wastewater Disposal

The City disposes of its treated effluent via percolation in Pond 4, Pond 5, and 26 acres of effluent disposal fields. The General Permit includes language on general actions that a wastewater system can take to reduce threats to surface and groundwater quality, to prevent nuisance odors, and to protect public health. Specifications for Ponds and Land application are discussed in more detail in the Prohibitions and Specifications section.

2.3.4 Recycled Water

The General Permit allows for the production and use of recycled water under Title 22 and Title 17 requirements. It also allows for the land application of treated wastewater that does not meet Title 22 requirements. Not only is the use of recycled water encouraged, but it is a goal of the Recycled Water Policy set forth by the SWRCB to maximize the use of recycled water where groundwater supplies are over drafted as determined by the Sustainable Groundwater Management Act (SGMA). SGMA is described in Section 2.4 of this regulatory overview.

To demonstrate compliance with Water Recycling Criteria contained in CCR Sections 60301 through 60355, the City must submit a Title 22 Engineering Report to the RWQCB and Division of Drinking Water (DDW) before recycled water projects can be implemented. These criteria prescribe recycled water quality and treatment requirements for various uses, recycled water use area requirements, and treatment facility reliability features.

2.3.5 Pretreatment Program

Pretreatment programs are intended to prevent interference or pass-through at WWTPs, protect opportunities to reuse wastewater or biosolids, and protect the public or City employees from hazardous substances. Pretreatment programs are required for WWTPs that treat an average dry weather flow of 5.0 mgd or more or for wastewater systems for which the RWQCB deems a pretreatment program necessary.

If a pretreatment program is required, a wastewater system must:

- Submit a Pretreatment Program Plan as described in Section 2.3.12 of this regulatory overview.
- Comply with pretreatment requirements in Code of Federal Regulations (CFR), Title 40, part 403, and implement and enforce its pretreatment program.
- Enforce requirements in sections 307(b), 307(c), 307(d), and 402(b) of the Clean Water Act and cause industrial users to achieve compliance. These sections provide guidance and authority for wastewater systems to establish pretreatment regulations and standards for controlling discharges to their WWTPs.
- Perform pretreatment functions in CFR part 403.8(f) such as implementing legal authorities, enforcing pretreatment requirements in CFR parts 403.5 and 403.6, implementing programmatic functions as provided in CFR part 403.8(f)(2), and providing funding and personnel to implement the pretreatment program.

Although the City's flow is currently 1.0 mgd, less than the 5.0 mgd threshold, pretreatment programs are sometimes still deemed necessary. A Cannabis Facility Evaluation Memorandum (Wallace Group; 2020) outlined recommendations for the development of a sewer pretreatment program for cannabis facilities. Another consideration that may impact a potential pretreatment program would be the two cannabis facilities on Cherry Avenue discharging to the WWTP. Both facilities cultivate cannabis, manufacture cannabis products with volatile extraction processes to extract tetrahydrocannabinol (THC) and cannabidiol (CBD), and run onsite reverse osmosis (RO) systems, sending their brine to the sewers. Both facilities are planning to nearly double their operations in the near future. Furthermore, additional planned cannabis facilities are forthcoming, which will likely utilize RO treatment and want to discharge their brine into the sewer. The 2020 Draft Sewer Collection Master Plan (Wallace Group) lists known future cannabis facilities. Salinity is of increasing concern throughout the state, and stricter discharge limits are being considered. As cannabis operations expand within the service area and increase the salinity loading to the WWTP, a pretreatment program may be necessary to meet salinity discharge objectives.

Even if not required to implement a full pretreatment program for national approval, the City may elect to establish pretreatment program elements to protect the WWTP and potential future water recycling opportunities. In this case, the City would not be obliged to meet all of the requirements of a fully-fledged pretreatment program.

2.3.6 Antidegradation Analysis

State Water Board Resolution No. 68-16, referred to as the Antidegradation Policy, contains the following language:

> *Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*
>
> *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*

Unless limited degradation is consistent with maximum benefit to the people of the state, dischargers must implement best practicable treatment or control to maintain the high quality of waters of the state. The General Permit authorizes limited degradation if it is consistent with the Antidegradation Policy. The General Permit includes effluent limits, the implementation and monitoring of which will results in the best practicable treatment or control of wastewater constituents.

2.3.7 Title 27 Exemption

The activities of wastewater systems regulated by the General Permit are exempt from the requirements of CCR Title 27, Section 20005 and subsequent sections, which regulate the treatment, storage, processing, and disposal of solid waste.

2.3.8 CEQA

Wastewater systems that are operating or under construction prior to the adoption date of the General Permit are exempt from the requirements of CEQA in accordance with CCR Section 15321, Article 19, Chapter 3, Division 6, Title 14.

However, new or expanded wastewater systems may not be covered by the General Permit until after CEQA requirements have been satisfied. If the City moves forward with expanding or replacing the WWTP, the City will have to comply with CEQA requirements.

The CEQA process for a proposed project starts with an Initial Study. If the Initial Study finds that the proposed project will have no potential for significant impacts, a Negative Declaration can be issued. California Public Resources Code Section 21080 covers situations for which a Negative Declaration may apply. If the Initial Study shows evidence that the project will impact the environment, then an Environmental Impact Report (EIR) must be prepared.

2.3.8.1 EIR Contents

In addition to a table of contents, project description, and discussion of the environmental setting, an EIR must contain the following components:

- Consideration and discussion of significant environmental effects of the proposed project such as energy impacts, effects which cannot be avoided, changes caused by the proposed project, and growth-inducing impact of the proposed project.
- Mitigation measures proposed to minimize significant effects such as those related to historical resources, those related to greenhouse gas emissions, and mitigation measures in general.
- Alternatives to the Proposed Project.
- Limitations on the Discussion of Environmental Impact.
- Effects Not Found to be Significant.
- Organizations and Persons Consulted.
- Discussion of Cumulative Impacts.
- Economic and Social Effects.

2.3.8.2 Environmental Impacts

In evaluating the environmental effects of a proposed project, the 2019 CEQA Statute and Guidelines offer guidance on consideration of the following categories of impacts:

- Aesthetics.
- Agriculture and Forestry Resources.
- Air Quality.
- Biological Resources.
- Cultural Resources.
- Energy.
- Geology and Soils.

- Greenhouse Gas Emissions.
- Hazards and Hazardous Materials.
- Hydrology and Water Quality.
- Land Use and Planning.
- Mineral Resources.
- Noise.
- Population and Housing.
- Public Services.
- Recreation.
- Transportation.
- Tribal Cultural Resources.
- Utilities and Service Systems.
- Wildfire.
- Mandatory Findings of Significance.

2.3.9 MRP

All wastewater systems enrolled under the General Permit are subject to the requirements of the MRP (included in Appendix B). The requirements include:

- Sampling and analysis.
- Water supply monitoring.
- Influent and effluent monitoring.
- Land application area, percolation pond, and spreading basin monitoring.
- Solids disposal monitoring.
- Groundwater monitoring.
- Reporting requirements.
- Legal requirements.

2.3.10 Water Supply Monitoring

Raw water supply must be sampled and analyzed for constituents listed in Table 2.2 of the General Permit MRP and included here as Table 2.3. The City may request RWQCB approval to submit a well identification number and consumer confidence report in lieu of the required sampling.

Table 2.3 Water Supply Monitoring Requirements

Parameter	Units	Sample Type	Monitoring Frequency
Nitrate (as N)	mg/L	Grab	Annually
TDS	mg/L	Grab	Annually
Chloride	mg/L	Grab	Annually
Sodium	mg/L	Grab	Annually
Sulfate	mg/L	Grab	Annually
Boron	mg/L	Grab	Annually
Carbonate	mg/L	Grab	Annually
Bicarbonate	mg/L	Grab	Annually
Calcium	mg/L	Grab	Annually
Potassium	mg/L	Grab	Annually
Magnesium	mg/L	Grab	Annually

2.3.11 Influent and Effluent Monitoring

Different monitoring requirements are given in the MRP for different wastewater system types. If the City was to maintain their aerated ponds and percolation ponds, the pond monitoring and influent and effluent monitoring requirements listed in Tables 4A, 4B, and 4C of the General Permit MRP would apply. However, if the City was to upgrade their treatment plant to an activated sludge process, the influent and effluent monitoring requirements listed in Tables 6A and 6B of the General Permit MRP would apply. These tables are included here respectively as Tables 2.4, and 2.5. The monitoring listed in Table 2.5 is only required if the wastewater system receives significant amounts of fats oils and grease (FOG), phenol, formaldehyde, or zinc.

Table 2.4 Influent and Effluent Monitoring Requirements for Activated Sludge Systems

Parameter	Units	Influent Sample Type	Influent Sampling Frequency	Effluent Sample Type	Effluent Sampling Frequency
pH	S.U.(1)	Grab	Weekly	Grab	Weekly
BOD_5(1)	mg/L	24-hour composite	Quarterly	Grab	Monthly
TSS	mg/L	24-hour composite	Quarterly	Grab	Monthly
Settleable Solids	mg/L	NA	NA	Grab	Weekly
TN	mg/L	Calculated	Quarterly	Calculated	Monthly
Nitrate (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Nitrite (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
TKN(1) (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Ammonia (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
TDS	mg/L	24-hour composite	Quarterly	Grab	Monthly
Chloride	mg/L	24-hour composite	Quarterly	Grab	Monthly
Sodium	mg/L	24-hour composite	Quarterly	Grab	Monthly
Sulfate	mg/L	24-hour composite	Quarterly	Grab	Monthly
Boron	mg/L	NA	NA	Grab	Monthly
Carbonate	mg/L	NA	NA	Grab	Semiannually
Bicarbonate	mg/L	NA	NA	Grab	Semiannually
Calcium	mg/L	NA	NA	Grab	Semiannually
Potassium	mg/L	NA	NA	Grab	Semiannually
Magnesium	mg/L	NA	NA	Grab	Semiannually

Notes:
(1) BOD_5 – 5-day biochemical oxygen demand; S.U. – standard units; TKN – Total Kjeldahl Nitrogen.

Table 2.5 Effluent Monitoring for Select Constituents for Pond Systems

Parameter	Units	Sample Type	Monitoring Frequency
Oil and Grease	mg/L	Grab	Monthly
Phenol	micrograms per liter (µg/L)	Grab	Monthly
Formaldehyde	µg/L	Grab	Monthly
Zine	mg/L	Grab	Monthly

2.3.11.1 Land Application and Percolation Pond Monitoring

Because effluent is discharged to disposal fields, the City would be required to comply with monitoring requirements listed in Table 8 of the General Permit MRP and included here respectively as Table 2.6. Although the City has converted its spray fields to disposal fields through the addition of berms, the current WDR has not been revised to recognize this change, and it is unclear at this time whether these would be treated as percolation ponds or land application areas under the General Permit.

Table 2.6 Monitoring of Land Application Area and Percolation Ponds

Parameter	Units	Sample Type	Monitoring Frequency
Supplemental Irrigation	gpd	Metered/Estimated	Daily
Local Precipitation	inches/day	Weather Station	Each precipitation event
Acreage Applied	Acres	Measured	Daily
Application Rate	gpd	Metered/Estimated	Daily
BOD_5 Applied	lbs/acre/day	Calculated	Monthly
TN Applied	lbs/acre/day	Calculated	Monthly
Salts (TDS, sodium, chloride, sulfate, boron) Applied	lbs/acre/day	Calculated	Monthly
Soil Erosion Evidence	NA	Observation	Monthly
Containment Berm Condition	NA	Observation	Monthly
Soil Saturation/Ponding	NA	Observation	Monthly
Nuisance Odors/Vectors	NA	Observation	Monthly
Discharge Offsite	NA	Observation	Monthly

2.3.11.2 Groundwater Monitoring

If it can be demonstrated that the wastewater effluent quality can meet effluent limitations specified in Section 2.3.18.1 (Table 3, 4, or 5 of the General Permit), the City may choose not to implement a groundwater monitoring program.

If the City is unable to comply with the effluent limitations, a groundwater monitoring program may be required to demonstrate that effluent discharge is not degrading underlying groundwater quality. Requirements for installing a new groundwater monitoring well network are detailed in Section VI.B of the MRP. The discharger must submit a groundwater monitoring work plan and preliminary hydrogeologic conceptual site model within 120 days of issuance of the NOA, install the approved groundwater monitoring well network with 90 days of receiving RWQCB approval, and must implement an approved sampling and analysis plan to include groundwater monitoring requirements.

Table 2.7 lists the minimum groundwater monitoring requirements for each monitoring well.

Table 2.7 Minimum Groundwater Monitoring Requirements

Parameter	Units	Sample Type	Monitoring Frequency
Groundwater Elevation	0.01 ft	Calculated	Quarterly
Depth to Groundwater	0.01 ft	Measurement	Quarterly
Gradient	ft/ft	Calculated	Quarterly
Groundwater Flow Direction	degrees	Calculated	Quarterly
TN	mg/L	Calculated	Quarterly
Nitrate (as N)	mg/L	Grab	Quarterly
Nitrite (as N)	mg/L	Grab	Quarterly
Total Kjeldahl Nitrogen (as N)	mg/L	Grab	Quarterly
Ammonia (as N)	mg/L	Grab	Quarterly
TDS	mg/L	Grab	Quarterly
Chloride	mg/L	Grab	Quarterly
Sodium	mg/L	Grab	Quarterly
Sulfate	mg/L	Grab	Quarterly
Boron	mg/L	Grab	Quarterly
Carbonate	mg/L	Grab	Semiannually
Bicarbonate	mg/L	Grab	Semiannually
Calcium	mg/L	Grab	Semiannually
Potassium	mg/L	Grab	Semiannually
Magnesium	mg/L	Grab	Semiannually
pH	S.U.	Meter	Quarterly
DO	mg/L	Meter	Quarterly
Electrical Conductivity (EC)	microsiemens per centimeter (µS/cm)	Meter	Quarterly
Oxidation Reduction Potential (ORP)	millivolts (mV)	Meter	Quarterly
Temperature	degrees Celsius (°C)	Meter	Quarterly
Phenol	mg/L	Grab	Quarterly
Formaldehyde	mg/L	Grab	Quarterly
Zinc	mg/L	Grab	Quarterly

2.3.11.3 Reporting Requirements

Reporting requirements in the MRP include required reporting frequencies (quarterly and annually), required non-compliance report, and the requirement for electronic submittals. In addition, a description of the required technical reports is included. These are summarized in the following sections.

2.3.12 Pretreatment Program Plan

If directed by the RWQCB to develop a pretreatment program, the City would be required to submit a plan within 24 months of issuance of an NOA. The Pretreatment Program Plan must provide a long-term plan for addressing pretreatment requirements and must contain an implementation schedule and identification of adequate funding.

2.3.13 Operations and Maintenance (O&M) Manual

The City will be required to submit an O&M Manual to the RWQCB within 12 months of issuance of an NOA. The O&M Manual must contain the following components, each of which is detailed in the General Permit MRP and must be sufficient to assure compliance with the General Permit and NOA:

- Sampling and Analysis Plan.
- Sludge Management Plan.
- Land Application Area Management Plan.
- Spill Prevention and Emergency Response Plan.
- Training Records Log.

2.3.14 Climate Change Adaptation Plan

The City will be required to submit a Climate Change Adaptation Plan to the RWQCB within 24 months of issuance of an NOA. The Climate Change Adaptation Plan must contain the following components, each of which is detailed in the General Permit MRP:

- Hazards and Vulnerabilities.
- Resiliency Actions.
- Adaptation Strategies.
- Recycled Water Feasibility Plan (for wastewater systems with design flows over 1 mgd).

2.3.15 Salt and Nutrient Management Plan (SNMP)

The City would be required to submit a SNMP if directed to do so by the RWQCB. SNMPs ensure that the impact of treated wastewater and/or non-potable water recycling projects do not degrade groundwater quality. The SNMP must include a program to reduce mass loading of salts and nutrients (with an emphasis on nitrogen species) in treated effluent to ensure compliance with effluent limitations and protect beneficial uses of the groundwater. The program should identify potential salt contributors to the WWTP and describe nutrient source control measures and treatment processes optimization for nitrogen removal.

Because of the salt contribution to the City's WWTP by the cannabis facilities, it is possible that the City will be required to submit a SNMP.

2.3.16 Other Regulatory Requirements

The General Permit addresses other regulatory requirements including:

- **Statewide General WDR Order No. 2006-0003-DWQ** – this document contains statewide regulatory requirements for all sanitary sewer systems including considerations for system overflows, sewer system management plans (SSMPs), FOG control plans, and others.
- **California Water Code (CWC) Section 13241** – this code states that each RWQCB shall establish water quality objectives in water quality control plans to protect the beneficial uses considering several factors including environmental characteristics, economics, housing, recycled water, etc.
- **Human Right to Water** – RWQCB resolution No. R3-2017-0004 recognizes the human right to water as a core value, and the General Permit incorporates the human right to water by containing requirements that will protect drinking water beneficial use.
- **Climate Change** – The General Permit addresses the threat of climate change by requiring the submission of a Climate Change Adaptation Plan consistent with the MRP.
- **Disadvantaged Community Status** – A disadvantaged community is defined as one with an annual median household income less than 80 percent of the statewide annual median household income. 12 cities and 36 census block groups in the Central Coast region have been designated as disadvantaged communities.
- **CWC Section 13263(i)** – this code gives the SWRCB or RWQCB authority to establish general WDRs for wastewater systems with similar operations, wastes, or treatment standards.
- **CFR, Title 40, Section 133.105** – Because pond systems often cannot comply with technology-based BOD and TSS effluent limits, the United States Environmental Protection Agency (USEPA) has developed equivalent secondary treatment standards.
- **CWC Division 7** – Compliance with the General Permit should ensure compliance with water quality provisions in this code and any more stringent effluent limits to implement water quality control plans, protect beneficial uses, and prevent nuisance.
- The General Permit does not supersede the authority of municipalities, flood control agencies, or other local agencies.

2.3.17 Prohibitions and Specifications

A list of general prohibitions for wastewater systems related to treatment, storage, discharge, recycled water, and impacts to groundwater are listed in Section III of the General Permit. Some of the key prohibitions highlighted here include the following:

2.3.17.1 Setbacks

Table 2.8 summarizes the setback requirements for different activities of the wastewater system. In cases where two setbacks are shown, different setbacks are established by different sets of codes. These are listed in Table 2 of the General Permit.

Table 2.8 Wastewater System Setbacks

Equipment/ Activity	Domestic Well (ft)	Flowing Stream (ft)	Ephemeral Stream Drainage (ft)	Property Line (ft)	Lake, Wetland, or Reservoir (ft)
Aerobic Treatment Unit, Treatment System, or Collection System	100 50	50	50	5	200 50
Seepage Pit	150	150	50	8	200 150
Land Application Area (disinfected tertiary recycled water)	50	25	50	25	200
Land Application Area (disinfected secondary-2.2 or secondary-23 recycled water)	100	50	50	100 50	200
Land Application Area (undisinfected secondary recycled water, undisinfected secondary treated wastewater)	150	100	100	100 50	200
Impoundment (disinfected tertiary recycled water)	100	100	100	50	200
Impoundment (disinfected secondary-2.2 or secondary-23 recycled water)	100	100	100	50	200
Impoundment (undisinfected secondary recycled water, undisinfected secondary treated wastewater)	150	150	150	50	200

2.3.17.2 Pond System

- All treatment ponds must be lined (Ponds 1, 2, and 3).
- All ponds must maintain two feet of freeboard at all times.
- If spills occur at the ponds, the RWQCB may require a pond upgrade sized for 100-year annual precipitation distributed monthly with two feet of freeboard.
- A lower standard for the return annual total precipitation value may be allowed with the approval of a technical report describing operational measures to prevent wastewater spills.
- Mosquitos and burrowing animals must be controlled at the ponds.
- An approved Sludge Management Plan must be implemented and complied with prior to the removal, drying, treatment, or disposal of sludge for pond maintenance.

2.3.17.3 Land Application

Although the City converted its 26-acre spray field area to disposal fields through the building of berms, the RWQCB has not formally recognized this conversion in the current WDR, and it is unclear whether the change will be recognized under the General Permit. If the disposal area will continue to be regulated as a land-application area, the following specifications will apply:

- Effluent must not be applied with 24 hours of forecasted precipitation with greater than 50 percent probability.
- Spray irrigation is prohibited when wind speeds exceed 30 miles per hour.
- Ponding, runoff, and erosion must be prevented.
- Discharge of effluent from the application area is prohibited.
- If undisinfected wastewater is applied, stormwater runoff from the land application area is prohibited.
- If stormwater can run off from the land application area, applied water must at a minimum meet Title 22 disinfected secondary-23 recycled water standards.
- If recycled water is applied, it must comply with Title 22 water recycling criteria, the General Permit, the NOA, a conditionally accepted Title 22 Engineering Report, and DDW conditions.
- Signs and fences must be used to protect the public from contact with wastewater or recycled water.
- All setback requirements in Table 14 must be met.
- Mosquitos must be controlled in the land application area.

2.3.17.4 Biosolids Disposal

- To ensure optimal plant operation, solid waste must be removed from screens, sumps, tanks, and ponds.
- Treatment and temporary storage of sludge or biosolids must be on the wastewater system property.
- Leaching, runoff, and infiltration to soil and groundwater must be prevented.
- The state regulations for the treatment, storage, processing, and disposal of biosolids are covered in CCR Title 27, Division 2.
- Federal regulations for the use and disposal of biosolids are covered in 40 CFR 503.
- The RWQCB must be notified of modifications to an approved sludge management plan as part of an emergency action within five days of disposal.

To provide more detail on the requirements of both the state and federal regulations for biosolids treatment, storage, disposal, and use, a separate biosolids analysis may be needed.

CCR Title 27, Division 2

Chapter 1. General - Purpose, Scope and Applicability of this Subdivision.

Chapter 2. Definitions – Statutory and Specific Definitions.

Chapter 3. Criteria for All Waste Management Units, Facilities, and Disposal Sites – includes general topics such as ownership and responsibility for compliance; siting and design topics such as waste classification, site classification, and construction standards; water monitoring topics such as water standards, constituents of concern, concentration limits, points of compliance,

compliance period, system requirements, monitoring program, and corrective action program; criteria for landfills and disposal sites; and closure and post-closure maintenance.

Chapter 4. Documentation and Reporting for Regulatory Tiers, Permits, WDRs, and Plans – California Integrated Waste Management Board requirements, development of WDRs and Solid Waste Facility Permits, development of maintenance plans, and corrective action requirements.

Chapter 5. Enforcement – covers SWRCB mandatory closure orders.

Chapter 6. Financial Assurances at Solid Waste Facilities and at Waste Management Units for Solid Waste – includes definitions, requirements, allowable mechanisms, and enforcement procedures.

Chapter 7. Special Treatment, Storage, and Disposal Units – covers mining waste management, confined animals, composting facilities, waste tire facilities, transfer and processing stations, and solar evaporators.

Chapter 8. Other Provisions – includes the financial assistance program.

40 CFR Part 503

40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge, includes five subparts:

- Subpart A – General Provisions – covers applicability, compliance period, and exclusions.
- Subpart B – Requirements for Land Application – covers process design, biosolids quality, pollutant concentrations, cumulative pollutant loading rate, and annual pollutant loading rate.
- Subpart C – Requirements for Sewage Sludge Placed on a Surface Disposal Site – covers placement, treatment, and storage requirements.
- Subpart D – Requirements for Pathogen and Vector Attraction Reduction – describes pathogen and vector attraction reduction requirements for biosolids applied to and or placed on a surface disposal site.
- Subpart E – Requirements for Sewage Sludge Fired in a Sewage Sludge Incinerator – includes general requirements, pollutant limits, operation and management standards, and monitoring, recordkeeping, and reporting requirements.

2.3.18 Effluent Limits

2.3.18.1 Technology Based Limits

The General Permit establishes effluents limits consistent with USEPA secondary treatment standards, the Basin Plan, and Title 22 requirements. Technology-based limits are provided in the General Permit for treatment pond systems, trickling filter systems, and activated sludge, membrane bioreactor, or similar systems. Effluent limits are also specified based on the groundwater sub-basin that the treatment plant overlies, presented as Table 6 in the General Permit. Based on the Groundwater Sub-Areas map, also included in Appendix C, it appears as though the City's WWTP and disposal areas lie within the Lower Forebay Aquifer. Table 2.9 lists the 25-month rolling median effluent limits for the Lower Forebay. Table 2.10 compares the effluent limits between treatment ponds and an activated sludge process.

Table 2.9 Effluent Limits within the Lower Forebay

Parameter	Units	25-Month Rolling Median
TDS	mg/L	1,500
Chloride	mg/L	250
Sulfate	mg/L	850
Boron	mg/L	0.5
Sodium	mg/L	150
TN	mg/L	10

Notes:
(1) Select constituents for all wastewater systems.

Table 2.10 Effluent Limits Based on Treatment Technology

Parameter	Units	Treatment Pond			Activated Sludge		
		30-Day Average	7-Day Average	Sample Maximum	30-Day Average	7-Day Average	Sample Maximum
BOD_5	mg/L	45	65	NA	30	45	NA
TSS	mg/L	45	65	NA	30	45	NA
Settleable Solids	mL/L(1)	0.3	NA	0.5	0.1	0.3	0.5
pH	NA	6.5 - 8.4	NA	NA	6.5 – 8.4	NA	NA

Notes:
(1) mL/L = milliliters per liter.

2.3.18.2 Organic Loading Rate Limit

The General Permit also includes an organic loading rate limit for the land application of treated wastewater or treated non-potable recycled water. The 30-day average limit for BOD_5 is 100 lbs/acre/day, and the maximum loading rate is 300 lbs/acre/day.

2.4 SGMA

In September 2014, the SGMA was signed into law. SGMA requires governing bodies and water agencies of high and medium priority basins to cease over-drafting and to balance groundwater pumping and recharge. The deadlines for compliance with SGMA are 2040 for critically over-drafted basins and 2042 for high and medium priority basins.

The California Department of Water Resources (DWR) released the Bulletin 118 – Interim Update 2016 in December 2016, which contained a list of critical, high, and medium priority groundwater basins. If a basin was identified in the bulletin as high or medium priority, that basin would be required to form a groundwater sustainability agency (GSA) and submit a groundwater sustainability plan (GSP) by January 31, 2022.

DWR released the 2019 Basin Prioritization Process and Results in May 2020, which contains a list of high, medium, low, and very low priority basins. Basins newly identified as high- or medium priority in the SGMA 2019 Basin Prioritization are required to form a GSA or submit an Alternative within two years from the date the basin's priority is finalized and are required to submit a GSP five years from the same finalization date.

The City lies within the boundary of the Salinas Valley Forebay Aquifer (Basin Number 3-004.04), which was identified as a medium-priority basin in the 2019 Basin Prioritization, but not in the Bulletin 118 2016 Update. The Arroyo Seco GSA was formed in 2017 with plans to develop a GSP by 2022. A draft GSP was developed in May of 2020.

2.5 Air Quality Regulations

The federal Clean Air Act (CAA) requires the USEPA to set national ambient air quality standards to protect human health and welfare. The California Air Resources Board (CARB) is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CAA.

The agencies relevant to the City's air requirements include:

- Federal – USEPA.
- State – CARB.
- Local – Monterey Bay Unified Air Pollution Control District (MBUAPCD).

These agencies issue air quality permits for the modification of existing facilities or the construction and operation of new facilities and establish new source pollutant levels and treatment requirements.

CARB has developed state air quality standards that are generally more stringent than federal standards. Other CARB duties include monitoring air quality in conjunction with local air districts, setting emissions standards for new motor vehicles, and reviewing agency input on the State Implementation Plan (SIP). The SIP consists of emission standards for vehicles and consumer related sources set by CARB and attainment plans and rules adopted by local air districts.

2.5.1 State Air Regulations

This section provides a summary of the state air quality standards applicable to City operations.

The WWTP in the future would likely operate standby diesel engines to provide backup power for critical equipment. Any new engines would need to comply with the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition (CI) Engines. CARB originally approved the ATCM in 2004. Subsequent to the adoption of the original ATCM in 2004, the USEPA promulgated federal "New Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines." In October 2010, CARB approved amendments to the ATCM to closely align California's requirements with those in the federal NSPS. The amended ATCM became effective May 19, 2011.

The ATCM requires a 0.15 gram per brake horsepower-hour (g/bhp-hr) particulate matter (PM) emission limit for all new emergency standby stationary CI engines greater than or equal to 50 horsepower (hp). Annual maintenance and testing hours are limited to no more than 50 hours per calendar year, but local air districts may impose more limited hours. New emergency standby engines are required to meet the applicable non-methane hydrocarbon plus nitrogen oxides (NMHC+NOx), hydrocarbon (HC), and carbon monoxide (CO) Tier 2 or Tier 3 non-road CI engine emission standards, and Tier 4 standards that do not require add-on controls.

Table 2.11 shows emission limits for engine sizes comparable to those likely to be used at the WWTP.

Table 2.11 ATCM Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines

Maximum Engine Power	Particulate Matter(1)	Non-Methane Hydrocarbon plus Nitrogen Oxides(1)	Carbon Monoxide(1)
600<hp<750 (450<kilowatt (kW)<560)	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
hp>750 (kW>560)	0.15 (0.20)	4.8 (6.4)	2.6 (3.5)

Notes:
(1) All units in g/bhp-hr (gram per kilowatt-hour [g/kW-hr]). May be subject to additional emission limitations as specified in current applicable district rules, regulations, or policies. Applicable to model years 2008 and later.

2.6 Flood Hazard Mitigation

Impacts to wastewater utilities due to flooding can include loss of power, damage to assets, dangerous conditions for personnel, and discharge of untreated wastewater resulting in permit violations. Flooding hazards can occur from severe rain events, swollen rivers, levee or dam failure, local drainage issues, and water distribution main breaks. The federal regulations pertaining to flooding are 44 CFR Parts 59, 60, 65, and 70 authorizing the National Flood Insurance Program (NFIP), which is administered by the U.S. Department of Homeland Security Federal Emergency Management Agency (FEMA) in conjunction with state NFIP offices and local authorities having jurisdiction. The NFIP aims to reduce the impact of flooding on both public and private structures. The program encourages communities to adopt and enforce floodplain management regulations, which help mitigate the effects of flooding on new and improved structures. Requirements for projects to comply with the NFIP are typically enforced at the local, state, and federal levels, and particularly when federal and/or state funding is sought (e.g., federal grants and/or Clean Water State Revolving Fund (SRF) loans).

Siting of new facility structures should consider proximity to flood hazards as defined on the current FEMA Flood Insurance Rate Maps (FIRM). Figure 2.2 shows the FIRM that encompasses the City's WWTP, outlined in black.

The blue highlighted area, which covers all of the treatment ponds and the majority of the headworks and primary treatment area, represents Zone A, which is an approximate extent of the land flooded during the 1 percent annual chance (100-year) flood of the nearby Salinas River. The existing WDR indicates that the ponds and effluent disposal areas are protected from the Salinas River by a levee designed to withstand a 100-year flood. The base flood elevation (BFE) is the water surface elevation of the 100-year flood. The BFE was not determined in this FIRM and was not identified in available documentation through the Monterey County Water Resources Agency. In accordance with FEMA guidelines for floodplain management, new or substantially improved non-residential structures in flood plain areas must either be elevated or flood proofed (made watertight) to or above the BFE.

If the City moves forward with constructing treatment structures within the existing facility site, they likely need to determine the BFE through detailed methods, especially if considering pursuing federal funding. A Guide to Obtaining and Developing Base (100-Year) Flood Elevations (FEMA, 1995) describes the process for establishing a BFE, which includes a modeling effort using floodplain geometry (topography), flood discharge and/or volume (hydrology), and flood height (hydraulics). Coordination with the local jurisdiction, Monterey County Water Resources Agency, and FEMA is needed to develop a Conditional Letter of Map Revision, which defines how new infrastructure would affect the hydrologic or hydraulic characteristics of the river. After new structures are constructed, the City would then need to request a revision to the FIRM to reflect the "as-built" project.

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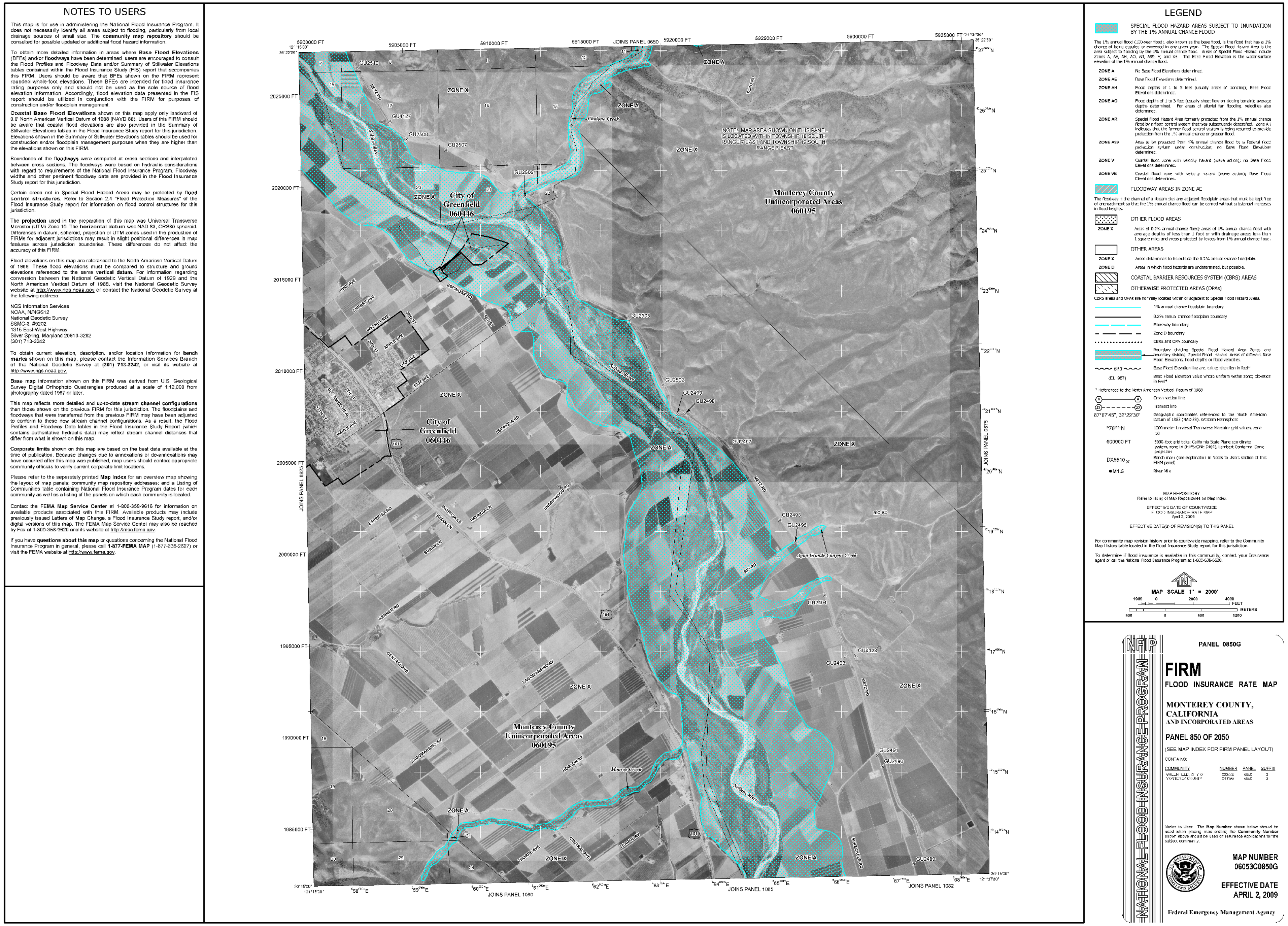

Figure 2.2 Flood Insurance Rate Map for the City of Greenfield WWTP

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Chapter 3

FLOWS AND LOAD ANALYSIS

The performance and capacity of the WWTP processes are determined based on historical and projected flows and influent loads. The City provided quarterly SMR submitted to the Central Coast RWQCB from January 2016 through March 2020. The following information from the SMRs was used to develop the flows and loads analysis:

- Average daily flow (ADF).
- 24-hour composite samples taken quarterly:
  - Influent: 5-day biochemical oxygen demand (BOD_5), TSS.
  - Effluent: BOD_5, TSS, TKN, TN.

Additional reporting requirements are described in the MRP (Appendix A). The NOV in 2018 brought about additional reporting requirements related to the effluent disposal fields.

Quarterly samples do not capture seasonal variability or maximum month conditions, which are commonly used to size wastewater treatment processes. The City has some supplemental monitoring data but the supplemental data do not comprise a consecutive data set and have significant variability. Therefore, the historical influent flow and loads discussed in the subsequent sections were based on daily reported flows and quarterly samples as reported in the SMRs submitted to the Regional Board.

3.1 Flows Analysis

The following definitions are used throughout this report:

- **ADF:** influent flow averaged during a one-day period. The SMRs report ADF.
- **AAF:** the average of ADF values during a calendar year.
- **ADMMF:** an average of the highest 30 consecutive ADFs.
- **Peak Hourly Flow (PHF):** highest flow occurring during a one-hour period.

Table 3.1 lists the design flow rates used to size various treatment processes.

Table 3.1 Basis of WWTP Process Sizing

Flow Parameter	Treatment Process
ADMMF, mgd	• Secondary Treatment Processes • Chemical Storage Facilities • Solids Handling Facilities
PHF, mgd	• Influent and Effluent Pump Station • Headworks (bar screens and grit removal) • Secondary Clarifiers • Filtration(1) • Disinfection(1)

Notes:
(1) Filtration and disinfection are sized for PHF if the processes are required by permit. Recycled water facilities are typically sized for ADMMF or smaller, depending on the recycled water demands.

Figure 3.1 presents the average daily flow and the 30-day average flow to the City's WWTP. Influent flows seem to be trending slightly higher over the last couple of years. Flows during the summer months are notably higher than during winter months. Data for the first and third quarters of 2019 were not readily available.

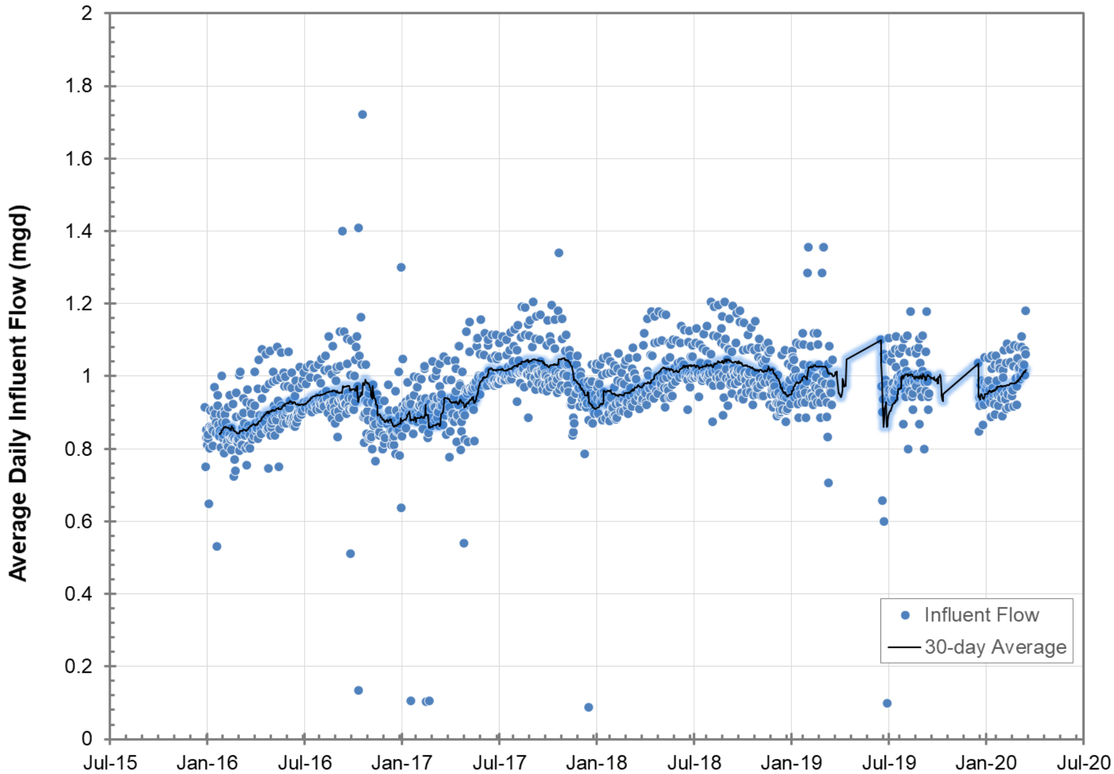

Figure 3.1 Historical Average Daily Flow

Historical flows and population are used to calculate average annual wastewater generation in gpcd. Future wastewater flows are predicted using population projections and a fixed wastewater generation factor. In January 2020, Wallace Group published a Preliminary Findings Memorandum for the 2019 Water and Wastewater System Master Plan Updates, which included population data. The City relies on the Association of Monterey Bay Area Governments AMBAG regional growth forecasts for population projections through the master plan planning period of 2040. Wallace Group identified recent annexed developments within the service area and increased the projected populations accordingly. Table 3.2 presents the historical and projected population, flow, and per capita wastewater generation

Table 3.2 Historical and Projected Influent Flow

Year	AAF (mgd)	ADMMF (mgd)	PHF (mgd)(1)	Peaking Factor (ADMMF/AAF)	AMBAG Population Plus Recent Annexations	AAF Wastewater Generation per Capita gpcd
			HISTORICAL			
2016	0.91	0.99	---	1.09	17,300	52.4
2017	0.97	1.05	---	1.08	17,517	55.4
2018	1.00	1.05	---	1.05	17,648	56.8
2019	0.99	1.05	---	1.06	17,924	55.3
			PROJECTED			
2025	1.29	1.40	3.53	1.09(2)	21,420	60(3)
2030	1.44	1.57	3.95	1.09	23,935	60
2035	1.63	1.78	4.48	1.09	27,145	60
2040	1.80	1.97	4.96	1.09	30,050	60

Notes:

(1) Historical peak hour flow data was not available. Projected peak hour flow is based on a peaking factor of 2.75, as identified in the Preliminary Findings Memorandum for the 2019 Water and Wastewater System Master Plan Updates (Wallace Group; 2020).

(2) Based on peaking factors between 2016 and 2019, the largest peaking factor of 1.09 was selected to estimate future max month flows.

(3) Based on wastewater generation factors between 2016 and 2019, a wastewater generation factor of 60 gpcd was selected to estimate future average annual flows.

Historical data show a wastewater generation factor between 52 and 57 gpcd over the last four years. A generation factor of 60 gpcd was chosen to project future flows to account for the potential easing of water conservation efforts. The max month peaking factor varies between 1.05 and 1.09. The highest peaking factor of 1.09 was chosen to estimate ADMMF from projected AAF. A max month peaking factor of 1.09 is slightly lower than what would be anticipated for a collection system this size but could be due to low inflow and infiltration (I&I).

In the last several years, population grew just over one percent annually. Based on AMBAG projections and identified annexations, the population is expected to grow at a faster rate, around 2.7 percent annually.

Figure 3.2 presents the historical and projected AAF through 2040.

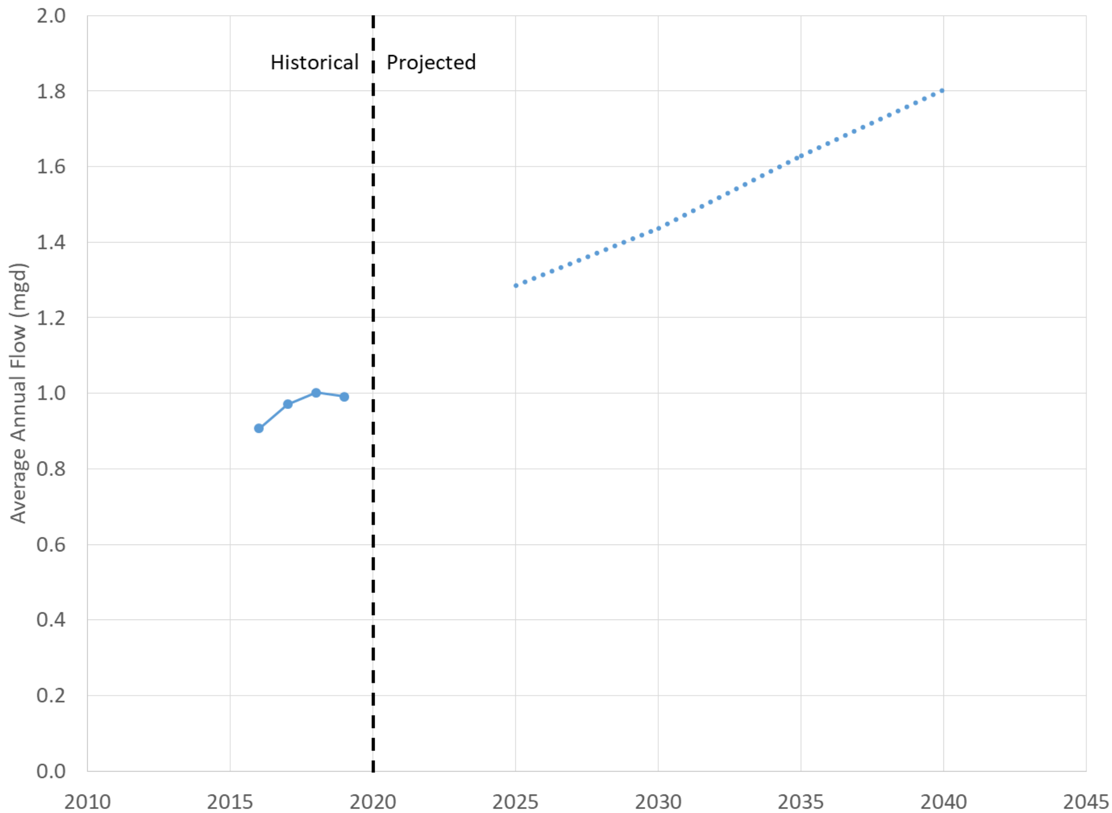

Figure 3.2 Projected Average Annual Influent Flow

3.2 Loads Analysis

The wastewater load is the mass rate (pounds per day [ppd]) of a given constituent in the influent and depends on the concentration and flow rate. The load is used to size the secondary treatment process and solids handling facilities needed to meet effluent discharge and biosolids requirements.

Influent concentration data was only available on a quarterly basis from the SMRs. Quarterly loads were calculated by multiplying the quarterly concentration by the average of the ADF during the quarter. Annual loads were calculated by averaging the load from each quarter. Table 3.3 presents the historical influent loads.

Table 3.3 Historical Influent Loads

Year	AAF (mgd)	BOD Concentration (mg/L)	BOD Load (lb/d)	TSS Concentration (mg/L)	TSS Load (lb/d)	TKN Concentration (mg/L)(1)	TKN Load (lb/d)
2016	0.91	377	2,821	316	2,326	63	478
2017	0.97	316	2,505	116	893	65	528
2018	1.00	273	2,278	100	841	72	600
2019	0.99	295	2,473	74	615	64	531
Historical Average	**0.97**	**309**	**2,461**	**152**	**1,175**	**66**	**532**
Minimum	**0.91**	**273**	**2,278**	**74**	**615**	**63**	**478**
Maximum	**1.0**	**377**	**2,821**	**316**	**2,326**	**72**	**600**

Notes:
(1) TKN is only measured in the effluent. The influent and effluent TKN concentrations are assumed to be the same.

The SMRs only report TKN and TN in the effluent. TKN is the sum of ammonia and organic nitrogen, while TN also includes nitrate and nitrite. A portion of settleable organic nitrogen, roughly ten percent of influent TKN, is likely removed in the primary clarifiers. Organic nitrogen is also removed through solids settling in the aerated ponds. However, if the ponds are not routinely dredged, the organic nitrogen accumulated in the solids can hydrolyze to ammonia and result in higher effluent TKN and TN concentrations. Because the reported effluent TKN and TN concentrations are equal, and given the relatively short detention time and low dissolved oxygen concentrations in the ponds, there is likely very little nitrification occurring. Without additional information, it was assumed that effluent TKN is equal to the influent TKN. Influent nitrogen sampling is needed to better understand the nitrogen loads.

Figure 3.3 presents the quarterly influent load for BOD, TSS, and TKN. The TKN concentration is stable and averages 66 mg/L. However, there is a lot of variability in the TSS and BOD. Typical municipal domestic wastewater has a BOD and TSS concentration between 250 and 350 mg/L, depending on the extent of water conservation efforts, which would result in a load for the City's WWTP between 2,000 and 3,000 lb/d. The difference between the BOD and TSS concentrations could be due to a large fraction of soluble BOD from industrial waste discharges. However, it is more likely that the variability is due to sampling methods. If the sample location is stagnant or not completely mixed before the sample is taken, solids could settle and the sample may not be representative. More frequent sampling would help improve consistency and allow for the distinction between anomalies and trends. The variability brings to question the validity of the TSS and BOD data.

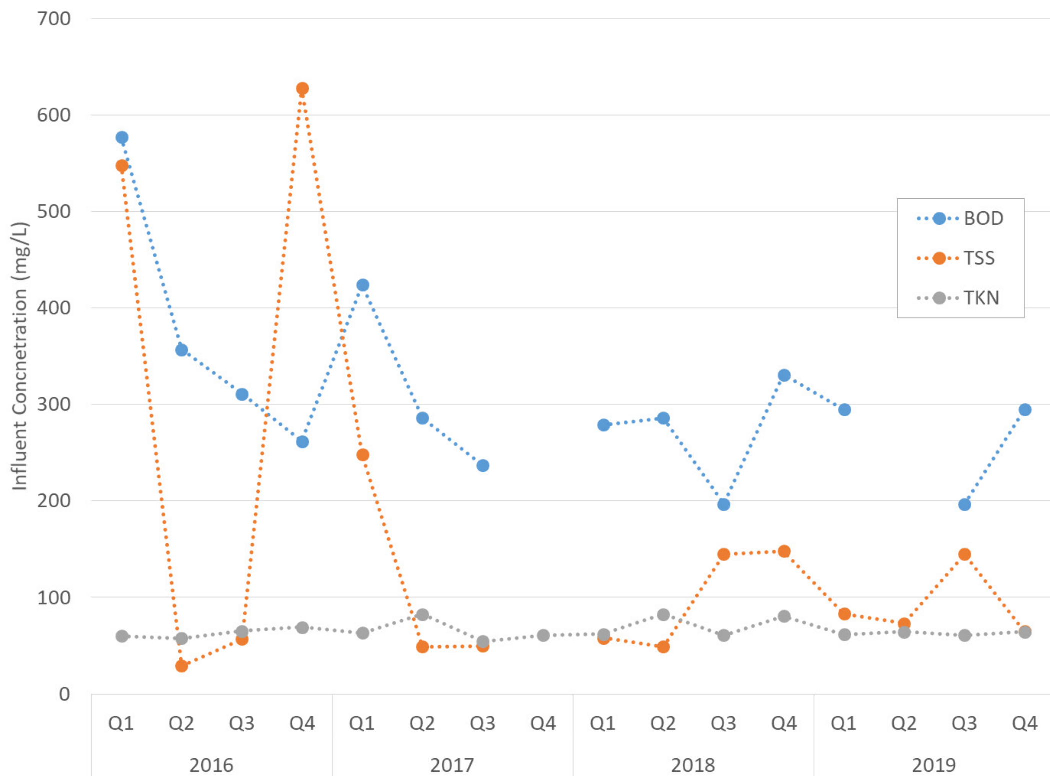

Figure 3.3 Historical Influent Concentration

Given the variability in BOD and TSS samples, wastewater characterization was compared to previous studies to refine the data analysis. Table 3.4 proposes wastewater characterization values for this study based on a comparison to previous studies and textbook design values.

Table 3.4 Influent Wastewater Characterization Comparison

Parameter	Units	(1)	(2)	(3)	(4)	(5)
Influent AAF	mgd	1.0	2.0	1.8	---	**1.8**
Population	---	13,000	28,400	28,400	---	**30,050**
Wastewater Generation Factor	gpcd	75	70	63	**42 – 61**	**60**
BOD Concentration	mg/L	240	300	333	**200 – 400**	**350**
TSS Concentration	mg/L	240	275	310	**195 – 389**	**325**
BOD Load	ppd	2,000	5,000	5,000	---	**5,260**
TSS Load	ppd	2,000	4,600	4,600	---	**4,870**
BOD Load per Capita	lbs/cap/d	0.15	0.18	0.18	**0.11 – 0.26**	**0.18**
TSS Load per Capita	lbs/cap/d	0.15	0.16	0.16	**0.13 – 0.33**	**0.16**

Notes:
(1) Expansion Report for City of Greenfield Wastewater Treatment Plant (Terra Engineering & Freitas + Freitas; 2003). Data based on 2003 conditions.
(2) City of Greenfield Wastewater Treatment Plant Evaluation (Kennedy/Jenks Consultants & Wallace Group; 2013). Data based on 2035 projections.
(3) City of Greenfield Wastewater Master Plan (Wallace Group; 2016). Data based on 2035 projections.
(4) Design of Water Resource Recovery Facilities Manual of Practice No. 8 (Water Environment Federation; Sixth Edition).
(5) This Wastewater Treatment Plant Master Plan (Carollo Engineers, 2020). Data projected for 2040 conditions.

Previous studies show a trend of decreasing wastewater generation factors due to statewide droughts and water conservation efforts. It is assumed that water conservation efforts have resulted in a lower wastewater generation factor being the new normal. Further water conservation efforts become increasingly more difficult to implement and result in marginal benefit. A wastewater generation factor of 60 gpcd is typical for a community of this size in California.

The future influent concentrations were calculated based on assuming the load per capita values remain consistent with the most recent wastewater studies. Although cannabis industry is expected to grow rapidly within the service area over the next several years, it may increase the salinity loading to the plant, but it should not have a significant impact on the biological influent loading. Based on the comparison with previous studies and discussion with the City, the BOD and TSS concentrations are estimated to be 350 and 325 mg/L, respectively, throughout the planning study. These concentrations are higher than the average concentrations calculated from the SMRs for the last few years but they are consistent with the City's previous wastewater studies and reflect the trend in historical water conservation efforts. Projected loads are estimated by the projected flows developed previously and assuming a constant influent concentration. Table 3.5 and Figure 3.4 present the projected influent loads through 2040.

Table 3.5 Projected Loads

Year	AAF (mgd)	ADMMF (mgd)	Average Annual Load (ppd)(1)			Max Month Load (ppd)(2)		
			BOD(3)	TSS(4)	TKN(5)	BOD(3)	TSS(4)	TKN(5)
2025	1.29	1.40	3,751	3,484	707	4,089	3,797	771
2030	1.44	1.57	4,192	3,893	790	4,569	4,243	862
2035	1.63	1.78	4,754	4,415	897	5,182	4,812	977
2040	1.80	1.97	5,263	4,887	992	5,737	5,327	1,082

Notes:
(1) The average annual projected load is based on the projected AAF and a constant average annual concentration.
(2) The maximum month projected load is based on the projected ADMMF and a constant average annual concentration.
(3) Projected BOD load based on a constant influent concentration of 350 mg/L.
(4) Projected TSS load based on a constant influent concentration of 325 mg/L.
(5) Projected TKN load based on a constant influent concentration of 66 mg/L.

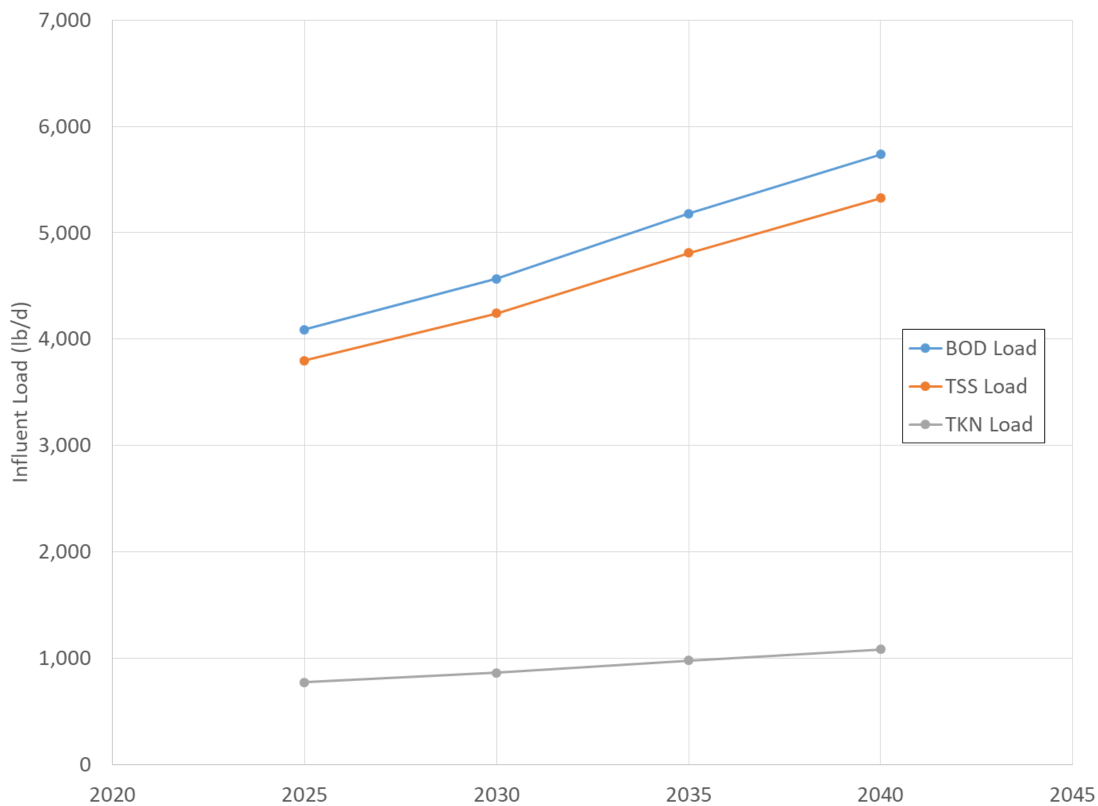

Figure 3.4 Projected Max Month Influent Loads

Projected loads are approximated based on limited data and a few critical assumptions. Any future biological process design should be based on at least one year of influent samples taken at least weekly and analyzed for BOD, TSS, and ammonia. Sampling protocol should be reviewed to verify that 24-hour composite samples are collecting samples that are representative of the influent flow.

Chapter 4

EXISTING WASTEWATER TREATMENT PLANT ASSESSMENT

This Chapter summarizes the existing WWTP assessment, which includes performance and capacity, ability to comply with the General Permit, and visual observations from a site visit.

Figure 4.1 shows a process flow diagram of the WWTP taken from the 2016 Wastewater Master Plan. Figure 4.2 shows an aerial of the primary treatment plant, treatment and percolation ponds, and effluent disposal fields.

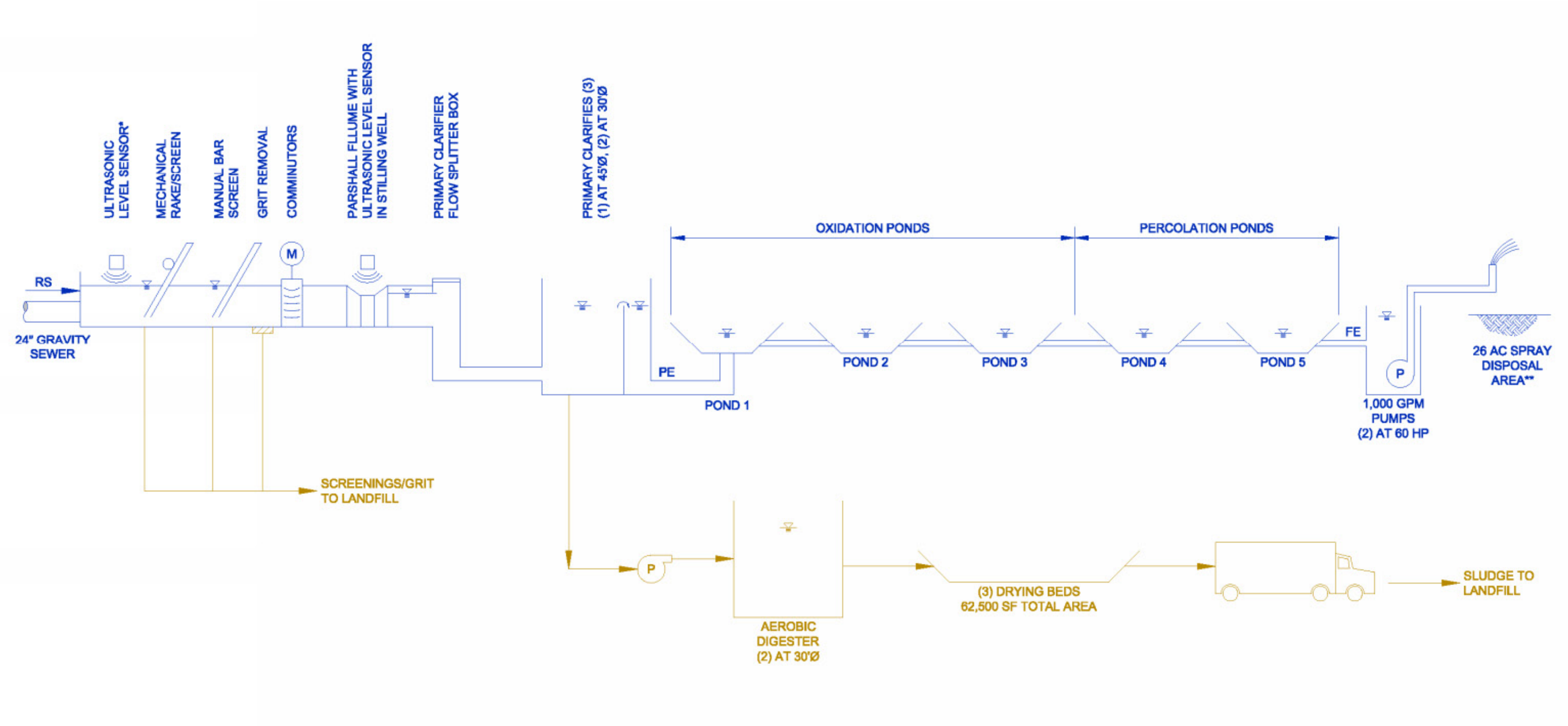

Figure 4.1 Wastewater Treatment Plant Process Flow Diagram

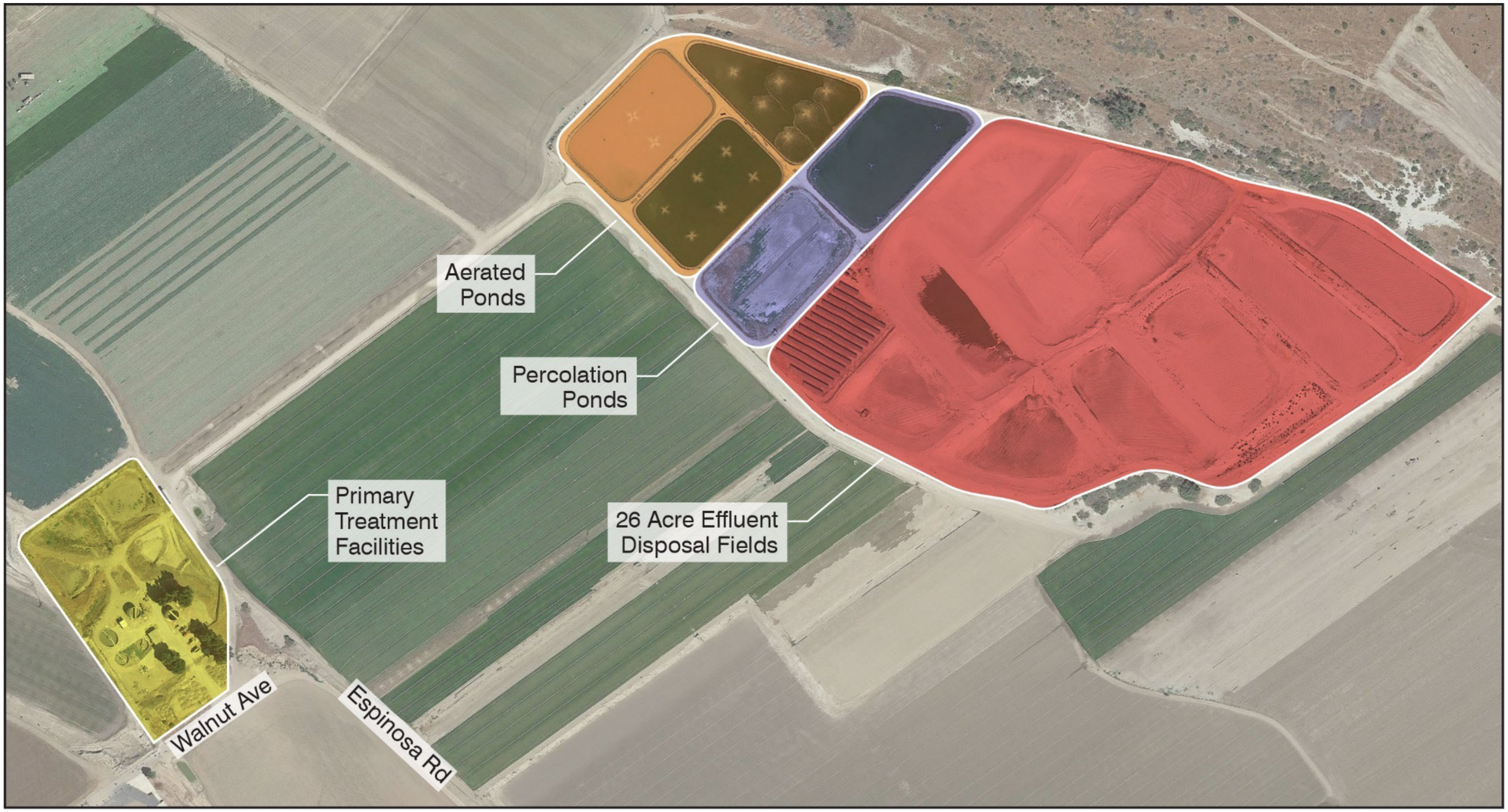

Figure 4.2 Existing WWTP Overview

4.1 Process Performance and Capacity Evaluation

The WWTP was originally designed and permitted for an AAF capacity of 1.0 mgd, with a peak hydraulic capacity of 5.0 mgd. Various consultants have evaluated the WWTP capacity and in 2013, a WWTP Evaluation (KJ and Wallace 2013) was submitted to the RWQCB in an effort to increase the permitted AAF capacity to 2.0 mgd with a peak hydraulic capacity of 10 mgd.

The performance evaluation includes review of available data from 2016 through 2019 and assesses whether unit processes are operating as intended and meeting expected removal rates and treatment objectives. It should be noted that the available operating data was limited, and the performance of some unit processes could not be evaluated. The capacity evaluation is limited to process capacity and whether the existing facilities have sufficient capacity to accommodate a future flow of 2.0 mgd. This was performed by estimating loading rates for key design criteria at the permitted future flow of 2.0 mgd. Since performance data available for review was limited, some of the capacity evaluation relies on the following reports, prepared by others:

- Effluent Disposal Study and Compliance Work Plan in Response to Notice of Violation (Wallace Group; 2018).
- Wastewater Master Plan (Wallace Group; 2016).
- Wastewater Treatment Plant Evaluation (Kennedy/Jenks Consultants and Wallace Group; 2013).

Hydraulic capacity of the treatment plant has been evaluated several times previously, most recently in the 2018 Effluent Disposal Study. Previous analysis indicate that each unit process has a hydraulic capacity that can support 2.0 mgd.

Figure 4.3 shows the primary treatment and solids handling elements.

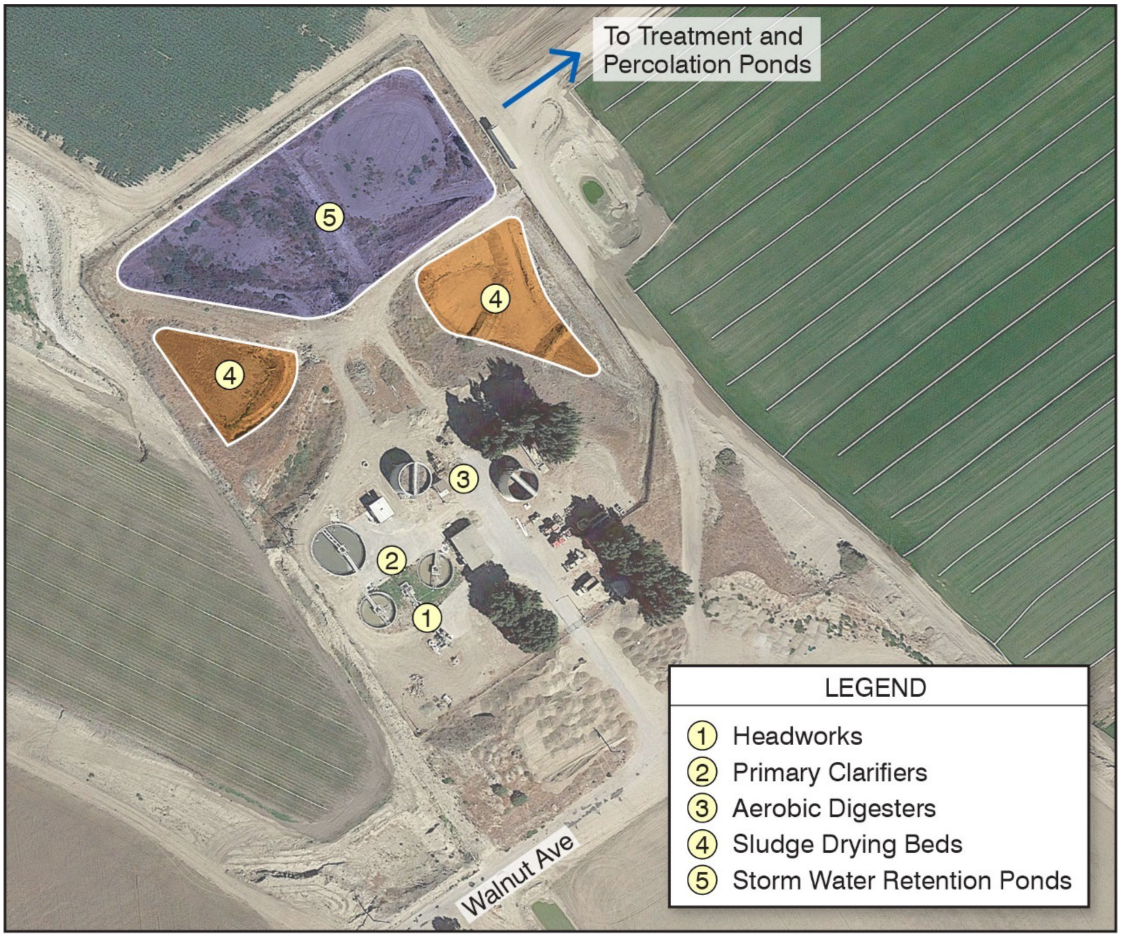

Figure 4.3 Primary Treatment and Solids Handling Site Layout

4.1.1 Headworks

The headworks historically consisted of a manual bar screen, grinder, grit removal, and flow monitoring. Previous reports identified an ineffectiveness of influent screening to remove rags and debris. This is due to the large spacing between the bars of the screen that allow significant debris to pass through to downstream processes. Additionally, once solids and debris pass the screen they are ground into smaller pieces in the grinder. Although this prevents downstream pumps from clogging, debris more easily gets into the treatment ponds where they build up and require more frequent dredging, reduce percolation capacity, and negatively affect effluent water quality. Grit removal was achieved by a sump located in the channel. As flow passed the grinder, the velocity was reduced, which allowed grit to settle out and collect within the sump. Plant staff periodically manually removed accumulated grit from the sump.

In Spring 2020, a new 2 mm spacing mechanical bar screen was installed and the grinder was decommissioned. The screenings dumpster fills up weekly, whereas with the previous manual screen it filled up monthly. Since the grinder was decommissioned, the velocity in the channels is too high to achieve grit removal.

The headworks structure and screening and grinder equipment were designed for a peak hydraulic flow capacity of 5 mgd. Plant staff have not observed any hydraulic limitations at the headworks. Information was not available to be able to determine grit removal performance. Most of the grit that passes the headworks will accumulate in the ponds and does not appear to have adverse effects on downstream equipment.

4.1.2 Primary Clarifiers

The plant has three primary clarifiers. Two 30-foot diameter clarifiers are around 30 years old and one 45-foot diameter was constructed around 2006. The primary clarifiers were serviced in the last few years, including repairs to the sludge scraper arms, replacement of the sludge pumps and piping, and electrical and control panel upgrades for the scum pumps. Under normal operation, two clarifiers are in service and one is offline for a year for cleaning and maintenance.

The SMRs do not report primary effluent samples. Limited supplemental samples were available for influent and primary effluent BOD and TSS. The supplemental influent samples are highly variable. Table 4.1 and Figures 4.4 and 4.5 present the BOD and TSS in the primary clarifiers. The BOD and TSS removal across the primary clarifiers is difficult to determine because of a lack of consistent data. Several samples had a primary effluent concentration higher than the influent, and the average BOD and TSS removal are around 10 and 30 percent, respectively, which is below typical removal rates.

Table 4.1 Primary Clarifier Performance

Parameter	Units	BOD	TSS
Influent Concentration(1)	mg/L	350	210
Average Primary Effluent Concentration	mg/L	320	145
Removal Efficiency(1)	%	10	30
Typical Removal Efficiency(2)	%	30 – 35	50 – 70

Notes:
(1) Values reflect median data from May 2018 to March 2020.
(2) Values taken from Design of Water Resource Recovery Facilities: WEF Manual of Practice No. 8 (Sixth Edition)

The cause for the poor performance is not known, although there are several possibilities:

- Sampling – Collecting samples that are not representative or laboratory or analytical issues is likely not occurring, but should be confirmed.
- Clarifier Depth – The clarifiers are shallow with a side water depth of less than 9 feet. While this could contribute to performance, there are operating facilities with similar side water depth that have better performance. Deeper side water depths typically have improved performance.
- Sludge Blanket Depth - Operating primary clarifiers with too high of a sludge blanket could contribute to poor performance. The higher the blanket, the more likely that primary sludge could solubilize, which increases primary effluent ammonia and BOD.
- High Surface Overflow or Weir Loading Rates – It is possible if the clarifiers are undersized, although the loading rates appear to be typical.

- Decant Return Flows from Aerobic Digester – The measured influent concentrations does not take into account decant returns from the aerobic digester, which are fed to the clarifiers. No water quality or flow rate data is available on the decant returns to be able to approximate their influence on the primary clarifier performance. Given the anecdotal poor performance of the aerobic digester, it is possible that high solids concentrations in the return flows could have negative impacts to the performance of the primary clarifiers and downstream processes.
- Influent Characterization – It is possible that the City's influent has unique settling characteristics, or an unusually high soluble BOD fraction.

It is recommended that additional performance data be collected so the cause for the poor performance is better understood.

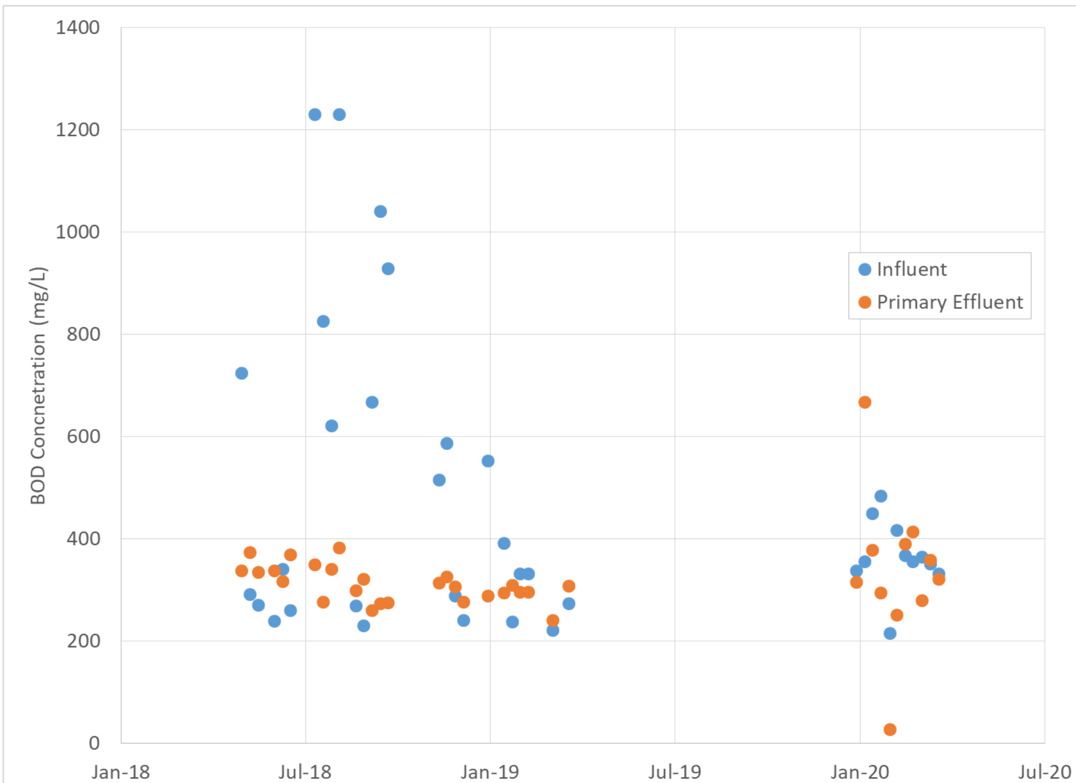

Figure 4.4 Primary Clarifier Influent and Effluent BOD

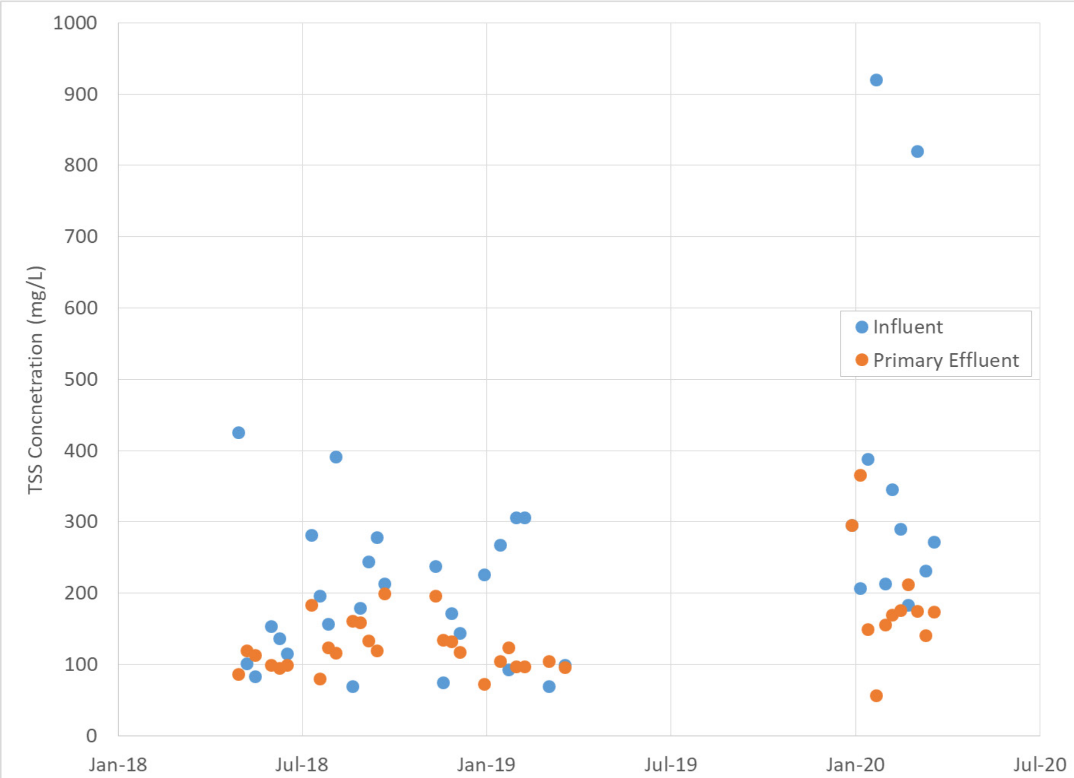

Figure 4.5 Primary Clarifier Influent and Effluent TSS

The surface and weir overflow rates were reviewed to see if the clarifiers are operating within their hydraulic design range and assess capacity. Table 4.2 presents clarifier operating conditions at a current flow of 1 mgd and a future flow of 2 mgd. The clarifiers are operating within typical design ranges at current and future flows. However, it should be noted that the overflow rates are high under the future peak flow condition of 10 mgd, which may impact performance. Given the very short duration these flows would be experienced, this may still be an acceptable loading rate as long as it does not upset the secondary process. If performance during the high flow period needs to be improved, chemical addition is a viable strategy that could be considered to improve settleability. Hourly flow data should be routinely collected to better understand the collection system peaking factors and the peak hourly flow (PHF) observed at the plant.

Table 4.2 Primary Clarifier Loading Rates

Parameter	Units	Existing Conditions(1)	Future Conditions (2)	Typical Design Range
Operational Surface Area	sq ft	1,414	3,004	---
Operational Weir Length	ft	188	330	---
Side Water Depth	ft	8.5	8.5	10 - 12
AAF	mgd	1.0	2.0	---
Surface Overflow Rate at AAF	gsfd	707	666	1,000(3)
Weir Overflow at AAF	gsfd	5,305	6,063	10,000 – 40,000(4)
PHF	mgd	5	10	
Surface Overflow Rate at PHF	gsfd	3,536	3,329	1,500 – 2,000(3)
Weir Overflow at PHF	gsfd	26,596	30,303	10,000 – 40,000(4)

Notes:
(1) Typical operations of existing conditions assume both 30-foot diameter clarifiers in service and the 45-foot diameter clarifier in standby.
(2) Typical operations of future conditions assume all three existing clarifiers in service.
(3) Value from Design of Water Resource Recovery Facilities: WEF Manual of Practice No. 8 (Sixth Edition)
(4) Value from Wastewater Engineering: Treatment and Reuse (Metcalf and Eddy; Fourth Edition)

Primary effluent from the clarifiers collects in a manhole before flowing by gravity over 2,000 feet to the treatment ponds. Plant staff have recently reported hydraulic limitations in the primary effluent pipe, which increases the water surface elevation in the manhole. While maintaining the road along the pipe alignment recently, the City exposed the primary effluent pipe and confirmed it is an 18" PVC pipe. Based on hydraulic calculations, the primary effluent pipe should be able to transport flows up to approximately 3.5 mgd before headloss causes flow to back up into the primary effluent manhole. There may be bends or sags in the pipe alignment, which could have caused a buildup of debris, reducing the effective pipe diameter. The City should jet the line with a vactor truck to clear it of debris. In the long term, the City should determine the pipe alignment and pipe profile and repair as necessary.

4.1.3 Aerated Ponds

The secondary treatment process consists of three aerated ponds. Figure 4.6 presents an aerial view of the treatment and percolation ponds and the flow path between ponds. Under normal operation, primary effluent is evenly split between Ponds 1 and 2. Flow is then sent to Pond 3 for additional treatment, then to Ponds 4 and 5. Some percolation occurs in Ponds 4 and 5 and the remaining flow is pumped to the adjacent effluent disposal fields. Occasionally at night, plant staff will return flow from the effluent pump station back to the pond influent flow splitting structure. In 2016, eighteen 5 horsepower (HP) surface aerators were added to Ponds 1, 2, and 3 (six aerators per pond), providing a total capacity of 90 HP. Table 4.3 presents the operating parameters and design criteria values for the treatment ponds.

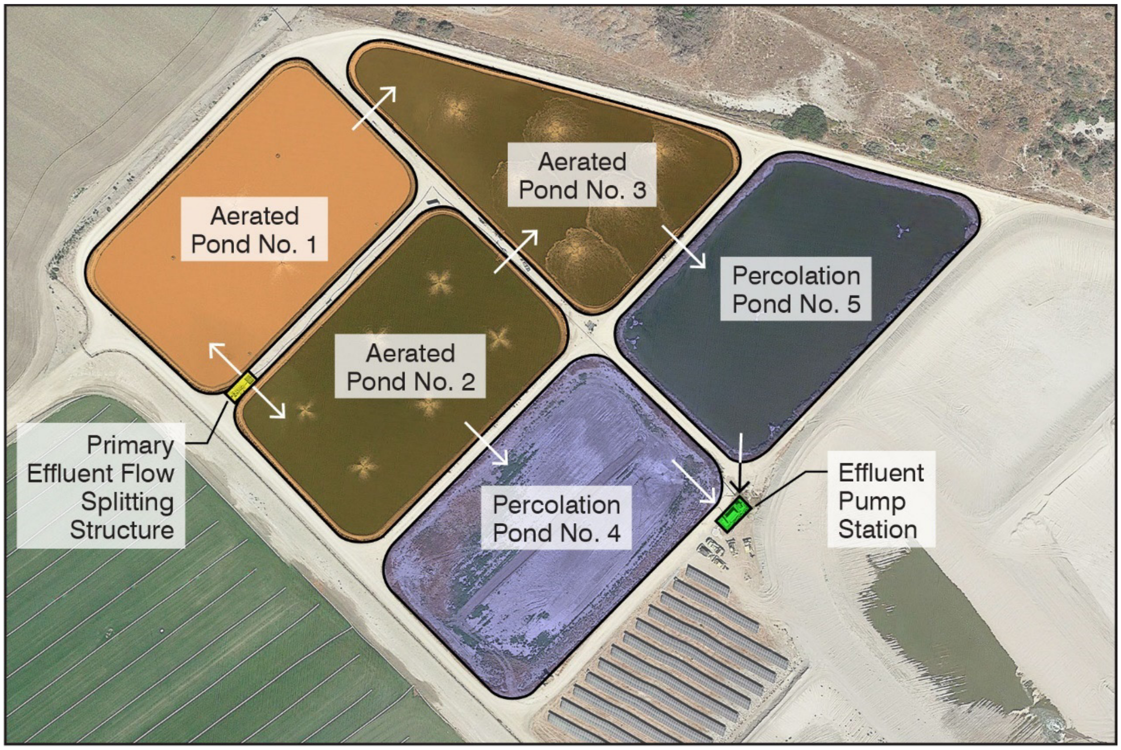

Figure 4.6 Wastewater Treatment Plant Ponds

Table 4.3 Aerated Pond Capacity and Performance

Parameter	Units	Existing Conditions	Future Conditions	Typical Design Range(1)
Average Daily Flow	mgd	1.0	2.0	
Primary Effluent BOD	mg/L	320	320	
Primary Effluent TSS	mg/L	145	145	100 – 400
Number of Aerated Ponds	---	3	3	
Surface Area, total	acres	6.25	6.25	
Depth	ft	5	5	5 – 15
Pond Volume, total	MG	10.2		
Installed Aeration Capacity	np	90		
Unit Aeration Capacity	hp/MG	8.8		25 – 40
Detention Time	days	10.2	5.1	3 – 30
BOD Loading Rate	lbs/acre/d(3)	262	524	35 – 125(2)
Effluent BOD Concentration	mg/L	100		20 – 40
Effluent TSS Concentrations	mg/L	85		20 – 60

Notes:
(1) Values taken from Wastewater Engineering: Treatment and Reuse (Metcalf and Eddy; Fourth Edition), unless otherwise noted.
(2) Design range from Natural Systems for Waste Management and Treatment (Reed et al.)
(3) lbs/acres/d = pounds per acre per day.

By installing mechanical surface aerators in 2016, the City upgraded from facultative ponds to aerated ponds. Aerated ponds can handle higher influent loading than facultative ponds at shorter detention times.

The poor primary clarifier performance contributes to the biological overloading of the aerated ponds. However, even if the primary clarifiers were achieving typical removal rates, the existing pond volume would not provide sufficient treatment capacity even at current flows. The required detention time for a pond system varies significantly because it depends on several factors, such as local temperature, organic loading (upstream process performance), pond mixing and aeration characteristics, kinetic growth rate, and effluent quality requirements. The calculated detention time is on the lower end of the design range and may not be sufficient for the operating conditions. Additionally, the effective pond depth may be shallower than the original depth because of solids accumulation. A deeper sludge blanket reduces the effective hydraulic detention time. It is estimated that with the current primary clarifier performance and aeration configuration, the detention time needed to meet an effluent BOD of 50 mg/L is closer to 20 days.

Calculations from a previous study showed a required aeration capacity of 90 HP to maintain a dissolved oxygen (DO) concentration in the ponds of 2.0 mg/L for buildout flows of 2 mgd. However, these calculations assumed a primary effluent BOD concentration of 170 mg/L, which is much lower than the current primary effluent concentration of around 320 mg/L. Additionally, the reported DO concentration in the ponds is usually less than 0.5 mg/L. If the primary clarifier performance does not improve, an estimated additional 100 HP of aeration capacity is needed.

Figure 4.7 presents the effluent BOD and TSS concentration. The average effluent BOD concentration is around 100 mg/L. Properly operating pond-based treatment systems can reliably achieve 80 percent or greater BOD removal, resulting in an effluent BOD concentration around 50 mg/L or less. The following summarizes potential issues inhibiting the ponds treatment performance:

- Pond influent concentrations higher than design values (primary clarifiers and aerobic digester not operating properly).
- Detention time is insufficient
- Flow path through the ponds results in short-circuiting and dead zones.
- Sludge accumulation, which would reduce detention times and contribute to dead zones. In addition, accumulated sludge could be undergoing anaerobic degradation, which would increase effluent BOD and ammonia.
- Lack of aeration capacity for the given primary effluent quality.

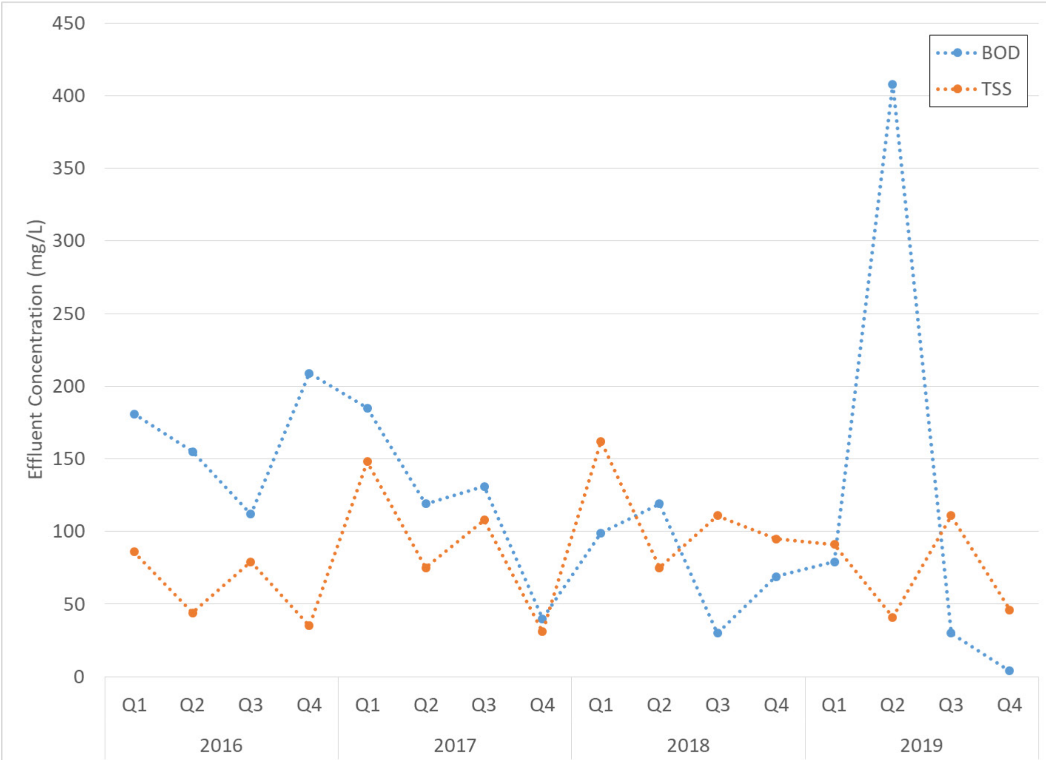

Figure 4.7 Effluent BOD and TSS Concentrations

Given the poor performance and highly loaded condition the ponds experience today, we do not believe the ponds have sufficient capacity to accommodate existing conditions, let alone the future condition of 2 mgd average dry weather flow (ADWF) and meet anticipated effluent requirements.

4.1.4 Effluent Discharge

Ponds 4 and 5 adjacent to the aerated ponds total 4.2 acres and hold the effluent between the aerated ponds and the effluent disposal fields. Solids passing through the primary clarifiers and aerated ponds end up in Ponds 4 and 5 and can settle out, potentially reducing percolation or storage capacity. The ponds have been disked within the last several years but are not routinely dredged. Ponds 4 and 5 likely provide little to no discharge capacity. The Effluent Pump Station pumps effluent from Ponds 4 and 5 to the adjacent effluent disposal fields for percolation.

The City originally discharged effluent through the use of 26 acres of spray fields south of the treatment ponds. In 2013, the City submitted a letter notifying the Regional Board of their intent to operate the spray fields as effluent disposal fields. Since then, the City has created berms and graded the area to create 11 distinct effluent disposal fields that they cycle through on a weekly basis. Figure 4.8 outlines the 26 acres of effluent disposal fields in relation to the treatment ponds.

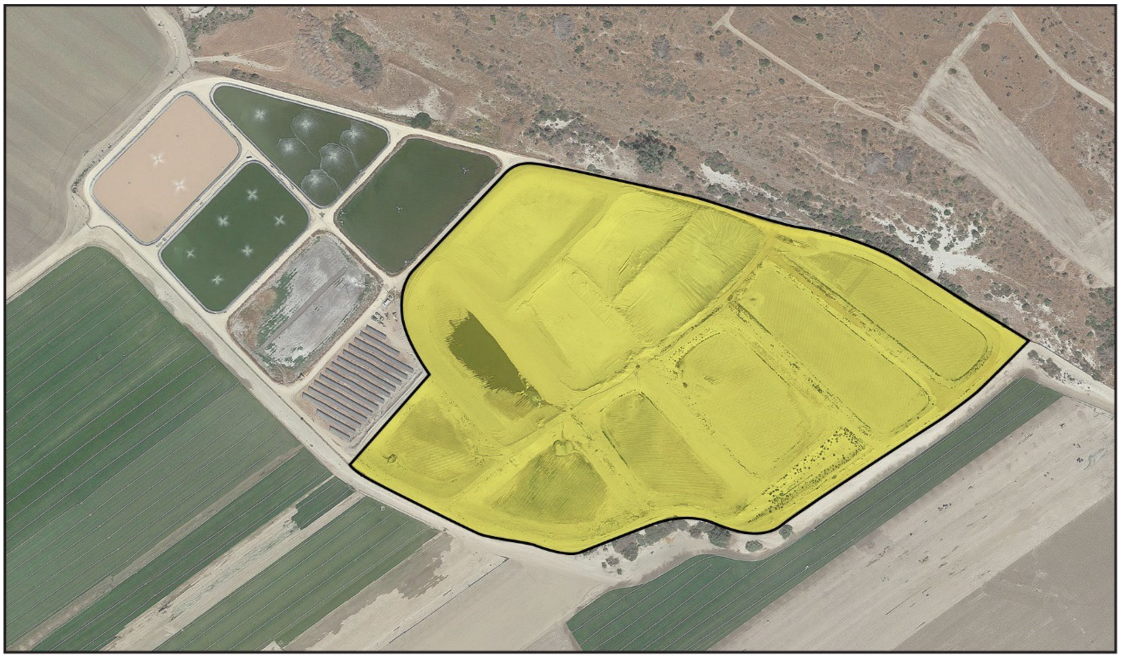

Figure 4.8 Wastewater Treatment Plant Effluent Disposal Fields

In May 2018, the percolation capacity of the disposal fields was not able to keep up with the application rate and ponding occurred. A few of the fields became flooded and effluent overtopped the berms. Eventually, the outer field embankment collapsed and effluent washed out onto the adjacent land. The City submitted a report of non-compliance to the Central Coast RWQCB and as a result, Wallace Group developed an Effluent Disposal Study and Compliance Work Plan in Response to Notice of Violation (June 2018).

The 2018 Effluent Disposal Study includes an analysis of the percolation capacity in the area adjacent to the effluent disposal fields based on infiltration rate tests performed in April 2018. Table 4.4 presents the discharge capacity of the percolation ponds and effluent disposal fields, assuming proper dredging and disposal of accumulated solids and typical effluent quality. Under optimal operating conditions, the plant has nearly sufficient surface area to percolate the rated capacity of 2 mgd. However, upstream process performance needs to be improved and ponds and disposal fields need to be routinely dredged to allow for adequate percolation.

Table 4.4 Effluent Discharge Capacity

Parameter	Area (acres)	Discharge Capacity(1) (mgd)
Ponds 4 and 5	4.2	0.26
Effluent Disposal Fields	26	1.6
Total	**30**	**1.9**

Notes:
(1) Application rate of 2.3 inches per day based on infiltration rate test performed in April 2018 and subsequent analysis by Wallace Group.

4.1.5 Aerobic Digester

Sludge from the primary clarifiers is pumped to an aerobic digester where it undergoes stabilization. It is uncommon to stabilize primary sludge using aerobic digestion. Because primary sludge has not undergone biological treatment, the composition of the solids is similar to raw sewage and can have significant odor issues. Primary sludge is usually stabilized using anaerobic digestion, which results in a more consistent sludge quality, improved sludge stabilization, reduced power usage, and reduction in odors. Although the energy balance and recovery opportunities for anaerobic digestion is attractive, it is much more complex and capital intensive when compared to aerobic digestion.

The City has two digesters but only one is operational. The older digester has significant structural damage that does not warrant repair and has reached the end of its useful life. The operational volume of the digester is around 80,000 gallons. The City lacks sufficient data on the primary sludge or digester decant flows or characteristics to do a substantive capacity or performance analysis. Routine sampling should be done on the primary sludge, digested sludge, and decant to measure flow, TSS, and volatile suspended solids (VSS).

Previous reports determined that the aerobic digester is severely over loaded and additional stabilization capacity is needed. Presumably, high solids concentrations in the digester decant returned to the clarifiers are negatively affecting the performance of the primary clarifiers. The City should consider alternative stabilization technologies, or at least expand the existing aerobic digestion capacity.

Table 4.5 presents the aerobic digester capacity analysis, which is based on poor removal rates from the most recent primary clarifier data. The analysis shows that the digester is loaded above the design criteria, even when the primary clarifiers are not removing sufficient solids. If the clarifiers were achieving design removal rates, the digester would be severely overloaded. Additional digestion capacity is needed to improve digestion and the primary clarifier performance.

Table 4.5 Aerobic Digester Capacity(1)

Parameter	Units	Design Value	Estimated Actual Value
Influent TSS	mg/L	300	210
Volatile Fraction	%VS	75	85
Primary Sludge Digester Feed	cfd	347	347
Digester Volume	cf	9,500	9,500
Digester SRT	days	30	27
Volatile Solids Loading Rate	pcfd	0.04	0.05
Volatile Solids Loading	ppd	382	465

Notes:
(1) Table adapted from Effluent Disposal Study (Wallace Group; 2018)
(2) Abbreviations: cf = cubic feet; pcfd = pounds per cubic foot per day; ppd = pounds per day

4.1.6 Sludge Drying Beds

After digestion, primary sludge is sent to the sludge drying beds to reduce moisture. The City is charged on a wet ton basis for solids to be periodically hauled offsite. The dryer the solids, the cheaper the hauling cost. Previous reports indicate that the sludge drying beds have sloped sides, which makes it difficult to thinly spread biosolids and achieve satisfactory drying. Design criteria indicate a sludge bed loading rate of 7.5 pounds per square foot per year (psfy). The existing sludge drying bed area is roughly 0.4 acres. If the City continues to dewater biosolids through the use of sludge drying beds, additional land may be needed. The City could investigate the possibility of repurposing the adjacent storm water retention ponds for sludge drying, which would likely provide sufficient space through projected influent flows of 2 mgd. Table 4.6 presents the sludge drying bed capacity.

Table 4.6 Sludge Drying Bed Capacity

Parameter	Units	Existing Conditions	Future Conditions
Influent Average Daily Flow (ADF)	mgd	1.0	2.0
Solids Loading to Drying Beds	ppd	864	1,728
Approximate Sludge Drying Bed Area	acres	0.4	---
Sludge Drying Bed Loading Rate	psfy	7.5	7.5
Required Sludge Drying Bed Area	acres	1.0	2.0

4.2 Compliance with the General Permit

The General Permit, described in detail in Chapter 2, will require improved performance of the treatment plant compared to the existing WDR. The General Permit requires compliance based on the treatment technology and based on the underlying groundwater sub-basin.

4.2.1 Limits Based on Treatment Technology

Table 4.7 compares the effluent quality from the treatment ponds to the General Permit limits. The General Permit specifies different limits for trickling filter and activated sludge processes, which are stricter than the limits for treatment ponds.

Table 4.7 Comparison of Effluent Quality to General Permit Discharge Limits for Treatment Ponds

Parameter	Units	30-Day Average Limit(1)	Average City WWTP Effluent(2)	Sample Max Limit	Sample Max Effluent
BOD	mg/L	45	118	N/A	408
TSS	mg/L	45	81	N/A	162
Settleable Solids	mL/L	0.3	0.1	0.5	1.5
pH	S.U.	6.5 – 8.4	7.9	N/A	---

Notes:
(1) The General Permit also proposes a 7-day average limit of 65 mg/L for BOD and TSS. The City does not currently sample frequently enough to calculate a 7-day average.
(2) The City samples effluent quality on a quarterly basis, so a 30-day average cannot be calculated. Reported values are average annual. The 30-day average concentration (or max month) would be higher than the listed average annual.

Based on the performance data reviewed, the City's WWTP would not be able to meet the proposed discharge limits in Table 4.7. The constraints identified in the capacity and performance evaluation sections would need to be overcome with significant modifications to the treatment process to improve the effluent quality. Modifications would likely require a significant increase in pond volume, detention time, and aeration capacity. Then, with more frequent maintenance and careful operation of the pond process, the treatment plant may be able to meet the BOD and TSS limits laid out in the General Permit. However, it should also be noted that the performance of treatment ponds in general is highly variable and sensitive to flow, load, and ambient temperature and other factors. At lower temperatures the biological kinetics slow down and the performance capacity of the ponds decreases. With stricter discharge limits, it will be very difficult for treatment ponds to reliably meet effluent requirements.

4.2.2 Limits Based on Underlying Groundwater Sub-Basin

Different limits are specified for different groundwater sub-basins. There are two options for complying with the groundwater sub-basin based limits:

- Option 1: The Discharger complies with specified effluent limitations based on the underlying designated groundwater basin. The RWQCB may still require groundwater monitoring if it is determined that the discharge may impact beneficial uses.
- Option 2: The Discharger does not comply with effluent limitations but is required to implement a groundwater monitoring program to demonstrate compliance with the water quality objectives specified in the Basin Plan.

4.2.2.1 Groundwater Sub-Basin Compliance Option 1: Effluent Quality

City's WWTP appears to overlay the Lower Forebay Aquifer. Table 4.8 provides a comparison between the City's historical effluent quality and the proposed discharge limits for dischargers overlying the Lower Forebay Aquifer.

Table 4.8 Comparison of Effluent Quality to General Permit Discharge Limits for the Lower Forebay Aquifer

Parameter	Units	25-Month Rolling Median	City WWTP Effluent
Total Dissolved Solids(1)	mg/L	1,500	984
Chloride(1)	mg/L	250	202
Sulfate(1)	mg/L	850	161
Boron(1)	mg/L	0.5	0.40
Sodium(1)	mg/L	150	147
Total Nitrogen(2)	mg/L	10	65

Notes:
(1) A limited dataset of mineral concentrations was available as a result of supplemental sampling that occurred in August 2020. Listed values are the average of 7 samples taken over a two-week period.
(2) The City samples influent TKN, which is assumed to be equal to influent total nitrogen. The listed value is the median from the last six influent TKN concentrations reported in the quarterly SMRs submitted to the RWQCB.

In general, it appears the WWTP would be able to meet the requirements in Table 4.8 for all constituents except nitrogen. Meeting the nitrogen limit with the current treatment processes poses additional challenges.

The WWTP effluent total nitrogen (TN) concentration is currently 65 mg/L. Meeting a discharge TN limit of 10 mg/L would require an 85 percent nitrogen reduction. It might be possible to achieve this level of reduction during warm weather periods if substantial modifications are made to the pond (including expansion). However, during colder months, the ability to nitrify is severely diminished and not feasible with a pond-based system. Treatment pond processes are not typically designed to be able to achieve nitrogen removal and reliably meeting an effluent TN concentration of 10 mg/L year-round for a pond-based process is not possible.

4.2.2.2 Groundwater Sub-Basin Compliance Option 2: Groundwater Quality

The other option for complying with the sub-basin based limits in the General Permit is by proving the effluent quality does not degrade underlying groundwater through the use of a groundwater monitoring program. The groundwater limits are based on median WQO defined in the Basin Plan. As a result of the Groundwater Monitoring Well Report (Staal Gardner & Dunne Inc, 1992) the City developed a groundwater monitoring project and dug two upgradient and two downgradient monitoring wells with each well having a shallow and deep monitoring point. The upgradient wells are intended to provide a representation of the underlying groundwater quality without the influence of the WWTP. The downgradient wells represent the influence that the WWTP has on the groundwater quality. The General Permit requires a hydrogeologic model and workplan to prove the groundwater monitoring well network is adequately representative of the underlying groundwater.

GSI Water Solutions Inc. (GSI) was retained for this project to assess the adequacy of the system to satisfy permitting requirements and develop recommendations for enhancing the groundwater monitoring program in compliance with the General Permit. The findings show that the relative direction of the groundwater flow is from east to west. With the previous expansion of the disposal fields, the location of MW-1 monitoring wells may potentially be affected by the applied effluent. It is recommended to re-designate the well cluster MW-1 as a side-gradient monitoring well. Monitoring well MW-3 would represent upgradient groundwater conditions. Additional monitoring wells do not need to be constructed at this time.

GSI recommends the City continue conducting groundwater monitoring of the wells within the groundwater network on a quarterly basis in accordance with the General Permit requirements in order to characterize groundwater conditions until compliance with the General Permit is confirmed. Appendix D includes the groundwater monitoring well network assessment report.

Table 4.9 compares the City's historical groundwater concentrations to the groundwater objectives for the Lower Forebay groundwater basin.

The groundwater concentration meets the water quality objectives for all constituents outlined in the Basin Plan with the exception of total nitrogen. Figure 4.9 shows the historical median groundwater nitrogen concentration from 2004 to 2019. Appendix E presents historical groundwater data for other WQO constituents. The upgradient concentration has been steadily increasing over the last 15 years and the downgradient concentration has consistently been greater than the WQO.

Table 4.9 Comparison of Groundwater Objectives and Monitoring Well Data

Constituent(1)	Lower Forebay Median Groundwater Objectives	Average of Upgradient Monitoring Wells(2)	Average of Downgradient Monitoring Wells(2)
Total Dissolved Solids	1,500	774	847
Chloride	250	74	117
Sulfate	850	162	93
Boron	0.50	0.40	0.46
Sodium	150	98	134
Total Nitrogen	8.0	4.6	23

Notes:
(1) All values are expressed in mg/L
(2) Monitoring well data is reported twice per year. Values are an average of available data from March 2004 to March 2019.

The RWQCB is increasingly focusing on developing nitrogen management strategies. Given the effluent nitrogen concentration from the WWTP and the corresponding downgradient groundwater concentration, the RWQCB will likely require the City to make significant strides to improve the groundwater quality through WWTP improvements. Because the downgradient groundwater nitrogen concentration is above the groundwater objective, the City would not be able to comply with Option 2 of the General Permit.

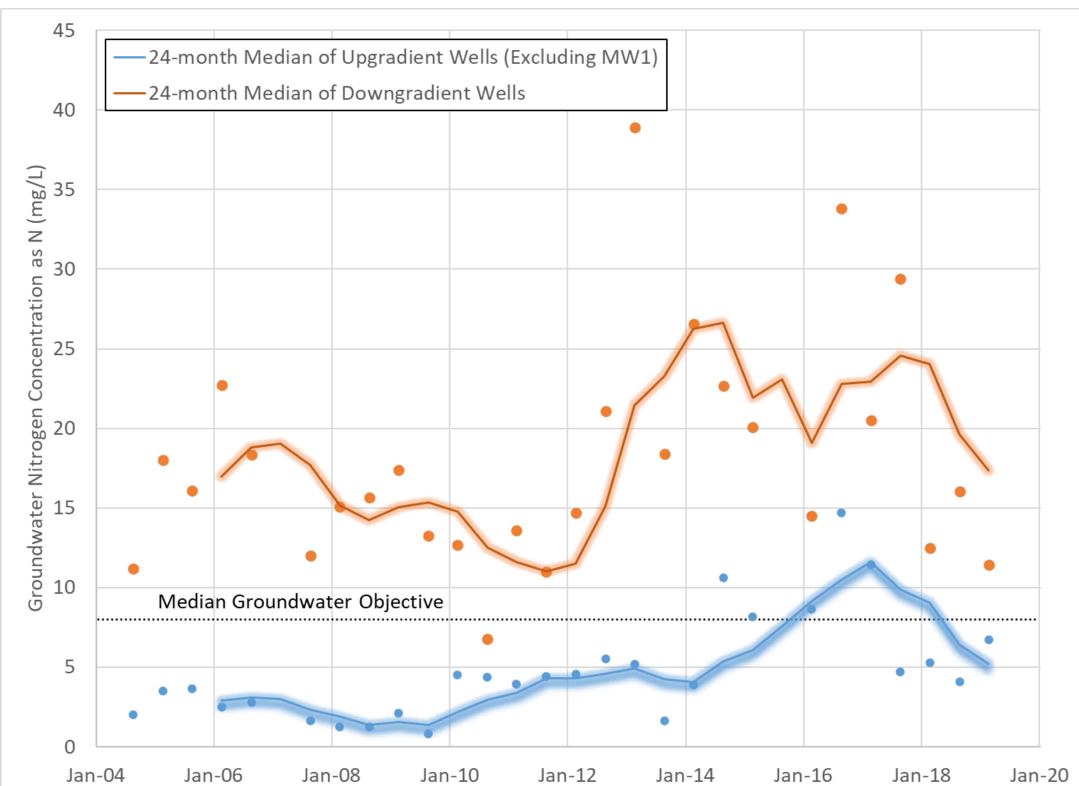

Figure 4.9 Groundwater Nitrogen Concentrations

4.2.3 Compliance Recommendations

The historical WWTP effluent quality is significantly higher than the proposed discharge limits. Some operational modifications can be made to improve the effluent quality. However, aerated ponds are not capable of consistently producing high-quality effluent nor achieving nitrogen reduction. Modifying the existing treatment processes in an attempt to comply with the General Permit effluent limits is not recommended.

The nitrogen concentrations in the groundwater make it infeasible for a groundwater monitoring program alone to comply with the General Permit. Because the nitrogen concentration in the upgradient and downgradient monitoring wells are higher than the WQO, the City will likely need to comply with Option 1 of the General Permit.

It is recommended that the City construct a new WWTP that utilizes a more modern secondary treatment process to achieve consistent effluent quality within the effluent limits defined in Option 1 of the General Permit. The City should still carry out the near-term recommendations provided in the 2018 Effluent Disposal Study to maintain operation of the existing facilities until a new WWTP can be constructed.

4.3 Site Visit and Visual Observation of Existing Facilities

In November 2020, a structural, electrical, and process engineer from Carollo visited the WWTP to assess the condition of existing infrastructure. Given the findings from the performance and capacity evaluation and the options for compliance with the General Permit, the purpose of the site visit was as follows:

- Recommend near-term improvements to maintain existing infrastructure until a new treatment plant can be constructed (approximately five years from now).
- Identify existing infrastructure that may be suitable for continued use and integration with a new treatment plant.

The following sections provide a summary of the findings from the site visit.

4.3.1 Site Visit Summary: Electrical

The general condition of the electrical equipment is sufficient to support another five years of operation. However, the following recommendations could potentially improve site safety and bring the site into compliance with Occupational Safety and Health Administration (OSHA) and National Electrical Code (NEC) requirements.

The main utility switchboard enclosures are rusted, as shown in Figure 4.10. The extent of damage to the internal switchboard was not determined during the site visit. Given the outdoor location, the enclosures should be National Electrical Manufacturers Association (NEMA) 3R rated. It is recommended to consult with the switchboard manufacturer to investigate the extent of damage and fix or replace the enclosure and internal components as needed.

Various terminal boxes and cables throughout the site are rusted and/or exposed, often repaired with tape as shown in Figure 4.11. It is recommended that an electrician do a walk-through of the site to bring miscellaneous electrical systems up to safe condition.

Figure 4.10 Rusted Switchboard Enclosures

Figure 4.11 Cable Terminations wrapped in Tape

Per NEC and OSHA requirements, all electrical equipment shall have arc flash labels, which provides information on the hazard level and the personal protective equipment (PPE) required to service the equipment. An arc flash study needs to be completed, which would include data gathering and analysis, electrical system modeling, electrical system evaluation and recommendations, and development of arc flash labels.

The NEC requires a minimum working space around electrical equipment. It is recommended to do a house cleaning and mark yellow lines around the equipment at the necessary spacing to ensure site safety and equipment accessibility at all times.

Some of the outdoor lights appear to be out of service. This could result in light deficiency if maintenance is required at night.

The installed capacity of the current electrical system is 400A at 240/120 VAC three phase. The electrical loads for a new treatment plant would likely require between 600A and 1,000A at 480 VAC three phase. The design of a new wastewater treatment plant will require an upgraded service connection to utility power and a standby diesel generator for backup power as well as a new switchboard and motor control center.

4.3.2 Site Visit Summary: Structural

The structural assessment determined that the operating infrastructure appears to be in good condition with minor cracking and normal wear and tear. Some additional evaluations and modifications are recommended to confirm structural integrity and maintain code compliance.

The concrete at the headworks structure appears to be in good condition. The manhole covers of the headworks bypass exhibit typical corrosion but do not warrant repairs at this time.

During the site visit, Clarifier 2 was offline and drained. The concrete appears to be in good condition with minor cracks in the walls and floor slab. Clarifier 1 is assumed to be in as good of condition considering they were constructed at the same time but a more detailed observation could not take place since it was in service. Clarifier 3 is several years newer than the two smaller clarifiers. The metallic assets such as the railing, walkways, and drive mechanism have localized corrosion damage but, overall, the damage does not appear significant enough to compromise the structural integrity.

The most considerable corrosion that warrants further investigation is on the drive mechanism (Figure 4.12) and bridge members (Figure 4.13) of Clarifier 3. Corrosion damage in the form of staining and flaking was observed, locally on walkway bridge support framing. Typically, if more than fifteen percent of the surface coating has failed, it is considered a complete coating failure. It is recommended these metallic assets be recoated with an epoxy coating system. Surfaces should be prepared in accordance with the Society of Protective Coating (SSPC)-Surface Preparation (SP) 5. Plant staff indicated that decant from the digester returns only to Clarifier 3, which could potentially cause higher hydrogen sulfide loads and higher exposure conditions in Clarifier 3 than Clarifiers 1 and 2.

The perimeter railings on the three clarifiers do not have kick plates, which are required per OSHA. Additionally, some of the grout and concrete around the baseplates of the railing posts is cracked and should be monitored and repaired if they experience further deterioration.

Some of the roof wood members in the Administration Building appear to be damaged but not significantly enough to warrant urgent repairs. It is recommended to monitor the integrity of the members and repair or replace as necessary.

The older prestressed reinforced concrete digester has not been in service for several years. Substantial vertical and circumferential cracks were observed in the digester walls, making the digester inoperable. It is recommended to decommission the older digester.

The newer concrete digester appears to be in very good condition. Although the internal components or top of digester were not observed, the condition of the exterior concrete appears to be able to support several years of continued operation.

Figure 4.12 Clarifier 3 Drive Gearbox and Pedestal

Figure 4.13 Clarifier 3 Bridge Mount

4.3.3 Site Visit Summary: Process

During the site visit, influent wastewater was bypassing the headworks screen so plant staff could service the screen. Grease buildup has caused the brushes to wear out, which require replacing. Clarifier 1 had significant foam buildup on the water surface, which impaired the ability of the scraper arm to remove it from the system (Figure 4.14). Liquid in the primary clarifiers appeared cloudy, indicating poor settleability. Bubbles were observed on the clarifier liquid surface, which could be a result of dissolved organic compounds coming out of solution. These factors indicate that the FOG coming into the plant are potentially causing a significant burden on the treatment processes and resulting in decreased performance. The high influent FOG load could explain the poor performance of the primary clarifiers and aerobic digester. The dissolved organic content in FOG can cause foaming events and inhibit settling in the primary clarifier, which reduces the scum and sludge that is removed and sent to the digester. Aerating the FOG in the digester can further produce foam and inhibit settling.

The City recently adopted a FOG program ordinance. The program permits the City to identify food service establishments and other businesses that generate FOG through testing, issue citations, and require pretreatment conditions, such as the installation of grease traps in commercial kitchens. The ordinance also includes an additional staff member to facilitate the implementation. Some of the progress around the ordinance has been hindered due to COVID. A good FOG program also includes a strong community outreach component to educate residents on the consequences of improper FOG disposal. A concerted effort should take place to implement the full authority of the FOG program. A successfully implemented FOG program will reduce the maintenance requirements in the collection system and at the treatment plant and improve the process performance.

The primary sludge, primary scum, digester aeration, and effluent pumping appear to be operating as intended and don't warrant any improvements. The Clarifier 1 drive appears to be slightly out of alignment. After each rotation the skimmer arm catches on the scum trough briefly before dropping back down. Although it is not likely to impact the performance of the process, improper alignment of the rotating mechanism can increase wear and reduce the lifespan of the equipment. It is recommended to consult the equipment manufacturer to have them service the drive mechanisms.

Figure 4.14 Primary Clarifier 1 Foam Accumulation

4.3.4 Summary of Site Improvements

Table 4.10 summarizes the significant recommended improvements outlined above and provides an estimate of the associated capitals cost. Less substantial improvements can likely be handled by City staff.

Table 4.10 Short-term Site Improvement Recommendations

Improvement	Estimated Capital Cost
Investigate the extent of damage to the switchboard enclosure and internal components.	$10,000
Miscellaneous Electrical Code Compliance Modifications	$5,000
Perform arc flash study	$30,000
Recoat Clarifier 3 metallic surfaces	$50,000
Add kick-plates to the hand rails around clarifier structures and bridges	$5,000
Total:	**$100,000**

Notes:
(1) The budgetary quote of $3,200 was provided for the initial investigation of the switchboard. Additional cost to replace internal components depends on the result of the initial investigation and could be much higher or lower than the cost listed. After initial investigation, it should be determined whether the switchboard can function until a new treatment plant is brought online, or if it needs to be replaced/repaired sooner.

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Chapter 5

EFFLUENT REUSE AND DISPOSAL

5.1 Background

Historically, the WWTP effluent has been disposed of onsite via percolation ponds and disposal fields. The effluent quality has precluded the City from pursuing recycled water. However, as forthcoming regulations prompt upgrades to the WWTP, the City can evaluate potential recycled water opportunities. Recycled water helps reduce demands on potable water supplies and can provide additional funding opportunities for future projects.

The following sections will compare the existing practices of effluent disposal to the modifications needed to support a recycled water system. The recycled water system discussion includes the identifying potential recycled water users, discussing water quality issues specific to recycled water, and preliminary sizing of a recycled water storage, pumping, and distribution system. Recycled water treatment alternatives will be discussed in subsequent chapters.

5.2 Overview of Effluent Reuse Regulations

The primary regulation governing recycled water use is published in Title 22, Division 4, Chapter 3 of the California Code of Regulations (Title 22). Title 22 regulations define four categories of recycled water determined by the treatment level and effluent turbidity and disinfection levels, which are summarized in Table 5.1. In order to be used for agricultural spray irrigation of food crops or landscape irrigation, the City's recycled water treatment facilities would need to meet the requirements for tertiary disinfected recycled water, which is the highest level of treatment defined by the State and allows for unrestricted reuse in virtually all recycled water applications. Table 5.2 provides the effluent limits for disinfected tertiary recycled water. Domestic wastewater requires biological (secondary) treatment, filtration, and disinfection to Title 22 effluent limits before it can be considered tertiary recycled water. Filtration treatment requirements include a specified filtration rate and turbidity limits depending on the filtration media. Disinfection treatment requirements specify a CT value (product of the chlorine residual and the modal contact time) if using chlorine disinfection or log-removal rates for other disinfection technologies such as UV light.

If pursuing recycled water, Title 22 requires the development of an Engineering Report to specify the treatment technologies and effluent monitoring and reporting, and define recycled water producers, distributors, and users, and their responsibilities including permitting, inspection, training, and reporting requirements.

The General Permit requires the Climate Change Adaptation Plan to include a Recycled Water Feasibility Plan for dischargers with design flows above 1.0 mgd. The Recycled Water Feasibility Plan shall discuss effluent beneficial reuse options, viable recycled water users, infrastructure upgrades, cost analysis, and schedule and milestones for next steps.

The SWRCB adopted the Water Quality Control Policy for Recycled Water (Recycled Water Policy; 2019) and the Water Reclamation Requirements for Recycled Water Use (General Order; 2016) in order to streamline the permitting process for recycled water.

If the City were to develop a new wastewater treatment facility, which included production of recycled water, a new recycled water permit would be required. Though a site-specific permit may ultimately be needed, it is advantageous for the City to pursue permitting under the SWRCB General Order as a first step. To obtain coverage under the Order, the City will be required to submit a Notice of Intent and an application fee to the RWQCB.

Table 5.1 Approved Uses of Recycled Water

Treatment Level	Approved Uses	Median Total Coliform Requirement (MPN(1) / 100 mL)
Disinfected Tertiary	Spray Irrigation of Food Crops Landscape Irrigation(1) Non-restricted Recreational Impoundment	2.2 MPN / 100 mL
Disinfected Secondary (2.2)	Surface Irrigation of Food Crops Restricted Recreational Impoundment	2.2 MPN / 100 mL
Disinfected Secondary (23)	Pasture for Milking Animals Landscape Irrigation(2) Landscape Impoundment	23 MPN / 100 mL
Undisinfected Secondary	Surface Irrigation of Orchards and Vineyards(3) Fodder, Fiber, and Seed Crops	N/A

Notes:
(1) MPN = most probably number
(2) Includes unrestricted access golf courses, parks, playgrounds, school yards, and other landscaped areas with similar access.
(3) Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar access.
(4) No fruit shall be harvested that has come in contact with the ground or irrigation water.

Table 5.2 Disinfected Tertiary Effluent Recycled Water Treatment Objectives.

Parameter	Units	Effluent Limit
BOD	mg/L	10
TSS	mg/L	10
Total Nitrogen	mg/L	10
Total Coliform	MPN(1)/100 mL	2.2(2)
Turbidity	NTU	0.2(3)

Notes:
(1) MPD = Most Probable Number.
(2) Disinfected tertiary effluent with total coliform < 2.2 MPN/100 mL is required for spray irrigation of food crops, landscape irrigation, and non-restricted recreational impoundments.
(3) Effluent turbidity must be less than 0.2 NTU 95 percent of the time and never to exceed 0.5 NTU monitored continuously.

5.3 Landscape Irrigation Demands

Local hydrologic properties such as precipitation and evapotranspiration define the irrigation requirements, which are used to size a recycled water system. Evapotranspiration is the combination of water surface evaporation, soil moisture evaporation, and plant transpiration. It is assumed that recycled water would be applied on turf grass areas. If recycled water is applied on landscapes other than open turf grass areas, the irrigation demand analysis should be revisited as different crops have different irrigation requirements. The following equation was taken from A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California (Guide)(California Department of Water Resources; 2000):

$$ET_C = K_C * ET_o$$

Where: ET_C = Crop evapotranspiration (inches)
K_C = Crop coefficient
ET_o = Reference evapotranspiration (inches)

The reference evapotranspiration rate for each month was obtained by averaging values from the Soledad and King City weather stations. Data was taken from the California Irrigation Management Information System (CIMIS) from September 2016 to June 2020. The Guide lists the crop coefficient for turf grass as 0.8.

The crop evapotranspiration value determines the amount of irrigation water needed to meet the needs of the turf grass. Not all water applied to landscapes is used by plants. Some is lost due to runoff, wind spray, or deep percolation. The irrigation inefficiency needs to be accounted for. Well-designed irrigation systems can have irrigation efficiencies between 80 percent and 90 percent, whereas poorly designed systems can have efficiencies lower than 50 percent. An irrigation efficiency of 70 percent was assumed for this calculation.

Table 5.3 provides the monthly irrigation requirement for turf grass around Greenfield.

Table 5.3 Average Monthly Landscape Irrigation Requirements

Month	ET_o(1) (inches)	ET_c(2) (inches)	Precipitation (1) (inches)	Net Irrigation Requirement(3) (inches)	Percent of Annual Irrigation Requirement(4) (%)
January	1.73	1.39	3.01	0	0
February	2.58	2.07	1.97	0.14	0.28
March	3.67	2.94	2.16	1.11	2.1
April	5.49	4.39	0.559	5.47	10
May	6.62	5.29	0.263	7.19	14
June	7.53	6.02	0.010	8.59	16
July	8.08	6.47	0.003	9.23	18
August	6.93	5.54	0.002	7.92	15
September	5.77	4.62	0.005	6.59	13
October	4.46	3.57	0.423	4.49	8.6
November	2.53	2.02	0.976	1.50	2.9
December	1.93	1.54	1.53	0.019	0.04

Month	ET_o(1) (inches)	ET_c(2) (inches)	Precipitation (1) (inches)	Net Irrigation Requirement(3) (inches)	Percent of Annual Irrigation Requirement(4) (%)
Total	**57.3**	**45.8**	**10.9**	**52.2**	**100**

Notes:
(1) Values calculated by averaging CIMIS King City and Soledad weather station data from September 2016 through June 2020.
(2) Values are 80 percent of the reference evapotranspiration, which takes into account the crop coefficient for turf grass.
(3) Values calculated as the difference between precipitation and crop evapotranspiration and includes a 70 percent irrigation efficiency.

5.4 Wastewater Production

The wastewater flows and loads analysis described in Chapter 3 lists the average annual, maximum month, and peak hour wastewater flows, which are summarized in Table 5.4.

Table 5.4 Historical and Projected Wastewater Flows

Flow Condition	AAF (mgd)	ADMMF/AAF(1)	ADMMF (mgd)	PHF/AAF(2)	PHF (mgd)
2019	0.99	1.06	1.05	---	---
2040	1.80	1.09	1.97	2.75	4.96

Notes:
(1) The max month peaking factor for 2019 was calculated to be 1.06. The future max month peaking factor was assumed to be the maximum value of 1.09 from the available data (2016 through 2019).
(2) No historical hourly flow data was available. The future peak hour flow peaking factor was assumed to be 2.75, which is consistent with the Preliminary Findings Memorandum for the 2019 Water and Wastewater System Master Plan Updates (Wallace Group; 2020).

The largest proposed recycled water treatment and distribution systems would be sized for 2.0 mgd to capture the 2040 maximum month flows without being oversized to capture all wet weather flows.

5.5 Potential Recycled Water Users and Distribution System

An initial list of potential recycled water users was compiled by identifying open green spaces in and around the City. Table 5.5 provides a list of potential recycled water users and the approximate irrigable land.

Most potential recycled water users are parks, schools, and cemeteries within the City, with the exception of Greenfields Turf, which is a sod farm adjacent to the WWTP. Figure 5.1 presents a preliminary layout of the potential recycled water users and distribution pipe network. The majority of potential recycled water users are relatively small, less than 10 acres, and spread throughout the City. If the City pursues recycled water, a more effective approach may be to focus on delivering recycled water to Greenfields Turf, Inc., Oak Park, and the Oak Park Cemetery. These three sites are the closest to the WWTP, would require less distribution piping, and comprise over half (60 acres) of the approximately 113 acres of potential recycled water landscape use area identified. In addition, there may be an opportunity to sell recycled water to Greenfields Turf, Inc. However, one of the biggest attractions of recycled water to regulators and a requirement to secure state or federal grants or funding is the offset of demand to potable water supplies. If Greenfields Turf Inc. and/or Oak Park and Cemetery are not tied in to City water supplies and irrigate using their own well, there would be fewer funding opportunities for a project to provide them with recycled water.

Table 5.5 Potential Recycled Water Users

Potential Recycled Water User	Approximate Irrigable Land (acres)
Greenfields Turf, Inc.	51
Greenfield High School	17
Vista Verde Middle School	11
Oak Park / Greenfield Cemetery	9
Patriot Park	8
Tuscany Park	4
Cesar Chavez Elementary School	3
Arroyo Seco Academy	3
Oak Avenue Elementary School	2
Mary Chapa Academy	2
Greenfield Holy Trinity Cemetery	1
Village Green Park	0.6
Total:	**113**

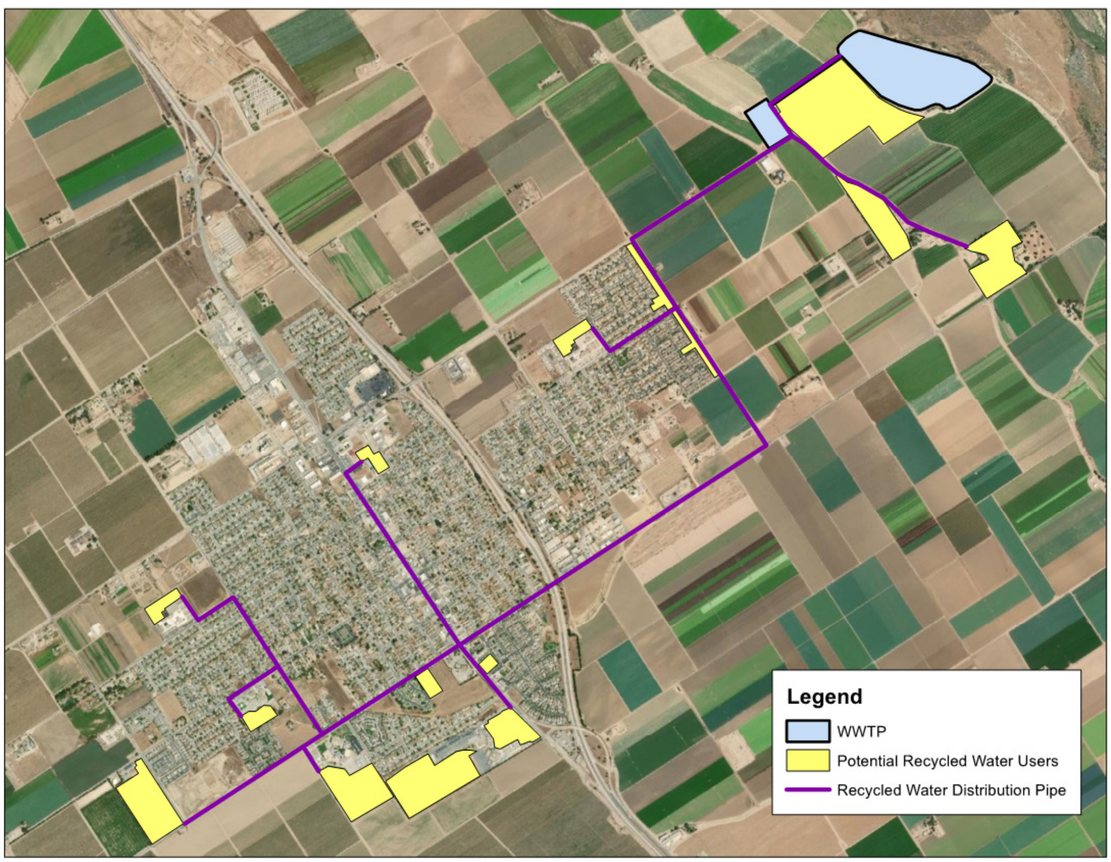

Figure 5.1 Potential Recycled Water Users and Distribution System

Additional recycled water users can be explored beyond turf grass irrigation, such as cannabis cultivation facilities, transit facility washdown (car washes, fire engines, municipal buses, etc.), or nearby industrial applications. Further discussions would be needed with relevant stakeholders to identify water demands and seasonal variability.

A monthly water balance of the recycled water demands and 2040 wastewater flows is included as Appendix F. The maximum recycled water use for all potential users at buildout flows is just under half of the projected 2040 wastewater flows. Given that the identified recycled water demands are less than the wastewater flows, a recycled water system could be sized to treat only a portion of the wastewater to meet recycled water quality requirements, and the rest of the effluent would only meet secondary effluent standards and be discharged to the existing effluent disposal fields. Figure 5.2 summarizes the monthly irrigation demands for potential recycled water users and excess wastewater effluent.

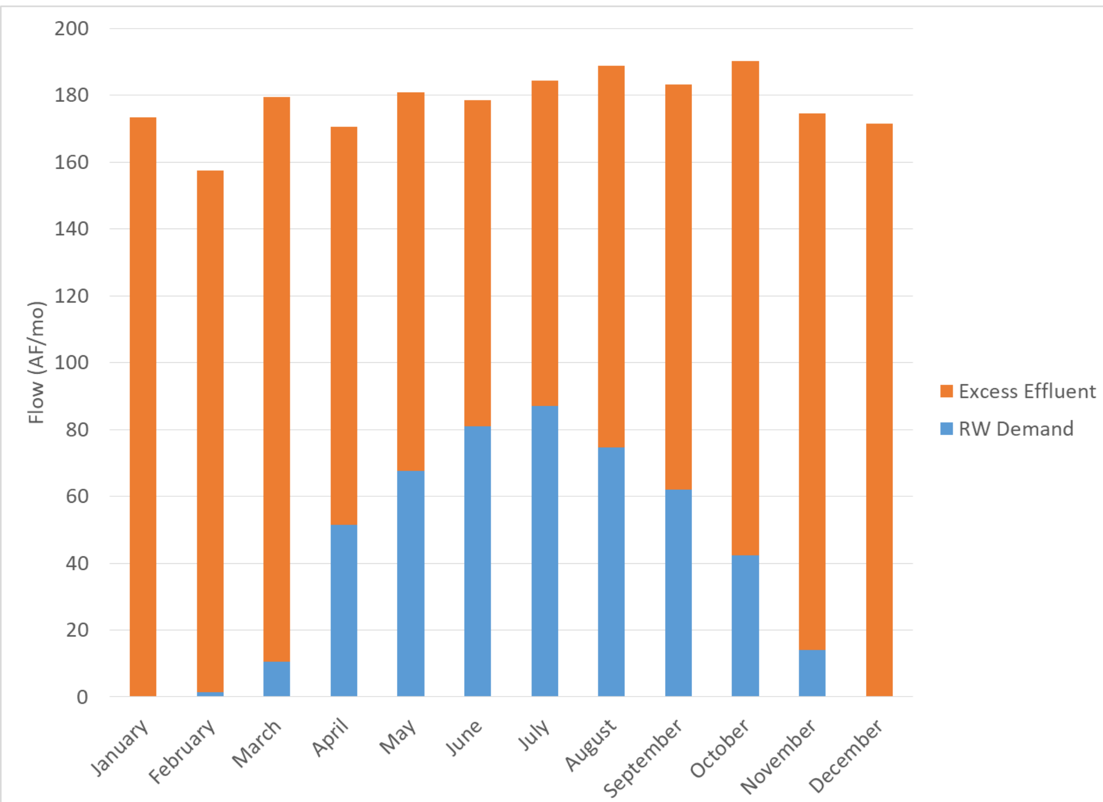

Figure 5.2 Monthly Recycled Water Balance

A recycled water system needs to be able to provide irrigation water on demand. Watering schedules can vary depending on the use area and the end-user but sometimes have high peak hour demands. The most effective way to accommodate the instantaneous demands of recycled water users is to provide recycled water storage coupled with a pump station sized large enough to deliver water at the necessary pressures. The City can convert existing treatment ponds to serve as a recycled water storage reservoir.

5.6 Recycled Water Quality

Beyond the regulatory requirements for recycled water effluent quality, additional water quality objectives need to be considered. Although mineral compounds are not commonly regulated in recycled water, high mineral concentrations and EC can have a detrimental effect on crops. Because traditional secondary and tertiary treatment processes do not remove inorganic ions, such as dissolved salts or minerals, future effluent concentrations are assumed to be the same as current effluent concentrations. Table 5.6 compares the City's influent wastewater mineral concentration to agronomic application guidelines.

Table 5.6 Degree of Use Restriction Guidelines for Recycled Water Quality

Parameter	Units	None	Slight	Severe	City Influent
Salinity					
EC	μmhos/cm	<700	**700 – 3,000**	>3,000	1,802
TDS	mg/L	<450	**450 – 2,000**	>2,000	1,004
Permeability					
adjSAR = 0 – 3 and EC		>700	700 – 200	<200	
adjSAR = 3 – 6 and EC		**>1,200**	1,200 – 300	300	adjSAR = 4.7 EC = 1,802
adjSAR = 6 – 12 and EC		>1,900	1,900 – 500	<500	
adjSAR = 12 – 20 and EC		>2,900	2,900 – 1,900	<1,900	
adjSAR = 20 – 40 and EC		>5,000	5,000 – 2,900	<2,900	
Sodium					
Root Adsorption	SAR	<3	**3 – 9**	>9	3.9
Foliar Adsorption	mg/L	<70	**>70**		154
Chloride					
Root Adsorption	mg/L	<140	**140 – 365**	>365	213
Foliar Adsorption	mg/L	<100	**>100**		213
Boron	mg/L	**<0.7**	0.7 – 3.0	>3.0	0.40
pH	S.U.		6.5 – 8.4 (normal range)		7.8
Total Nitrogen(1)	mg/L	<5	**5 – 30**	>30	<10
Bicarbonate (HCO_3)	mg/L	<90	90 – 500	**>500**	508

Notes:
(1) Effluent nitrogen concentrations are based on complying with the future General Permit discharge requirements.

The water quality of the City's wastewater indicates the need for a moderate level of use restriction to prevent detrimental effects to landscape crops. However, the successful long-term use of recycled irrigation water depends on many factors beyond just water quality, including the salinity of the recycled water, rainfall, leaching, soil drainage, irrigation water management, salt tolerance of plants, and soil management practices. While not the sole factor, a minimum level of water quality is also necessary.

Because salinity problems may eventually develop from the use of any water due to its mineral content, the following measures can be implemented to manage salinity in either agricultural or landscape irrigation:

- Irrigate more frequently to maintain an adequate soil water supply.
- Select plants that are tolerant of an existing or potential salinity level.
- Routinely use extra water to satisfy the leaching requirements.
- Direct the spray pattern of sprinklers away from foliage. To reduce foliar absorption, don't water during periods of high temperature and low humidity or high winds. Change time of irrigation to early morning, late afternoon, or night.
- Maintain good downward water percolation by using deep tillage or artificial drainage to prevent the development of a perched water table.

On-site maintenance concerns include additional conversion costs from potable irrigation valves and appurtenances to equipment that is more compatible with recycled water, due to higher salinity and salt build up in sprinkler heads.

If the City decides to pursue the implementation of recycled water, a small-scale demonstration project, ideally at the adjacent sod farm, utilizing salinity control measures would allow the City to observe the impacts of irrigating turf grass with recycled water quality effluent.

5.7 Effluent Disposal Alternatives

The City has the option to maintain an effluent disposal strategy similar to their existing operations, or to develop a recycled water system for effluent reuse. Even with recycled water, on-site effluent disposal capacity is needed during times when effluent flows exceed recycled water demands. It was assumed that the existing effluent disposal fields would be disked and conditioned to improve the percolation capacity. Also, new berms would be constructed to convert the fields into percolation ponds. Earthwork would improve the soil stability of the pond embankment and allow the ponds to accumulate water within the necessary freeboard requirements.

It was determined the existing effluent fields provide sufficient capacity to percolate projected wastewater flows from a new treatment process. Regardless, purchasing additional land adjacent to the treatment plant has several benefits. Owning the land between the treatment plant and the ponds would simplify pipeline construction to the effluent ponds, increase the noise and odor buffer around treatment facilities, and provide operational flexibility. The land could provide space for future facility infrastructure, including additional secondary treatment or disposal capacity.

5.7.1 Alternative 1: Effluent Reuse

In addition to the higher level of treatment required to achieve recycled water quality standards, a recycled water system consists of storage, pumping, and distribution. Recycled water treatment alternatives are discussed in Chapter 6.

The recycled water balance detailed in Appendix F supports the sizing of the recycled water system. The system size is driven by the peak demands, which depends on the irrigation schedule. The irrigation schedule assumes operation three days per week for eight hours each shift. To satisfy the recycled water demands identified previously, 14 AF of storage is needed, which can be provided by converting Ponds 1 and 2 to recycled water storage reservoirs. In order to convert the ponds, they would need to be drained and dredged. The condition of the existing synthetic liner would need to be evaluated to determine if it can be used for recycled water storage. Even if reuse of the pond liner is feasible, a cleaning protocol will need to be followed to disinfect it before startup. Depending on the end use of the recycled water, control measures may need to be considered to prevent contamination in the open reservoirs.

Based on the assumed irrigation schedule, the recycled water pump station would need to able to provide a peak flow of 6.4 mgd at a minimum distribution system pressure of 40 pounds per square inch (psi), or potentially higher depending on the end-use. Maintaining acceptable flow velocities at the peak flow requires the pipe diameter to be 16 inches. The headloss through the pipe from the recycled water pump station to the farthest end-use can then be calculated. The headloss and peak flow were used to size the recycled water pump station, which was determined to be 250 hp.

Developing a schedule to stagger irrigation demands from various end-users reduces the peak hour flows and allows the storage requirements, pump station, and transmission pipe all to be sized smaller.

Another significant component of a recycled water system is the distribution piping network. Based on the proposed recycled water system layout (Figure 5.1), the distribution piping covers approximately 36,000 feet. The peak hour flow determined that the distribution pipe from the pump station needs to be 16 inches in diameter. As recycled water is delivered to users along the distribution network, the pipe diameters can decrease. It was assumed that the pipeline would be constructed largely along the City right-of-way using open trench methods. Special construction methods are required when open trench methods are not feasible, for example when crossing Highway 101. Jack and bore is a common trenchless pipeline construction method that could be used to cross the highway and deliver recycled water to users on the other side of the highway.

The approximate capital costs for a recycle water system (excluding treatment) are detailed in Table 5.7.

Table 5.7 Approximate Recycled Water System Capital Costs

Component	Unit Cost(1)	Approximate Value	Project Cost
Recycled Water Storage			
Existing Pond Dredging and Solids Hauling	$50/WT	4,700 WT(2)	$235,000
Pond Lining	$2.50/sq ft	187,000 sq ft(3)	$467,500
Pump Station	$3,500/hp	250 hp(4)	$875,000
Distribution Piping			
Open Trench Pipe Construction (12 in PVC)(5)	$250/ft	36,000 ft	$9,000,000
Jack and Bore (under Highway 101)	$1,500/ft	400 ft	$600,000
Total:			**$11,177,500**

Notes:
(1) Unit costs are developed from history of industry experience planning, modeling, and constructing recycled water and various pipeline projects.
(2) The approximate sludge hauling volume assumes the ponds can be drained to a depth of one foot and routed through the treatment process. The remaining one foot of sludge would be hauled offsite. This value could be reduced if the sludge is dewatered or allowed to dry in place for several weeks or months after the ponds are drained and prior to disposal.
(3) The liner area assumes both existing pond footprints of 230 feet by 380 feet at a depth of 5 feet.
(4) The pump station horsepower is based on the following equation: HP = headloss * flow / 3960. The headloss was calculated using the Hazen Williams equation for a four mile, 16 inch diameter pipe, a flow rate of 6.5 mgd, and a roughness factor of 130.
(5) The distribution pipeline network will vary from 16 inches in diameter down to approximately 6 inches in diameter. In order to calculate the approximate distribution system cost without developing a recycled water model, the average pipe diameter across the entire distribution system was assumed to be 12 inches.

Additional costs should be budgeted for maintenance of equipment such as the pond liner, effluent pumps, and distribution system valves. Annual operating costs will also include power for the pump operation and routine operation and maintenance labor.

As mentioned previously, the irrigation schedule directly affects the size and cost of the recycled water system. If the recycled water demands could be distributed evenly across an irrigation schedule that operated eight-hour shifts for six days per week, the distribution pipe could be decreased to approximately 12 inches in diameter and the pump station to approximately 150 hp, resulting in significant cost savings.

The recycled water demands only account for roughly one fourth of the annual wastewater flows. It is assumed that excess effluent would be disposed of through the existing effluent disposal fields. A percolation rate of 4 inches per day was assumed based on previous infiltration rate testing and subsequent analysis provided by Wallace Group detailed in the 2018 Effluent Disposal Study. The existing disposal field area provides sufficient percolation capacity to dispose of excess effluent. Figure 5.3 presents the pond configuration with recycled water.

With Recycled Water:

1. Dredge Ponds 1, 2, and 3.
2. Install a new liner in Ponds 1 and 2.
3. Abandon Pond 3.
4. Dredge and disc Ponds 4 and 5.
5. Construct new percolation ponds (6 and 7 at startup, 8 by 2035, 9 and 10 after 2040).

Figure 5.3 Effluent Pond Configuration with Recycled Water

5.7.2 Alternative 2: No Effluent Reuse

If the City decides not to implement a recycled water system, the existing disposal fields can be used to percolate effluent. A water balance excluding recycled water demands was developed to determine the percolation area needed. At the 2040 projected flows, 32 acres would be needed to dispose of the effluent during the worst-case month. The City has 26 acres of existing effluent disposal fields. However, based on the water balance, the City does not need additional percolation capacity until the maximum month effluent flows surpass 1.6 mgd, which based on the flows and loads analysis is not expected to occur until after 2030. Furthermore, the percolation rate assumed for the water balance may be overly conservative. With a percolation rate of 4.5 inches per day, the existing 26 acres is sufficient to dispose of the projected 2040 flows. With higher quality effluent from a new treatment process, the percolation rate may be even higher than 4.5 inches per day. Once the new treatment process is operational, studies should be done to determine the actual percolation rate and determine a more accurate water balance. If necessary, the City could convert the existing treatment ponds to percolation ponds to provide another 10 acres of percolation area.

Figure 5.4 presents a possible pond configuration without recycled water.

Without Recycled Water:

1. Dredge Ponds 1, 2, and 3 and abandon.
2. Dredge and disc Ponds 4 and 5.
3. Construction of new percolation ponds (6, 7, 8 at startup; 9 by 2035, 10 after 2040).

Figure 5.4 Effluent Pond Configuration without Recycled Water

Chapter 6

TREATMENT ALTERNATIVE ANALYSIS

6.1 Introduction

The previous chapters identified limitations with the existing pond-based treatment processes and their inability to comply with effluent standards presented in the General Permit. A new treatment plant is needed to overcome these constraints. The following sections present a summary of needed improvements and a financial and non-financial evaluation of treatment process alternatives capable of complying with the General Permit effluent limits. The comparison of treatment alternatives and subsequent recommended project and implementation plan present a long-term strategy to meet forthcoming regulations. The City may be investigating interim improvements, which are not considered in this report.

6.2 Description of Wastewater Treatment Plant Process Elements

A modern wastewater treatment plant process comprises many components. Liquid treatment can include preliminary, primary, secondary, tertiary, and effluent disposal, while solids treatment can include thickening, stabilization, dewatering, and biosolids disposal. Additional infrastructure and ancillary components are also needed to support the overall operations of the treatment plant.

The following sections introduce various process components and alternative process technologies, including those capable of producing recycled water.

6.2.1 Summary of Common Improvements

The following sections describe several common site modifications and process elements the City would need for a new treatment plant, regardless of the recommended treatment alternative.

6.2.1.1 Operations Building and Utility Service

A new Operations Building is recommended to house the main electrical system components, such as motor control centers, provide a space for process controls, and provide support facilities for operators. The existing Operations Building is outdated and lacks sufficient space to support the needed upgrades. The Operations Building should include space for laboratory equipment as needed to support process controls.

It is recommended that any new treatment plant will be operated by programmable logic controllers (PLC). The PLCs are the brains of the system that can change the operating configuration of process elements based on defined setpoints and control loops. Operators interact with PLCs through the use of supervisory control and data acquisition (SCADA). SCADA allows operators to adjust the current operating conditions and analyze the performance of the treatment plant in real-time.

The electrical systems will need to be upgraded to support a new treatment facility. During the site visit, the current electrical service was identified as 240VAC with a 400A switchboard. Additional loads needed for new process aeration, pumping, and site maintenance will require a 480VAC service, with a main switchboard that can support between 600 and 1,000 amps, depending on the final equipment design. The Operations Building should include an electrical room sized to house new motor control center and switchboard cabinets and other miscellaneous electrical panels.

It is recommended to install a new standby diesel generator sized to handle critical power loads in case of emergency, such as utility shutoffs or power failures.

6.2.1.2 Headworks and Influent Pumping

It is recommended that the headworks structure be replaced to accommodate the hydraulic conditions needed to support the integration with a new treatment plant. Additionally, grit is not being removed in the existing headworks, but is typically required in a mechanical treatment process to protect downstream equipment. Rather than retrofitting the existing headworks to include grit removal, a new headworks would provide improved grit removal, flow metering, and hydraulic conditions for flow splitting. The mechanical bar screen that was installed in the Spring of 2020 could be relocated to a new headworks structure. Depending on the hydraulics of the wastewater entering the treatment plant (gravity main vs. force main) a new influent pump station may be needed to pass flow through the headworks and split flow to the secondary process.

6.2.1.3 Effluent Pump Station and Non-Potable Water Supply

Intermediate pumping is typically required for a tertiary treatment process. However, once pumped through the headworks, wastewater often flows by gravity through a secondary treatment plant. Wastewater may be able to flow by gravity to the existing effluent pump station adjacent to the percolation ponds for disposal. Pumping requirements will be determined based on the hydraulic profile of the recommended project.

If the City implements a recycled water system, a pump station would be needed to deliver water to end-users, as described in Chapter 5: Effluent Reuse and Disposal.

Regardless of the effluent disposal method, effluent pumps are needed onsite for periodic cleaning and maintenance purposes. Non-potable plant effluent, commonly referred to as 3W, is used onsite for wash water to maintain equipment, including the headworks screen, clarifier troughs, and dewatering units. It may also be needed for seal water for certain pump gaskets. High-pressure hoses can be used for spray-down of basins to keep the site clean.

6.2.1.4 Existing Site Work and Demolition

Part of the design for a new wastewater treatment plant will include detailed construction phasing. New infrastructure can be constructed on the edge of the site, which will require significant earthwork and grading. If constructing to the north, the stormwater pond and sludge drying beds would need to be filled in with engineered fill to support a structural foundation. The stormwater ponds serve the City drainage system, not just the WWTP on-site drainage. Further evaluation of the drainage system is needed to reconfigure the drainage system or relocate the stormwater basins.

The amount of earthwork on site provides the opportunity to incorporate a site drainage system into the finished paving and grading plan. A site drainage system allows wash-down water and stormwater to collect and be pumped to the head of the plant and go through the treatment process.

Site work common to the alternatives includes demolition of existing infrastructure once new processes are constructed, earthwork needed to regrade around new infrastructure, dredging and hauling of solids in the treatment ponds, and earthwork to convert the existing effluent disposal fields to percolation ponds.

6.2.1.5 Treatment Pond Decommissioning

Whether pursuing recycled water or maintaining the existing discharge method of percolation, it is recommended to decommission the aerated ponds once the new secondary treatment process is constructed. After the new process has started up and is acclimated, the wastewater from the ponds should be sent through the new treatment plant. The remaining sludge in the ponds should be pumped to the dewatering process to reduce the moisture content, then hauled offsite. The ponds can then be converted to percolation fields to provide additional disposal capacity or used as a recycled water storage reservoir, depending on the type of discharge method the City pursues.

6.2.2 Secondary Treatment Alternatives

Table 6.1 presents the treatment objectives for any new secondary treatment process.

Table 6.1 Suspended Growth Secondary Process Treatment Objectives

Constituent	Design Treatment Objective (mg/L)	General Permit Limit (mg/L)
BOD	10	30
TSS	10	30
Total Nitrogen	8	10

Table 6.2 presents the types of secondary treatment processes that are commonly considered and their ability to remove certain constituents.

Table 6.2 Secondary Treatment Processes Meeting Permit Discharge Requirements

Process	Ability to Remove(1)		
	Organics (BOD)	Ammonia	Total Nitrogen
Suspended Growth			
Conventional Activated Sludge	✓	✓	✓
Oxidation Ditch	✓	✓	✓
Membrane Bioreactor	✓	✓	✓
Attached Growth			
Trickling Filter	✓	X	X
Nitrifying Trickling Filter	X	✓	X
Denitrifying Trickling Filters	X	X	✓
Land Based Systems			
Aerated Ponds	✓	Summer only	X

Notes:
(1) The General Permit will require BOD, ammonia, and total nitrogen removal.

The performance limitations of aerated ponds have been discussed previously. They are not considered a reliable technology capable of meeting the proposed effluent limits and won't be considered further. Similarly, the attached growth processes have a long history for treating wastewater, but they are limited in their ability to meet strict BOD and ammonia limits. Denitrifying filters are reliable and effective, however, chemical costs for their operation are significant, and it is usually more preferable to achieve nitrification in a suspended growth process where chemical requirements will be significantly less. For these reasons, attached growth and land-based technologies will not be evaluated further in this Master Plan.

Suspended growth processes provide reliable, year-round BOD, ammonia, and total nitrogen removal and provide the most flexibility for meeting increasingly stringent discharge requirements.

Several similarities exist between suspended growth alternatives. The content of the secondary biological treatment reactor in a suspended growth process is referred to as mixed liquor. The suspended growth alternatives achieve both nitrification and denitrification to meet the effluent total nitrogen limits. Nitrification occurs when ammonium oxidizing bacteria (AOB) and nitrite oxidizing bacteria (NOB) utilize oxygen to convert ammonia to nitrite, then nitrate. Denitrification occurs when denitrifying bacteria utilize a carbon source (e.g. BOD), without the presence of oxygen, to reduce nitrate to nitrogen gas, which bubbles out of solution. The processes utilize an internal recycle to send mixed liquor from the aerobic zone to be denitrified in the anoxic zone.

The activated sludge secondary process consists of a biological reactor followed by a solids separation process and return sludge pumping. The solids separated from the liquid stream in a suspended growth process are referred to as return activated sludge (RAS). RAS is sent from the solids separation process to the head of the biological reactor to maintain the desired solids concentration for treatment. The SRT is a key design parameter for nutrient removal systems. The SRT is a measure of the average residence time of the micro-organisms in the secondary process. Most nutrient removal systems require an SRT of at least 8 to 10 days so that the AOB's and NOB's have sufficient time to grow and maintain a sufficient population density to achieve the desired treatment objectives. Excess solids, or waste activated sludge (WAS) is removed from the system and sent to the solids handling process.

Upgrade to an activated sludge process with a design flow of 5 mgd or less would trigger the treatment plant to become a Class III process, which requires the Chief Plant Operator (CPO) to be at minimum Grade III and the Designated Operator-in-Charge (DOIC) to be at minimum Grade II.

The following sections highlight the differences in the three suspended growth alternatives.

6.2.2.1 Conventional Activated Sludge

One configuration of the conventional activated sludge process is the MLE. This option typically consists of rectangular, concrete, open basins, which include a smaller anoxic zone followed by larger aerobic zones.

Process air is supplied in the aerobic zones by an aeration system consisting of mechanical blowers and submerged fine bubble membrane diffusers. The bubbles produced from the diffusers provide an oxygen source to achieve organics and ammonia removal, while keeping the solids in suspension.

Nitrate in the mixed liquor produced during the nitrification step is then pumped from the last aerobic zone to the front of the anoxic zone by a MLR pump where it is mixed with screened influent. The anoxic zone is unaerated and requires mixers to keep the mixed liquor in suspension.

The typical conventional activated sludge process includes secondary clarifiers, which allow mixed liquor flocs to settle from the main liquid stream via gravity. Pumps send RAS and WAS to the MLE basin and solids handling processes, respectively.

MLE is a common, proven technology that can be used in a wide range of climates to reliably remove organics, ammonia, and total nitrogen. It can also be easily expanded or modified in the future to increase overall capacity or achieve stricter nitrogen or phosphorus limits. Disadvantages of the MLE option are the use of more complicated process controls and mechanical equipment as compared to oxidation ditches. This increased operational complexity and additional maintenance associated with the diffusers, mechanical blowers, and MLR pumps result in greater operator attention and periodic shutdowns, to clean, replace, and repair the equipment. Figure 6.1 presents the MLE secondary process flow.

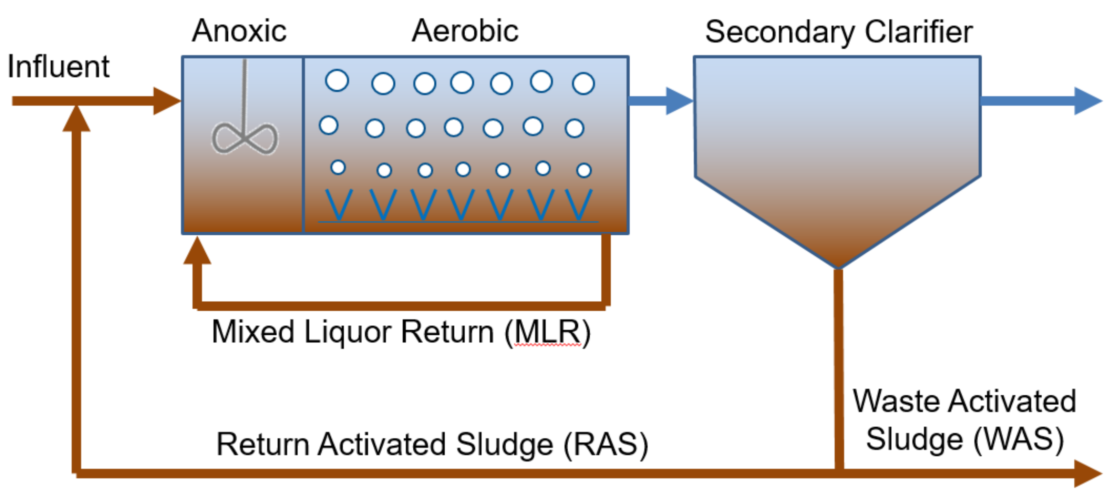

Figure 6.1 MLE Process Schematic

6.2.2.2 Oxidation Ditch

Oxidation ditches are typically oval-shaped concrete, open basins consisting of one or more concentric rings. Flow is recirculated in a racetrack configuration with a smaller anoxic volume upstream to facilitate denitrification, similar to the MLE process. As the flow circulates around the basin, a mechanical arm pivots to control the flow from the aerobic zone back through the anoxic zone, similar to the function of the MLR pumps in the MLE process. The oxidation ditch basins are much larger than the MLE or MBR basins, resulting in a longer SRT. Since they are operated at a long SRT, they are commonly used at treatment plants that do not have primary clarifiers. The long SRT in an oxidation ditch is capable of oxidizing the volatile solids in raw sewage.

Organics removal and nitrification occurs in the larger aerobic volume. The anoxic zone typically includes mixers to keep the mixed liquor in suspension. Oxygen in the aerobic zone is supplied by vertical impeller mixers that agitate the surface of the water to introduce oxygen. The typical oxidation ditch process includes secondary clarifiers, which allow activated sludge flocs to settle from the main liquid stream. The RAS and WAS flows from the secondary clarifier are operated similarly as they are for the MLE process.

The advantages of an oxidation ditch process compared with the MLE and MBR options are that it is simpler to operate, has fewer parts that require maintenance (no membranes, blowers, diffusers), and provides a higher degree of reliability in handling shock loads and avoiding process upsets given the larger basin size. Also, oxidation ditches do not typically require a standby basin since it typically does not need to be taken out of service for maintenance. Disadvantages of the oxidation ditch process include a larger footprint and slightly increased aeration costs due to the reduced efficiency of mechanical aeration compared to diffused aeration. Figure 6.2 shows the oxidation ditch process flow.

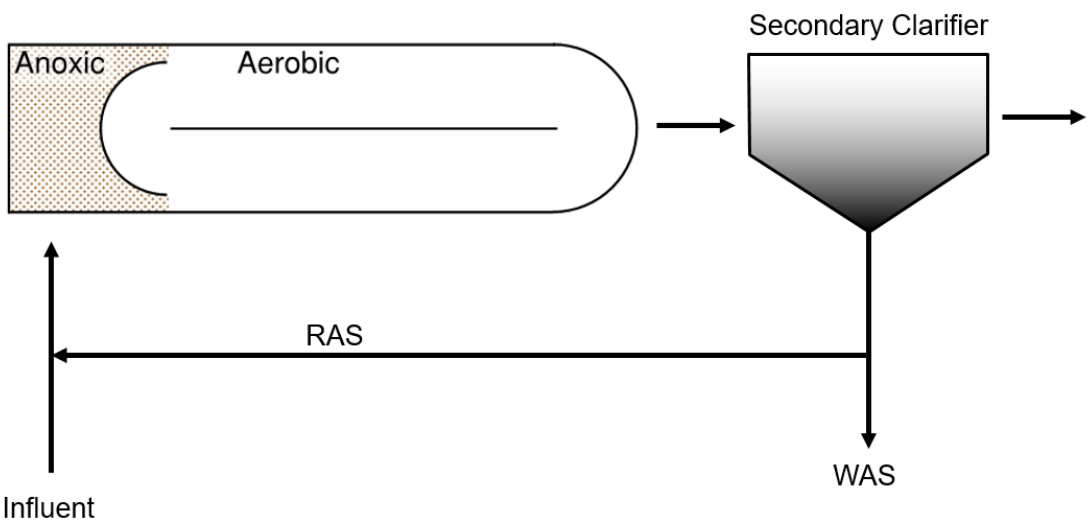

Figure 6.2 Oxidation Ditch Process Schematic

6.2.2.3 Membrane Bioreactor

The membrane bioreactor MBR process is similar to MLE, except another basin housing porous hollow fiber membrane cassettes replace the need for secondary clarifiers. Because solids separation is performed with membranes instead of gravity settling, the MLSS concentration can be much higher, up to 12,000 mg/L, compared to that of MLE or oxidation ditch, which is around 3,000 mg/L. The higher MLSS concentration results in reduced aerobic and anoxic basin volume compared to the other two processes.

The membranes are capable of reducing turbidity to the levels required by Title 22 for unrestricted reuse quality effluent. Therefore, no filter is required downstream of an MBR process to produce tertiary treated effluent. Since secondary clarifiers and tertiary filters are not required with the MBR process, the overall secondary treatment facility footprint is smaller compared to other suspended growth processes.

Considerations unique to the MBR process are described below:

- Screening requirements for MBRs are more stringent than the other options in order to protect the membrane fibers. Headworks screen spacing is required to be no larger than 2 mm in all directions (perforated drum screens needed in addition to bar screens).
- Additional blowers are needed for MBR for process air and membrane air scouring. Air scouring is required under the MBR cassettes to prevent solids from fouling the membrane. If the blowers are housed in a common building, the MBR blower building will have a larger footprint than an MLE blower building.
- Chemical dosing is required on a routine basis to prevent membrane fouling.
- Given the higher headloss across the MBR process, permeate pumps are needed to pull water through the membranes.
- Additional tanks and a mechanical building are required to house the membrane equipment including the membranes, permeate pumps, recirculation pumps, and membrane cleaning facilities.
- Upstream flow equalization was not included but may be considered during preliminary design as it provides a benefit to maintain consistent filter feed flow compared to other alternatives and can help reduce the size of the membranes.

The primary advantages of the MBR option are that it is a compact, proven technology with numerous municipal installations nation-wide, and it produces a high quality effluent for reuse applications without the need for an additional filtration process. Disadvantages are that membranes require fine screening pretreatment and periodic cleaning with chemicals to mitigate fouling. The MBR option also has an increased energy cost associated with the additional aeration and pumping requirements. Figure 6.3 shows an example of a proposed MBR process flow.

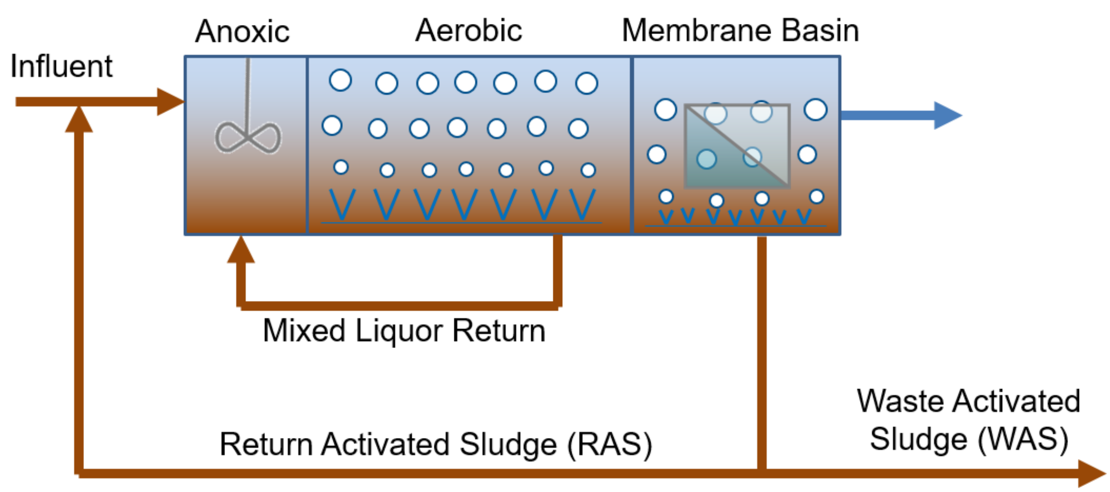

Figure 6.3 Membrane Bioreactor Process Schematic

6.2.3 Solids Handling Alternatives

Solids from the existing treatment system currently accumulate in the aerated ponds. With the proposed facility, the majority of solids will be generated from WAS from the secondary treatment process.

The three process elements of solids handling are thickening, stabilization, and dewatering. The level of solids treatment depends on the intended biosolids end-use. Federal regulations governing land application (40 CFR 503) vary for pathogen and vector attraction reduction requirements in the stabilization process depending on if the plant produces Class A EQ, Class A, Class B, or sub-Class B biosolids. Certain biosolids markets require a higher quality product for land application. For this evaluation, it was assumed that the City would produce a Class B product and contract a third-party to haul biosolids and land apply off site. The hauler may also elect to send the biosolids to a composting facility or to the landfill for alternative daily cover if more cost-effective or advantageous. Table 6.3 lists the solids handling processes utilized for each secondary treatment alternative.

Table 6.3 Solids Handling Processes for Secondary Treatment Alternatives

Secondary Treatment Alternatives	Thickening	Stabilization	Dewatering
MLE	(1)	✓	✓
Oxidation Ditch(2)	(1)	(2)	✓
MBR	(1)	✓	✓

Notes:
(1) Although a dedicated thickening process is not proposed for any of the secondary alternatives, solids thickening can occur as part of the stabilization process.
(2) Although a dedicated solids stabilization process is not proposed for the oxidation ditch option, given the longer time that solids are retained in the oxidation ditch, the WAS is still anticipated to comply with the Class B biosolids regulations through fecal coliform testing.

6.2.3.1 Stabilization

Solids stabilization options approved to meet the pathogen reduction requirements include aerobic digestion, air drying, anaerobic digestion, composting, and lime stabilization.

Air drying is similar to the sludge drying beds utilized by the City currently, however, the Regional Board no longer permits unlined sludge drying beds. With the construction of a new treatment facility, the existing sludge drying beds would need to be upgraded to include a concrete or asphalt slab to spread biosolids and collect drainage water. In order to provide adequate stabilization for buildout biosolids loads, the area of concrete slab would need to be several acres. Furthermore, air drying is weather-dependent and does not produce a consistent biosolids product.

For the composting process, biosolids are combined with a woody waste material, such as wood chips, and biologically decomposed. Composting was not considered for this analysis because of the significant O&M effort associated with acquiring, grinding, screening, and mixing the woody waste material and producing and marketing a compost product.

Lime stabilization is the addition of lime chemical (calcium oxide or calcium hydroxide) to increase the pH of the biosolids above 12, which inactivates pathogens. This process was not considered because of the ongoing cost and safety impacts associated with chemical addition and handling.

Aerobic digestion and anaerobic digestion are the recommended solids stabilization options to be considered moving forward. However, if the biosolids end-use changes, the recommended solids stabilization process can be revisited during design of the new treatment facility.

Aerobic Digestion

Conventional aerobic digestion stabilizes sludge by meeting a minimum solids residence time to prevent odors, minimize vector attraction, and reduce pathogens. The digestion process aerates volatile solids in the WAS, which reduces the solids volume sent to dewatering, and in turn reduces hauling costs. An additional benefit of aerobic digestion is improvement of the sludge dewatering characteristics, which allows for better solid/liquid separation in turn reducing hauling volumes.

Aerobic digesters are typically open-air concrete basins similar to an aeration basin. Aerobic digesters should have an operating temperature between 15 and 20 degrees Celsius and a SRT between 40 and 60 days in order to meet Class B pathogen reduction requirements. The process includes mechanical blowers and coarse bubble diffusers that provide oxygen through aeration to help bacteria metabolize the volatile organics in the sludge, prevent odors, and keep the digester mixed. Pump mixers may be included to improve mixing conditions within the basin. Operating the basin with cyclical aeration can achieve some nitrogen removal and recover alkalinity. Additionally, while aeration is off, solids can settle and supernatant can be decanted to the headworks to thicken solids prior to dewatering.

Advantages of aerobic digestion compared with anaerobic digestion are the simpler process control and reduced operations and maintenance requirements. Disadvantages include larger footprint, higher odor potential, and increased power costs. Aerobic digestion is not typically used with primary sludge due to the risk of odors. In addition, primary sludge is high in volatile organics and well-suited for anaerobic digestion, where the methane generated from volatile solids destruction can be used beneficially.

The only difference between the operation of the proposed aerobic digester and the existing aerobic digester is the SRT. A much longer SRT is needed to fully stabilize the solids, reduce odors, and meet regulatory requirements. The current aerobic digester SRT is unknown due to a lack of information on the primary sludge and wasting flows but is likely less than 30 days.

Anaerobic Digestion

Mesophilic Anaerobic Digestion (MAD) is the most common sludge stabilization process in the United States. In this process, thickened primary sludge and WAS are fed into a heated and mixed digester, where the sludge degrades in the absence of oxygen. MAD is operated at temperatures between 95 and 105ºF, with an SRT of 15 days or more to meet Class B requirements.

The digestion process occurs in three stages all within the same reactor:

- Hydrolysis: solubilization of particulate matter.
- Acidification: production of volatile acids.
- Methanogenesis: formation of methane gas.

In the MAD process, solids are hydrolyzed, converted to volatile fatty acids, then reduced into methane and carbon dioxide gases, referred to as biogas.

Anaerobic conditions in these digesters release ammonia from the solids into the liquid, which remains in the liquid stream during dewatering and is returned to the plant's headworks. This ammonia recycle stream increases the load to the secondary treatment process, requiring additional energy input for treatment.

Anaerobic digestion requires heat exchangers to increase the temperature of the sludge, and high solids mixers. Additionally, the biogas requires special handling equipment and regulatory compliance. Biogas can be beneficially used by operating turbines and boilers onsite to produce electricity and heat, some of which is typically used for digester heating. The biogas can also be used to create renewable natural gas (RNG) to power fleet vehicles or supplement an adjacent utility's natural gas supply via pipeline injection. All uses would require some gas conditioning to remove impurities such as carbon dioxide, hydrogen sulfide, water vapor, and siloxanes. RNG and pipeline injection would require the highest level of gas treatment. Alternatively, biogas can be disposed of onsite through the use of an enclosed flare, which requires an air emission permit, but also the least amount of gas conditioning.

6.2.3.2 Dewatering

With limited land application options and an increasingly stringent regulatory climate for biosolids, sludge dewatering is typically a required step to reduce the moisture content of the biosolids prior to truck hauling and disposal. The two most common dewatering options are air drying through sludge drying beds and mechanical dewatering. Mechanical dewatering options include screw presses, belt filter presses, and centrifuges.

If operated correctly, air drying provides stabilization and dewatering. As mentioned previously, the air drying beds would require a large concrete slab. The process is weather-dependent and can cause significant odor issues, particularly during periods of warm wet weather. Furthermore, the end-product quality is inconsistent throughout the year. For these reasons, it was not considered further.

Due to the operator attention and odors associated with belt filter presses it was not analyzed in detail for this project.

Screw press and centrifuge mechanical dewatering will be considered in further detail. Although some assumptions were made to limit the number of alternatives considered for a detailed analysis, if certain drivers change, particularly on the biosolids end–use, the dewatering alternatives should be revisited prior to design of a new facility.

Screw Press

A screw press consists of a horizontally mounted screw conveyor that moves biosolids down a reduced diameter bowl, thereby increasing pressure along the length of the screw press, squeezing water out of the biosolids. The dewatering feed is dosed with polymer and activated in a flocculation tank to bind solids together and improve separability in the screw press. As liquid is pressed out, it separates and drains from the biosolids and flows back to the headworks to be treated. A screw press also requires high pressure wash water to periodically wash down the internal components to prevent buildup of biosolids and to maintain performance.

The main advantages of a screw press are their mechanical simplicity, low power requirements, and ability to be operated on a 24-hour schedule without supervision. Screw presses require minimal operator attention and have the ability to contain odors. Although they can be run for extended durations without attention, a typical operation for a facility this size would be to operate a few shifts per week. The dryness of cake from a screw press is roughly 15 to 18 percent total solids.

They are typically housed in a dewatering building or shade structure with a conveyor to raise the biosolids and allow dewatered cake to be loaded directly into a hauling truck or dumpster. A building or shade structure would be sized to store biosolids for several weeks.

Centrifuge

A decanter centrifuge is a mechanical process that operates similarly to a screw press. Biosolids are fed into an enclosed horizontal bowl and conveyor, which rotate at a high rate of speed. The centrifugal force physically separates the solids from the liquids. A tapered conveyor transports biosolids into higher pressure zones, further separating the water, or centrate. The centrate flows in the opposite direction of the solids and is sent back to the headworks. Centrifuges require polymer addition, similar to screw presses, however, they don't require washwater.

The mechanical components of a centrifuge are more complicated than a screw press and therefore require additional operator attention and maintenance. Unattended extended operation is not recommended. The equipment also results in higher power costs and polymer consumption. One of the main advantages of centrifuges are their ability to produce a consistently drier cake product, around 20 to 24 percent total solids.

A centrifuge design would include similar requirements for solids conveyance, biosolids storage, and building structure as the screw press.

6.2.4 Tertiary Treatment Alternatives

Tertiary treatment alternatives are identified here to address potential future facility objectives and permit compliance requirements for producing recycled water. If the City does not implement recycled water, tertiary treatment is not needed. Tertiary treatment consists of filtration and disinfection. All of the tertiary processes evaluated for this project have been accepted by the State of California as being capable of meeting the Title 22 requirements to produce recycled water. Two filtration alternatives and two disinfection alternatives were selected based on water quality requirements, future flow capacity of the facility, demonstrated reliability, and relative ease of operation and maintenance.

The tertiary treatment options were sized average day max month flows rather than peak hour flows to reduce the overall size of the tertiary process. For a future recycled water treatment facility, when flows exceed the max month, the excess secondary effluent flows would bypass the tertiary treatment processes and be routed to the secondary effluent disposal method.

Upgrade to a tertiary process with a design flow between 1 and 10 mgd is classified as a Class IV WWTP, which requires a Grade IV CPO and Grade III DOIC.

6.2.4.1 Filtration

Filtration technologies that are commonly considered include membrane filters, surface filters, and granular media filters. While there are variations within each filtration technology, such as a difference in media type, the filtered effluent quality is designed to meet the filtration rate and turbidity requirements for Title 22 unrestricted reuse-quality effluent. For the MBR secondary treatment option, an additional tertiary filtration process would not be required. However, both the MLE and oxidation ditch options would require filtration to produce recycled water.

Of the filtration options considered, cloth media disk filters and granular media filters are the most common and will be analyzed in further detail.

Cloth Media

Cloth media disk filters remove solids by sedimentation as well as filtration. The heavier solids settle out before reaching the filter cloth and an intermittent sludge pump removes the settled solids from the bottom of the tank. As secondary effluent flows through the filters, solids accumulate on and within the depth of the filter cloth forming a mat across the surface. As the mat forms, headloss through the cloth increases, causing the liquid level in the tank to rise.

Automatic filter backwash is typically initiated based on liquid level. Flow is reversed which removes the majority of particles accumulates on the surface of the filter cloth. Depending on the filter media type, automated cleaning can also be achieved through high-pressure spray wash or chemical cleaning.

Advantages of the cloth media disk filter are small footprint, minimal energy and pumping requirement, and minimal operator attention. A disadvantage of the cloth media disk filter is the potential for media clogging and scaling depending on the secondary effluent quality, affecting operational run time as well as O&M time and labor. Cloth media filters are also more sensitive to the influent feed water quality than granular or membrane filters.

Granular Media Filtration

Granular media filters include conventional single and multimedia filters, deep-bed filters, and continuous backwash filters. Conventional single and multimedia filters typically utilize sand and/or anthracite media and have a media depth of two to four feet. Deep-bed filters use larger sized media, usually anthracite, and have a depth of four to eight feet of media. Continuous backwash filters have a sand bed depth of three to six feet.

The continuous backwash filter was evaluated as the granular media filtration alternative for the City. Other granular media filters are not further considered based on the applicability for this size of facility.

Secondary effluent is fed into a reactor halfway up the height of the sand bed depth. Water travels up through the sand bed, which filters out the solids, and filtered effluent overflows a weir. An airlift pump at the bottom of the reactor continuously lifts the solids and media into a sand washer box within the reactor near the water surface. The upflow of the filtered water separates the solids from the sand. The heavier sand falls back into the media bed and the solids collect within the wash box and overflow a separate adjustable weir. The solids in the wash water stream is sent to solids handling to be processed with the WAS.

An advantage of the continuous backwash filter is the lack of separate construct backwash water supply or wastewater holding basins, or backwash pumps since the media is continuously backwashed. This can help reduce the filter construction cost and leads to increased ease of operation. A disadvantage of the continuous backwash filter is higher power cost due to the continuous operation of an air compressor.

6.2.4.2 Disinfection

The disinfection technologies available for recycled water systems include ozone, UV light, and chlorination. Of the disinfection options considered for this size of facility, UV and chlorination are recommended because both are proven, reliable, and can safely follow filtration to meet recycled water quality objectives. While ozone is common in potable water systems, it is not recommended for further evaluation because its use for wastewater disinfection is scarce. Ozone also typically has the highest lift cycle cost.

Chlorine

Wastewater chlorination can be achieved through open concrete basin or in-pipe configurations using chlorine gas, delivered sodium hypochlorite, or onsite-generated sodium hypochlorite. For the size of this facility, an open concrete basin using delivered sodium hypochlorite is recommended. Chlorine gas system has additional O&M and safety concerns. Onsite-generated sodium hypochlorite requires additional equipment and increased power consumption.

The major components of a sodium hypochlorite disinfection system are a chlorine contact basin, chemical storage tanks for bulk deliveries, chemical metering pumps, chemical piping, chemical mixing and/or injector units, and a chemical feed control system. It is assumed that the new metering pumps and controls would be located in a new chemical feed building located adjacent to the chlorine contact basin.

Advantages of a sodium hypochlorite system are that it is a proven, reliable process and has the ability to maintain a disinfectant residual in the recycled water distribution system. Although not required by Title 22, disinfectant residual in the effluent is recommended to prevent biological growth within the recycled water distribution pipes. With an automatic chemical feed control system, a disinfection system would require little operator attention. Disadvantages include periodic chlorine contact basin cleaning, reliance on chemical deliveries, and chemical feed and mixer/injector equipment maintenance. Sodium hypochlorite could also generate disinfection byproducts, degrade, and become less effective in sunlight, and generate sodium, which could impact recycled water quality. Chlorine is highly corrosive and toxic in all forms; therefore, storage, shipping, and handling requires additional safety and O&M considerations.

Ultraviolet

UV disinfection most commonly utilizes mercury amalgam to power lamps enclosed within quartz sleeves arranged in modules. When the lamps are energized, they emit UV light at a specific wavelength that inactivates pathogens by disrupting the bacteria's ability to reproduce and infect.

Several configurations of UV disinfection exist for recycled water including open channel, in-vessel, and microwave. Open channel is the most common and was the only UV configuration analyzed for this report.

UV design criteria is based primarily on UV transmittance (UVT) and UV dose. UVT is a measure of the quantity of UV light transmittable through wastewater, which could be reduced by color, turbidity, certain metals, TDS, TSS, and other factors. UV dose is determined for each target organism, bacteria and/or virus, according to Title 22 regulations. Because UVT data for future filtered secondary effluent is not available, an assumption of 60 percent UVT for post-media filtration was made based on the National Water Research Institute (NWRI) guidelines. If membrane filtration is used, a design UVT of 69 percent could be used per NWRI 2012 guidelines. Similarly, the required UV dose for membrane filtration effluent is lower than that of media filtration, 83 millijoules per square centimeter [mJ/cm^2] vs 104. A higher design UVT and lower design UV dose reduces the sizing of the UV system by as much as 40 percent, in turn reducing the capital cost and O&M requirements.

Equipment reliability must be considered when designing a UV system. For open channel system the NWRI guidelines recommend a standby bank per channel or a standby channel to ensure the specified UV dose is provided under worst case conditions with one bank of lamps out of service.

Because UV system sizing is specific to the manufacturer and model, a refinement of the UV disinfection design criteria should be made during preliminary design based on the selected filtration alternative. Up to three manufacturers should be considered during this process.

An advantage of UV disinfection is that it is a physical process rather than a chemical process. Therefore, no chemicals are used to disinfect the water meaning no disinfection byproducts (DBPs) that could negatively impact the receiving water. UV disinfection also typically requires a smaller footprint than sodium hypochlorite disinfection. Disadvantages include higher power usage than chlorine disinfection and increased O&M due to bulb replacement and cleaning. Bulbs require routine cleaning with a chemical solution to prevent fouling. Safety considerations associated with UV disinfection include operator exposure to UV light and the potential for mercury release from lamp bulbs if damaged.

6.3 Evaluation of Potential Treatment Configurations

Putting together the individual process elements described above, Table 6.4 provides a list of potential treatment configurations capable of meeting General Permit discharge limits, producing recycled water, and complying with Class B biosolids regulations.

Although the treatment configurations include processes to produce recycled water, if the City elects not to implement a recycled water system, then tertiary facilities would not need to be constructed. The decision whether to implement recycled water does not change the analysis performed for the secondary treatment and solids handling processes.

The list of potential treatment configurations includes three MLE alternatives, one oxidation ditch alternative, and one MBR alternative. The MLE alternatives are primary treatment (new or existing primary clarifiers) or no primary treatment. The oxidation ditch and MBR alternatives assume no primary treatment.

Alternatives with primary treatment include anaerobic digestion. Primary sludge contains more volatile solids than WAS (has a higher energetic content), and therefore, produces more biogas, which could be beneficially used. Without the higher energetic content from primary sludge, it is not as viable for alternatives without primary treatment to digest sludge anaerobically.

Table 6.4 Initial List of Potential Treatment Configurations

Process	Element	Secondary Process				
		MLE w/o PC	MLE Exist PC	MLE New PC	Ox Ditch	MBR
Preliminary	Screening	✓	✓	✓	✓	✓
	Grit Removal	✓	✓	✓		✓
Primary	Existing Clarifiers		✓			
	New Clarifiers			✓		
Solids Stabilization	Aerobic	✓				✓
	Anaerobic		✓	✓		
	None (Sludge Holding)				✓	
Dewatering	Centrifuge	✓	✓	✓		
	Screw Press				✓	✓
Filtration	Cloth Media				✓	
	Sand	✓	✓	✓		
Disinfection	Sodium Hypochlorite				✓	
	UV	✓	✓	✓		✓

The modeled SRT for an oxidation ditch process is much longer than the SRT for the MLE or MBR process. The longer SRT is expected to improve solids stabilization within the secondary basin, reducing the residence time needed in the stabilization basin. MLE and MBR are anticipated to meet Class B biosolids requirements by maintaining a 40 to 60 day SRT within the aerobic digester. The oxidation ditch is expected to meet Class B biosolids requirements by taking sludge samples to prove a fecal coliform concentration less than 2,000,000 MPN per gram total solids. Therefore, the oxidation ditch stabilization process is referred to as an aerated sludge holding basin, rather than an aerobic digester, and has a smaller volume requirement.

The soluble fraction of organics in the oxidation ditch is expected to be lower than in the MLE alternative because of the longer SRT in the secondary basin. Soluble organics can foul cloth media filters more easily than sand media filters, which is why the cloth media filtration is only paired with the oxidation ditch alternative.

The dewatering and disinfection alternatives operate largely independently from the secondary process; either dewatering or disinfection process can be paired with any of the secondary alternatives. However, the MBR effluent has a higher design UVT and lower UV dose, which may make UV disinfection more cost-effective than chlorination for the MBR alternative.

Given the larger basin size and less mechanical equipment, grit removal is not required for the oxidation ditch process. Perforated fine-screens, such as a rotary drum screen, are required for an MBR process to protect the integrity of the membranes.

6.3.1 Biological Process Modeling

A secondary treatment process model was developed for each alternative using BioWin™ software (EnviroSim Associates, Hamilton, Ontario, Canada). The purpose of developing a process model for each configuration is as follows:

- Establish viability of process configurations to meet effluent quality treatment objectives
- Predict effluent quality.
- Predict sludge production quantities.
- Determine preliminary basin size requirements for biological process elements (secondary biological treatment basins and solids stabilization basins).
- Determine preliminary recycle rate (MLR, RAS, WAS) and aeration requirements to meet effluent quality treatment objectives.

Filtration is a physical process and disinfection is a chemical process, neither of which relies on biological kinetics. As such, the tertiary treatment processes were not included in the biological process model.

Table 6.5 presents the model inputs, which are largely taken from the flows and loads analysis presented in Chapter 3.

Table 6.5 Biological Process Model Inputs

Parameter	Units	Value	Basis
Flow	mgd	2.0	(1)
BOD	mg/L	350	(1)
BOD	lb/d	5,838	(1)
TSS	mg/L	325	(1)
TSS	lb/d	5,421	(1)
VSS	mg/L	265	(2)
TKN	mg/L as N(3)	66	(1)
TKN	lb/d	1,100	(1)
Alkalinity(4)	mmol/L	8	(2)

Notes:
(1) Values reflect the 2040 projected maximum month conditions, presented in Chapter 3: Flows and Loads Analysis.
(2) Assumed values based on typical wastewater influent.
(3) mmol/L = millimoles per liter.
(4) No data was available for the influent alkalinity concentration. Lower influent alkalinity can cause unstable operating conditions and may require supplemental alkalinity addition. It is recommended to take routine influent alkalinity samples to establish a better understanding of the influent conditions prior to design of a new treatment facility.

Figures 6.4 through 6.7 present the process flow schematic developed in the BioWin model for each configuration. One process model was developed for both primary treatment alternatives because whether the primary clarifiers are existing or new theoretically should not affect the process performance.

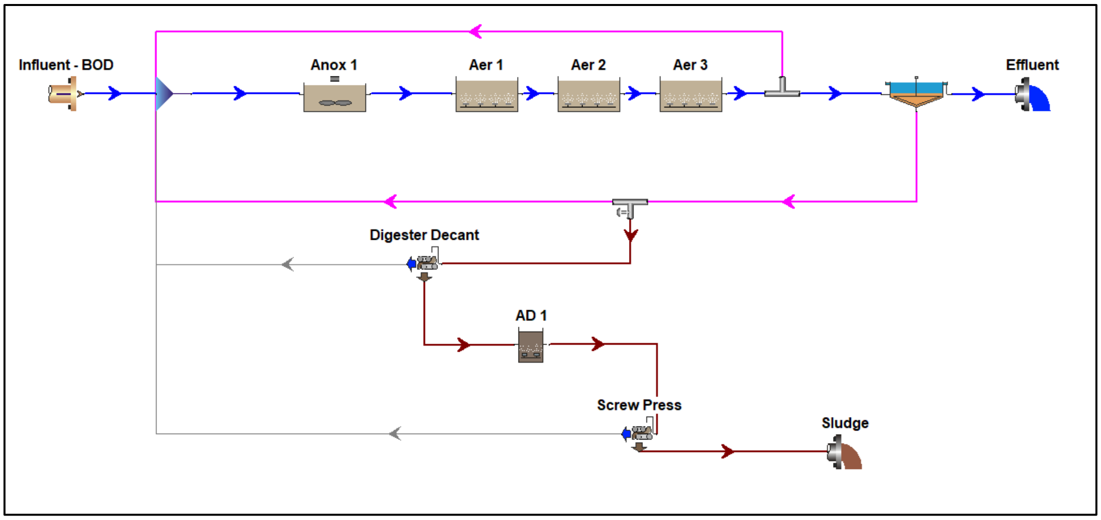

Figure 6.4 Process Model Flow Diagram: MLE without Primary Treatment

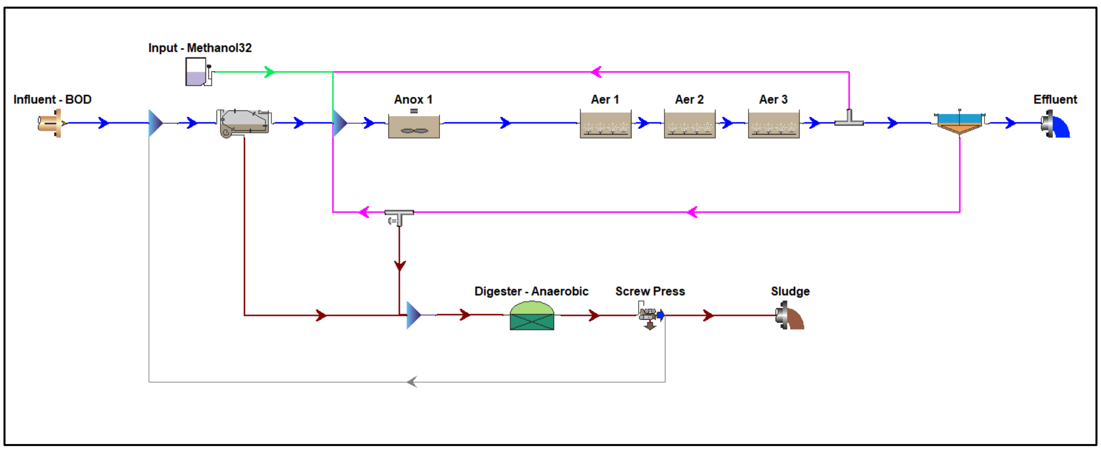

Figure 6.5 Process Model Flow Diagram: MLE with Primary Treatment

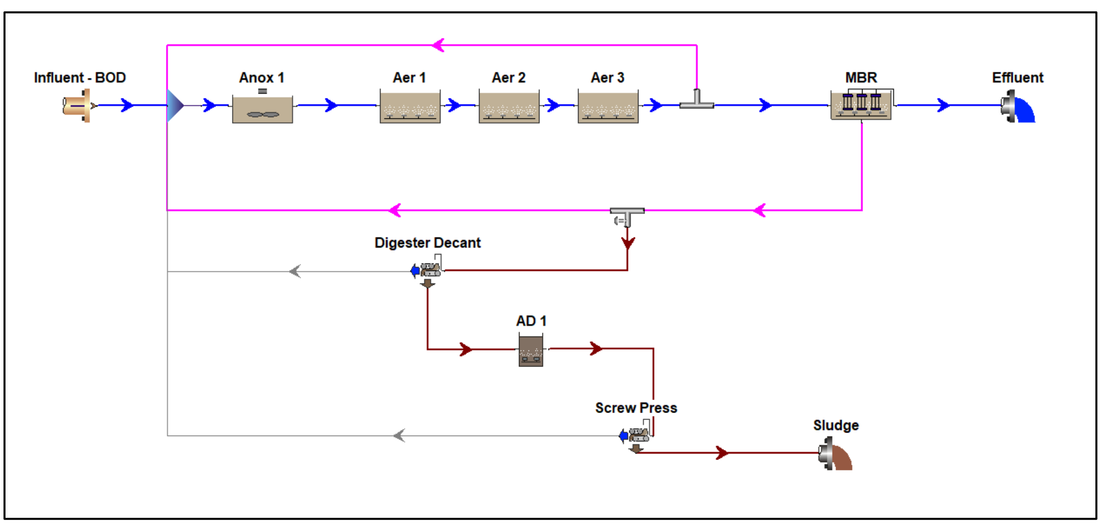

Figure 6.6 Process Model Flow Diagram: MBR

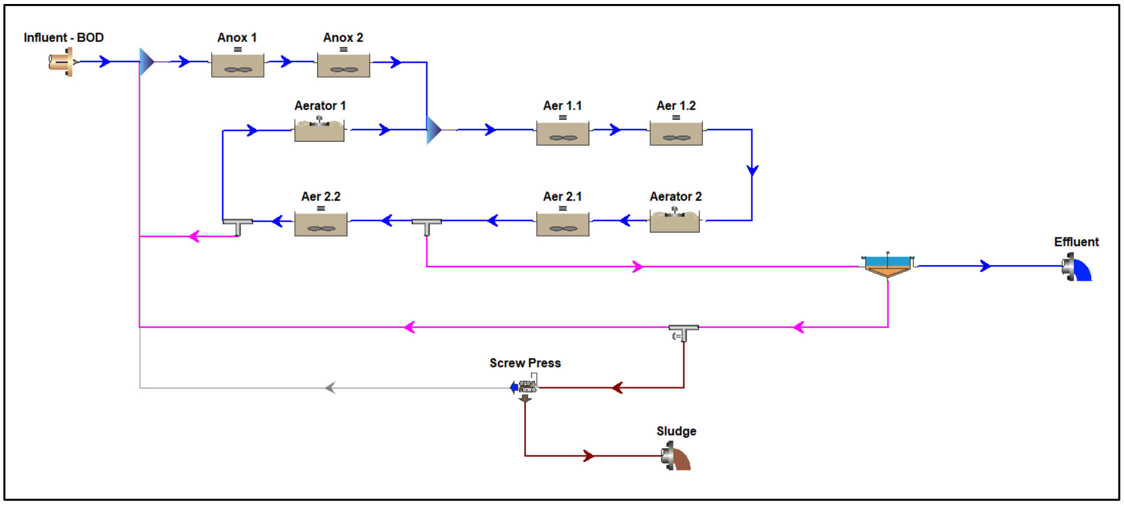

Figure 6.7 Process Model Flow Diagram: Oxidation Ditch

Once the inputs and flow schematic are established, a steady-state simulation is run. Getting the model to produce an adequate result requires several iterations of changing basin sizes, flow splits, aeration setpoints, and solids separation element performance to balance the process sizing and desired effluent quality.

Anaerobic digestion was not initially screened out because of the potential to utilize the existing primary clarifiers and send primary sludge to new anaerobic digesters. However, anaerobic digestion is not considered a good fit for the City. Although primary clarifiers can help reduce the size of secondary process basins, the biogas generated from anaerobic digestion requires additional infrastructure, and substantial safety and permitting considerations. Furthermore, the existing clarifiers would require retrofits to be able to integrate with an anaerobic digestion process and to improve the integrity of the structures and ancillary components for long-term use.

The beneficial use of biogas does not make financial sense until the size of the facility is much larger, typically greater than at least 5 mgd, and staffed 24/7. For smaller facilities with fewer staff, anaerobic digestion produces small quantities of biogas, requiring significant complexity to handle without providing much benefit.

The biological process model uncovered additional requirements associated with primary treatment. Bacteria in the anoxic zone of the secondary process require a carbon source BOD to convert nitrate to nitrogen gas. Without sufficient BOD, effluent nitrogen limits cannot be met. In addition to removing about 60 percent of the influent TSS, primary clarifiers also remove around 30 percent of the influent BOD and 10 percent of the influent TKN. Given the relatively high influent TKN load at the treatment plant, BOD removal in the primary clarifiers causes carbon deficiency and inadequate denitrification in the secondary process.

A carbon source, usually in the form of methanol or acetic acid, can be dosed into the secondary process to prevent inhibition of nitrogen removal. This requires routine chemical deliveries, chemical storage and metering systems, and safety certification and protocols, which adds unwanted operational complexity.

Primary clarification and anaerobic digestion were eliminated from further consideration because of their complexity and limitations. Although primary treatment was modeled with an MLE secondary process, the above findings for primary treatment are relevant if paired with any of the secondary processes.

The models developed for alternatives without primary treatment produced acceptable results and will be discussed in further detail in the following sections.

6.4 Evaluation of Viable Treatment Configurations

Table 6.6 presents the viable treatment configurations that will be evaluated in detail.

Table 6.6 Short-List of Viable Treatment Configurations

Process	Element	Secondary Process		
		MLE	Ox Ditch	MBR
Preliminary	Screening	✓	✓	✓
	Grit Removal	✓		✓
Solids Stabilization	Aerobic	✓		✓
	None (Sludge Holding)		✓	
Dewatering	Centrifuge	✓		
	Screw Press		✓	✓
Filtration	Cloth Media		✓	
	Sand	✓		
Disinfection	Sodium Hypochlorite		✓	
	UV	✓		✓

The alternatives analysis includes the following components:

1. For each short-listed alternative, develop:
   a. Process flow diagrams.
   b. Basin sizing used to develop conceptual site layouts showing location and footprint.
   c. Capital, annual O&M, and 20-year life cycle costs.
2. Compare alternatives based on financial (capital, O&M, life cycle) and non-financial (technical, environmental, social) criteria.

Figures 6.8 through 6.10 present the process flow diagram for each alternative.

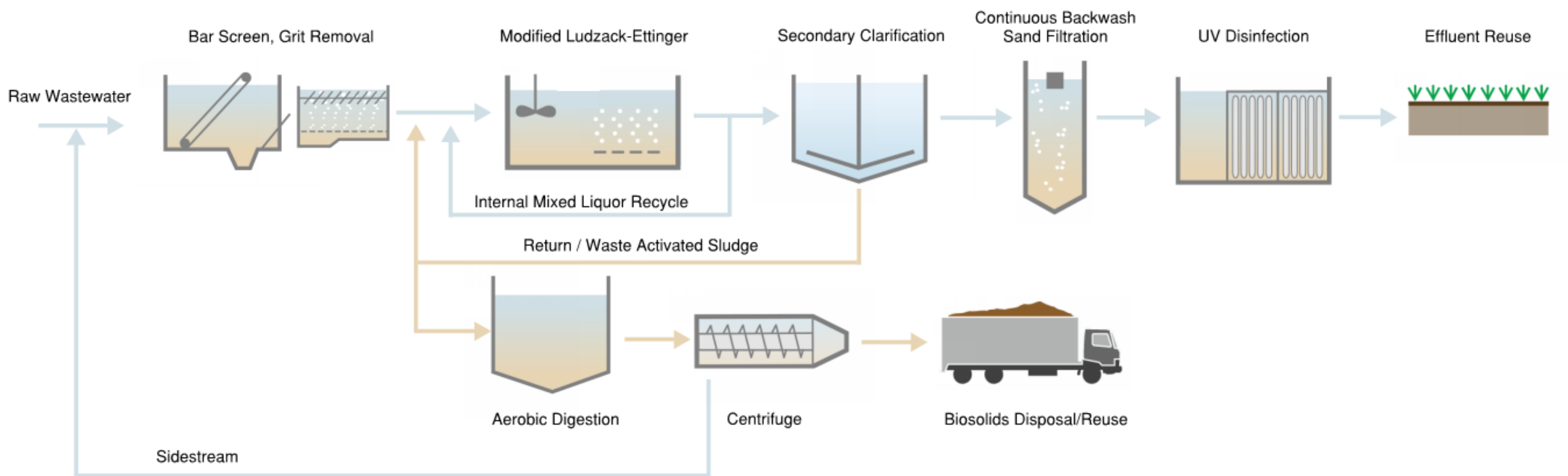

Figure 6.8 Process Flow Diagram: MLE Alternative

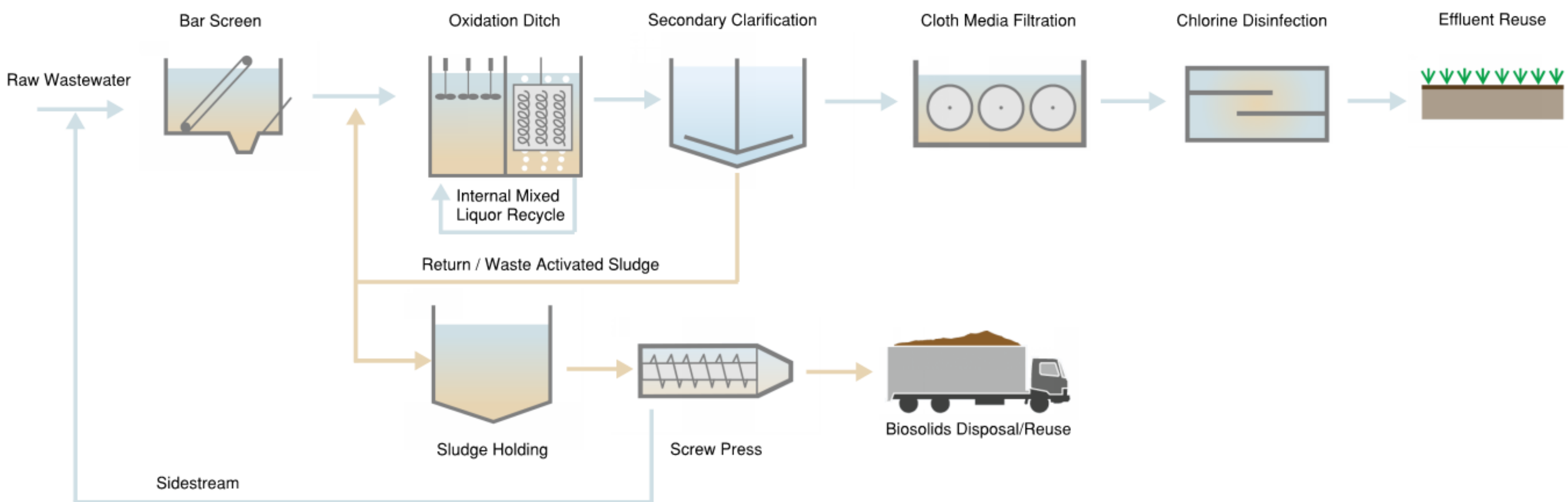

Figure 6.9 Process Flow Diagram: Oxidation Ditch Alternative

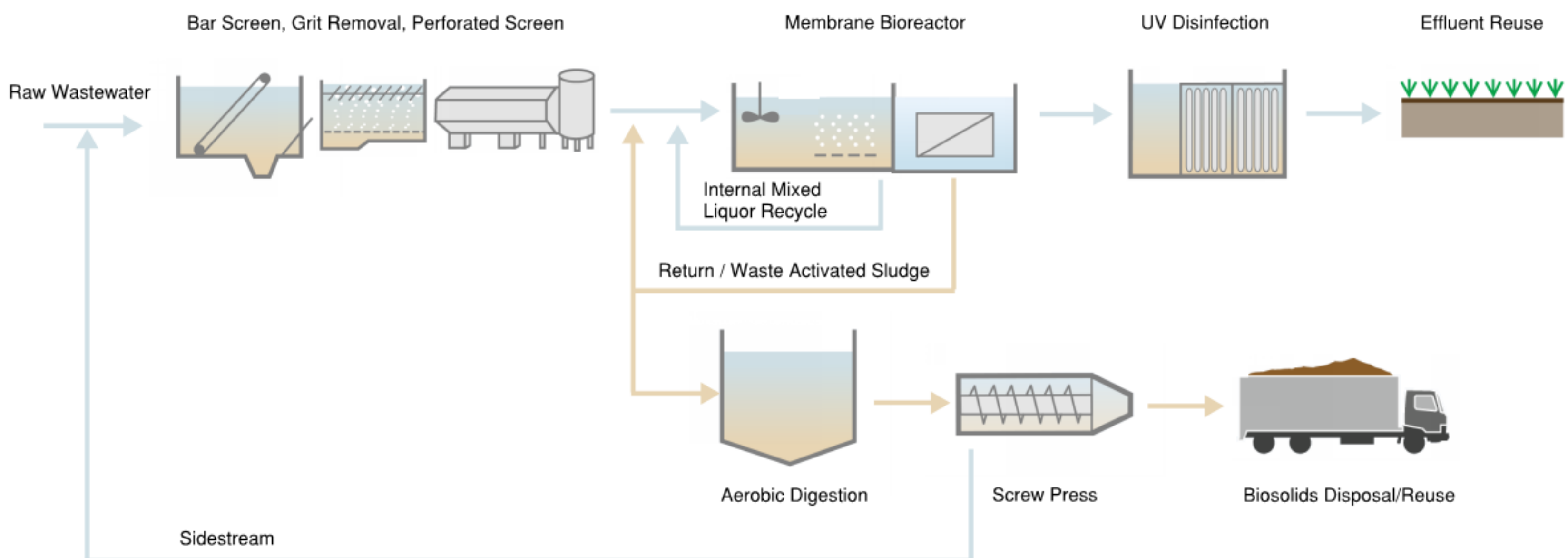

Figure 6.10 Process Flow Diagram: MBR Alternative

6.4.1 Process Element Sizing

Table 6.7 compares the findings from each of the process models, including the basin sizes, return flow and aeration requirements, sludge production, effluent quality, and solids performance. Assumptions for several of the process elements are identified in the footnotes.

Table 6.7 Comparison of Findings from the Biological Process Modeling

Parameter	Units	MLE	Ox Ditch	MBR
Anoxic Percent of Total Bioreactor Volume	%	25	25	25
Anoxic Basin Volume	MG	0.45	0.9	0.2
Aerobic Basin Volume(1)	MG	1.35	2.7	0.6
Membrane Basin Volume(2)	MG	N/A	N/A	0.05
Total Bioreactor Volume	MG	1.8	3.6	0.85
MLSS	mg/L	3,000	3,000	6,500
Total Secondary SRT	days	10	25	10
MLR Flow	mgd	10	30	10
RAS Flow	mgd	1	1	8
Effluent BOD	mg/L	3.4	2.5	1.1
Effluent TSS(3)	mg/L	9.0	9.2	0
Effluent TN	mg/L	8.1	6.2	6.7
WAS Flow	gpd	60,100	46,900	68,600
WAS %TS	%	0.9	0.9	0.8
WAS Load	lb/d	4,510	3,610	4,630
Solids Stabilization Basin Volume(4)	MG	1.5	0.5	1.5
Cake Percent TS(5)	%	20.0	15	17.5
Cake Volume(6)	WT/d	7.5	11.8	8.8

Notes:

(1) The dissolved oxygen (DO) setpoint through the aerobic zones tapers from 1.5 to 0.5 mg/L for the MLE and MBR processes. The DO in the area adjacent to the mechanical mixers in the oxidation ditch was assumed to be 2.0 mg/L.

(2) The MBR process assumes the use of 12 membrane cassettes, with a displaced volume of roughly 10 percent. The DO setpoint in the membrane tank is 4.0 mg/L.

(3) The secondary clarifiers assume a solids capture of 99.8%. The MBR assumes an effluent TSS of 0.0 mg/L.

(4) The solids stabilization basin volume for all alternatives assumes that routine aeration, settling, and decant cycles can achieve 2.0 %TS in the basin. The calculated volume for MLE and MBR assumes a 60 day SRT in the digester, however, a smaller volume can be provided if the liquid temperature is maintained above 15C.
The aerated sludge holding basin volume for the ox ditch alternative is calculated to provide a 10 day SRT for flexibility for dewatering operations.

(5) The centrifuge and screw presses both assume a solids capture rate of 98%. Centrifuges can achieve a drier cake than screw presses. The MBR cake was assumed to be drier than the ox ditch cake because of the thicker feed from the aerobic digester.

(6) Drier cake and lower cake volumes were assumed for the MLE and MBR alternatives because the decant operation in the aerobic digester provides a thicker feed to the dewatering process. The MLE alternative has the driest cake and lowest volume because the dewatering process uses centrifuges.

The BioWin model established the size of the anoxic, aerobic, MBR, and solids stabilization processes. A state point analysis was used to determine a viable size and quantity of the secondary clarifiers. State point analysis is a graphical model that incorporates MLSS concentration and suspension settling characteristics, surface area available for thickening, and influent and RAS flow rates. The state point analysis presents the solids flux as a function of the solids concentration. The state point is the intersection of the clarifier overflow rate and underflow rate lines. The clarifier is considered underloaded (i.e. performing adequately) as long as the state point is below the solids flux curve and the underflow line is below the tailing edge of the solids flux curve.

Two scenarios were tested to determine the appropriate clarifier size. The first scenario assumes one clarifier is in standby and the influent flow rate is the projected peak hour flow rate for 2025 (3.5 mgd), the approximate peak hour flow at startup. The second scenario assumes all clarifiers in service and the influent flow rate is the projected peak hour flow rate for 2040 (5.0 mgd). For both scenarios, the following conditions were assumed:

- Sludge volume index (SVI), used to measure the settleability of the solids, is 150 mL/g.
- The solids flux curve is discounted 20 percent to provide a safety factor.
- RAS flow rate is 50% of the influent flow rate.
- MLSS concentration is 3,100 mg/L.
- All clarifiers are sized equally.

After several iterations of modifying the clarifier diameter and quantity, it was determined that two and three 50-foot diameter clarifiers met the 2025 and 2040 conditions, respectively. Figures 6.11 and 6.12 present the state point analyses from the two scenarios.

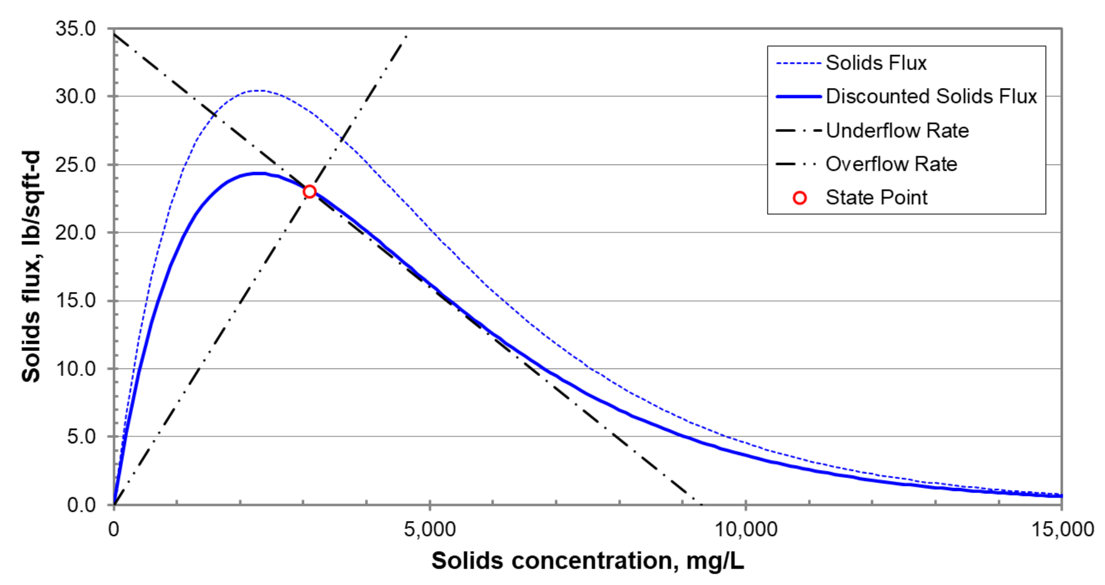

Figure 6.11 State Point Analysis at 2025 Peak Hour Flow with Two 50-diameter Clarifiers in Service

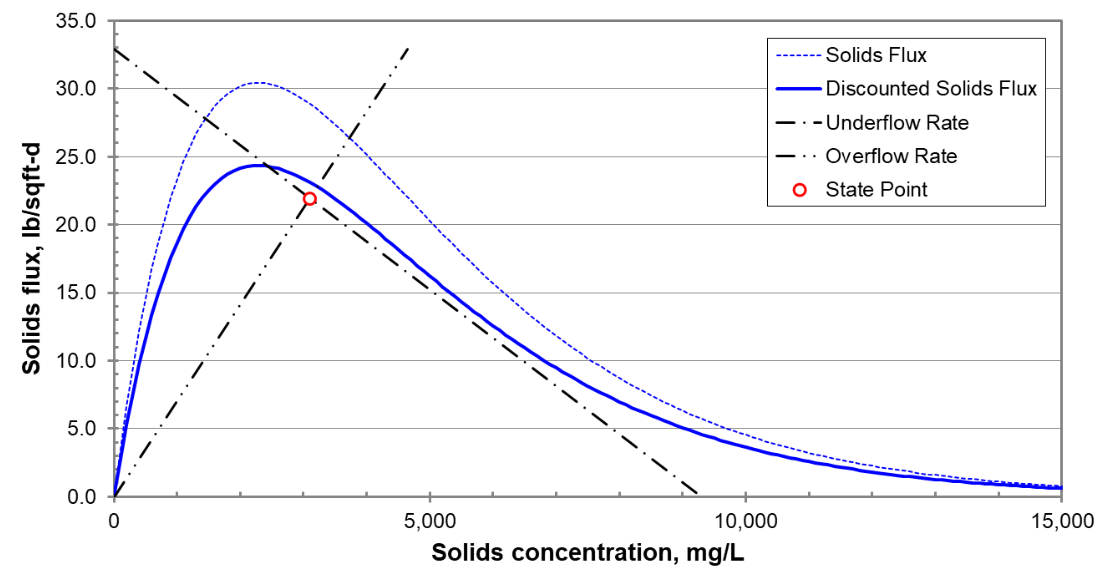

Figure 6.12 State Point Analysis at 2040 Peak Hour Flow with Three 50-diameter Clarifiers in Service

The size of the dewatering process depends less on the equipment and more on the amount of onsite biosolids storage desired. Because dewatering will occur intermittently, the WWTP can operate without standby dewatering units. Process elements, including the polymer feed and blending unit, flocculation tank, and dewatering unit are commonly provided as a package and can be mounted on a common skid. Ancillary components such as feed pumps and conveyor can easily be integrated into the skid and structure.

A biosolids storage structure is recommended to protect equipment and prevent re-wetting of dewatered cake. A concrete slab with short perimeter walls allows biosolids to be moved around with a front-end loader. An area approximately 3,000 to 4,000 sq ft is recommended, which would provide roughly four to six weeks of biosolids storage. Larger biosolids storage with a longer holding time can also help further reduce the moisture content, and thus hauling costs. The size of the dewatering facility can be modified as necessary based on the final design of the dewatering process performance, hauler schedule, and desired biosolids storage.

Filtration processes are sized based on a design hydraulic loading rate per unit area of filtration media. Cloth-disk and continuous backwash sand filtration processes are most commonly provided on a skid as part of a vendor package. The cloth-media filters are submerged in a tank often within a building or under a shade structure. This project was estimated to need a 10-disk two train cloth-media filtration skid within a structure that is roughly 25 ft by 10 ft. For the sand filtration process, it was estimated that eight 50 sq ft surface area filter vessels are needed. The sand filters share a common manifold and concrete slab but don't need to be enclosed in a structure.

The preliminary sizing for a chlorine contact basin was established based on the contact time and chlorine residual concentration to meet Title 22 requirements for recycled water. A five-pass serpentine basin with a total volume of just under 0.2 MG was estimated to provide sufficient contact time. The size and configuration of a chlorine contact basin can be optimized during the design process.

Manufacturers provided information on three different UV systems to compare the size, power consumption, O&M requirements, and cost. UV lamps are housed together in modules. The UV system varies between a total of 48 and 112 lamps, provided in 4 to 7 modules. All three UV systems are provided within a structure that is roughly 25 ft wide and varies from 40 to 70 ft long. The UV system size was taken as the average of the different sizes. Appendix G summarizes the comparison of the UV manufacturers. MBR effluent is higher quality than sand or cloth-media filtered effluent and therefore, requires a smaller UV system. Two analyses were performed, one comparing UV systems with MBR effluent and one comparing UV systems with sand or cloth-media filter effluent.

Table 6.8 summarizes the sizing and design criteria for the process elements for each alternative.

Table 6.8 Unit Process Design Criteria

Parameter	Units	MLE	Ox Ditch	MBR
Secondary Process				
Number of Bioreactor Basins	#	3	2	3
Total Bioreactor Volume(1)	MG	1.8	3.6	0.85
Number of Secondary Clarifiers(2)	#	3	3	0
Secondary Clarifier Diameter	ft	50	50	N/A
Solids Stabilization				
Basin Volume	MG	1.5	0.5	1.5
Dewatering				
Cake Volume	WT/d	7.5	11.8	8.8
Dewatering Structure Footprint(3)	sq ft	3,000	4,000	4,000
Filtration				
Number of Filtration Modules(4)	#	6+2	1+1	N/A
Filtration Area Footprint	sq ft	1,250	900	N/A
Disinfection				
UV Transmittance	%	55	N/A	65
UV Dose	mJ/cm^2	104	N/A	83
Chlorine Dose	mg-min/L	N/A	450	N/A
Disinfection Area Footprint	sq ft	1,250	3,000	1,250

Notes:

(1) Anoxic volume accounts for 25% of the total bioreactor volume.

(2) At 2025 projected peak flow conditions, two clarifiers are in service and one is in standby. At 2040 projected peak flow conditions, three clarifiers are in service with no standby clarifiers. Operation assumes a RAS flow rate of 50% of the influent flow rate and an SVI of 150 mL/g.

(3) The dewatering structure footprint provides for a few weeks of cake storage. A smaller footprint was provided for the centrifuge because it produces less cake. The size of the facility can be revisited after determining the desired cake storage needs.

(4) Filtration elements are sized based on a loading rate of 5 gpm/ft^2. Sand filtration requires six duty and two standby 8-ft diameter filter vessels. Cloth media filtration requires one duty and one standby channel. Each channel contains ten cloth media filter disks.

6.4.2 Site Layouts

Figures 6.13 through 6.15 present the site layouts for the three alternatives. The site layouts place new infrastructure to the north and east of existing infrastructure, generally within the existing sludge drying beds and stormwater retention pond. As mentioned previously, although this will require significant earthwork to fill in and grade the site, it allows the existing equipment to maintain uninterrupted operation while the new facility is constructed. The existing primary effluent pipe will need to remain operational during construction. Temporary piping and pumping facilities may be needed to prevent conflicts with construction of new infrastructure. The specific layout and spacing between structures can be optimized during the design process.

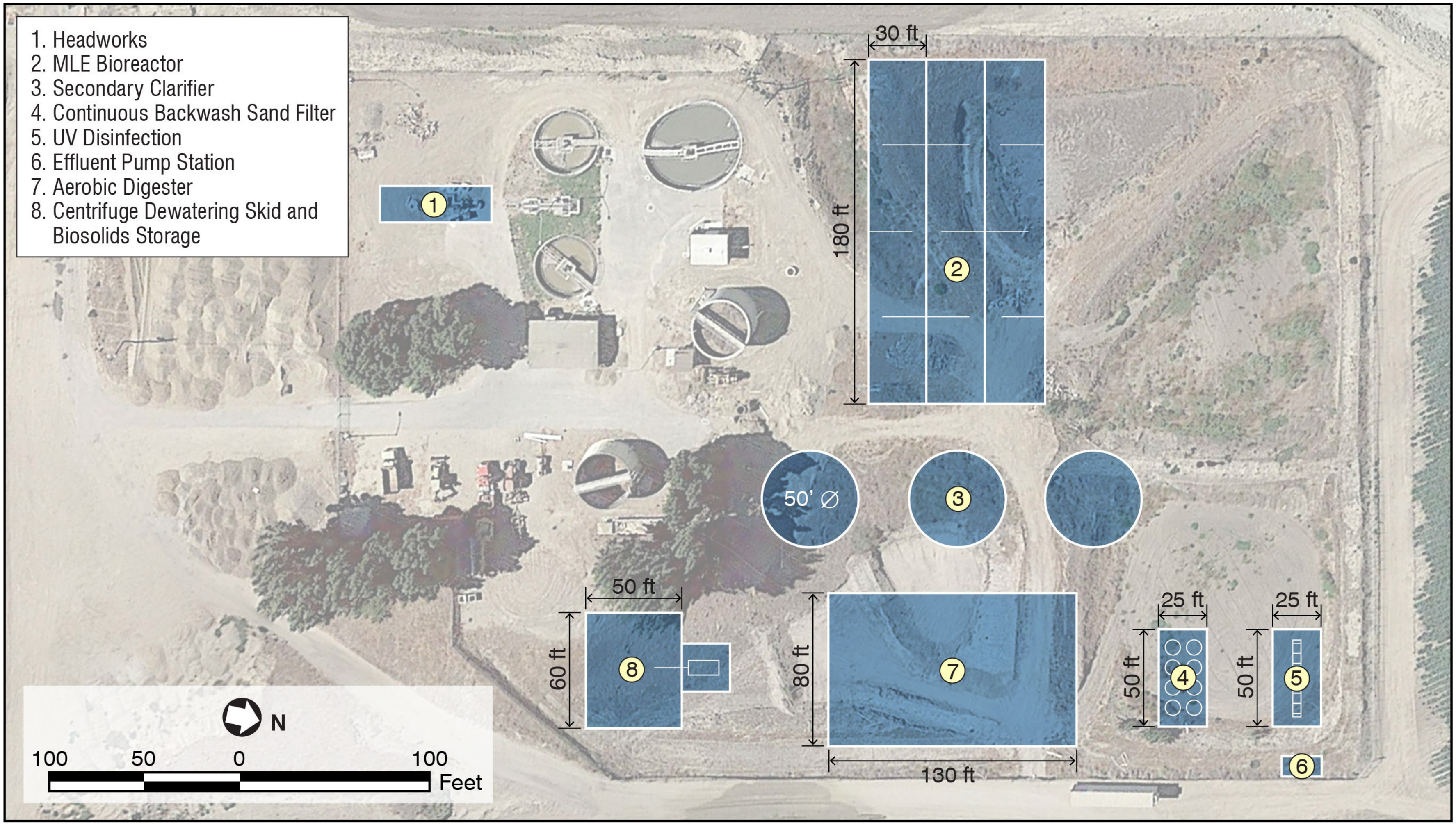

Figure 6.13 Site Layout: MLE Alternative

Figure 6.14 Site Layout: Oxidation Ditch Alternative

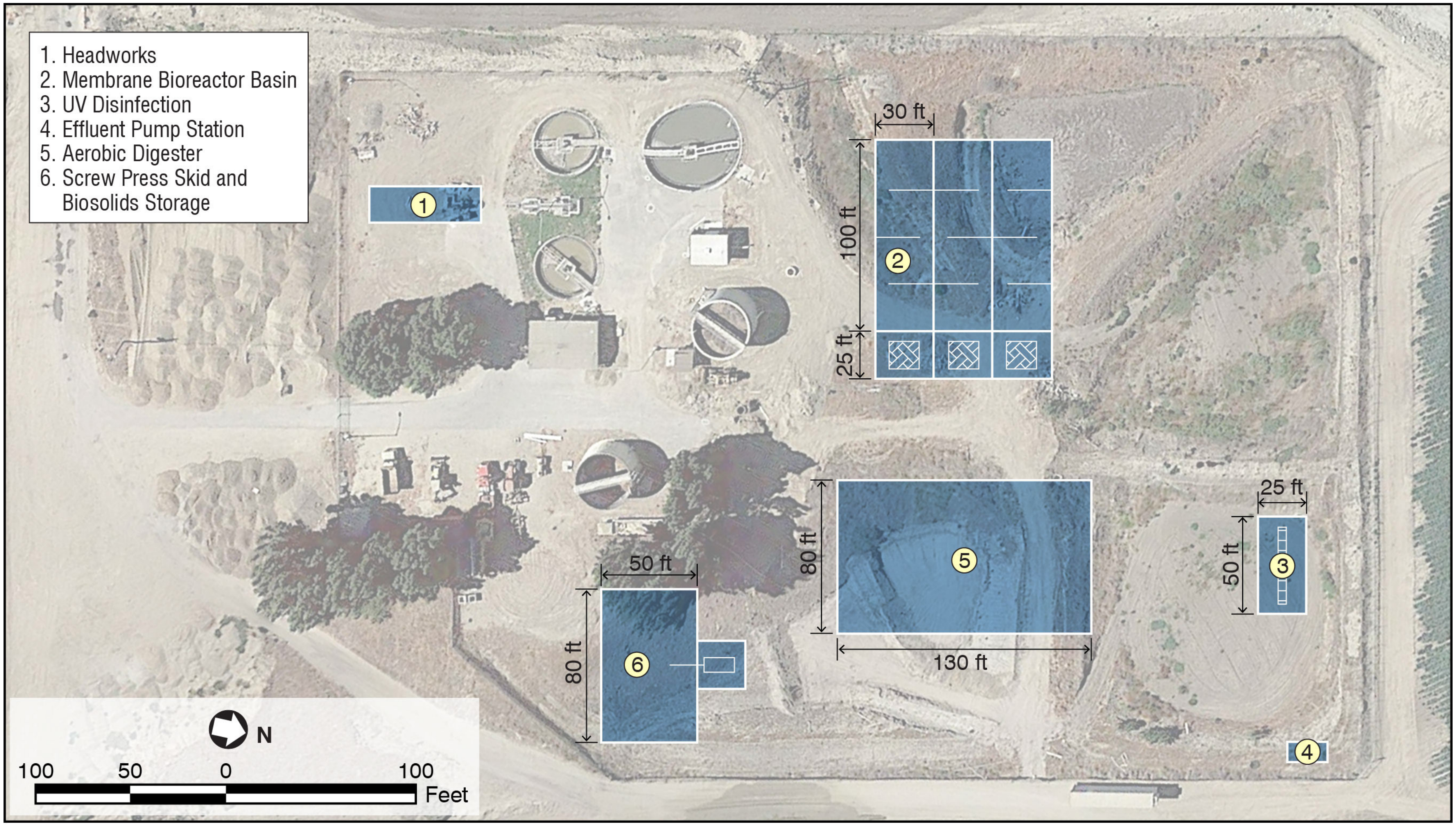

Figure 6.15 Site Layout: MBR Alternative

6.4.3 Financial Evaluation Methodology

Life-cycle costs for each alternative were estimated using a present-worth analysis for capital and O&M costs, as described in the following sections

6.4.3.1 Capital Costs

Capital costs represent the total value of completing a new project, including design, bidding, and construction.

The Association for the Advancement of Cost Engineering (AACE) International defines five classes of cost estimates, with Class 1 being the most accurate. For this project, cost estimates are Class 5, which are used for planning level and concept screening purposes and have expected accuracy ranges between -50 and +100 percent.

Due to inflation, construction costs escalate over time. The standard indicator that tracks these changes in construction prices is the Engineering News-Record (ENR) Construction Cost Index (CCI). The CCI tracks construction markets in 20 cities throughout the United States and publishes monthly indices indicating relative market performance.

To determine the escalation to future construction costs, the historical percent change in the 20-city average CCI was determined, as shown in Table 6.9. Based on the historical construction cost index values, a conservative rate of three percent was selected as the basis for escalating construction costs.

Table 6.9 ENR 20-City Construction Cost Index

Year	Annual Average 20-City CCI(1)	Percent Change from Previous Year
2009	8,570	---
2010	8,804	2.7
2011	9,070	3.0
2012	9,308	2.6
2013	9,547	2.6
2014	9,807	2.7
2015	10,035	2.3
2016	10,338	3.0
2017	10,737	3.9
2018	11,062	3.0
2019	11,281	2.0
10-Year Average		**2.8**

Notes:
(1) Data obtained from the ENR 20 City CCI.

A variety of methods was used to develop capital cost estimates. Quantity take-offs were calculated for larger cost items including earthwork and concrete. Unit costs were taken from the Carollo Cost Estimating database, which is compiled from industry knowledge. The costs for some process elements, such as dewatering equipment, is largely contained within a vendor package. For these items, costs were developed based on comparisons to similar recently completed projects. Lesser cost elements for things such as metal fabrication, equipment installation, and electrical, instrumentation, and controls (EI&C), were accounted for by adding percent allowances depending on the components of the process. Lump sum values were added based on the complexity of the process to account for all other miscellaneous elements. This summarizes the total direct costs.

The estimated construction cost is the combination of direct and indirect costs. Indirect costs include contingency, contractor overhead and profit, sales tax, etc. The total estimated project cost includes the construction cost plus engineering, legal, administrative, and construction management.

Table 6.10 breaks down the cost factors and their application to estimate capital project costs.

Table 6.10 Basis for Estimating Total Project Cost

Cost Factor	Applied To	Factor (percent)
Electrical, Instrumentation, and Controls	Total Direct Cost	25
Total Direct Cost		
Contingency	Total Direct Cost	30
General Conditions, Contractor Overhead, Profit, and Risk	Previous subtotal	25
Escalation to Mid-Point	Previous subtotal	15(1)
Sales Tax	50 percent of Total Direct Cost	9.5
Construction Cost		
Design, Legal, and Administration Fees	Construction Cost	15
Construction Management	Construction Cost	10
Total Project Cost		

Notes:
(1) The escalation to mid-point assumes costs escalate at three percent per year and the mid-point of construction is 2025.

6.4.3.2 Operation and Maintenance Costs

Annual O&M costs were developed for each process element to summarize costs associated with electricity consumption, chemical consumption, equipment replacement and maintenance, O&M labor, and biosolids hauling.

Electricity usage was estimated based on assumed equipment loads and operating times. Chemical usage was estimated based on the anticipated dose and flow rate. Replacement intervals vary between five and 25 years, depending on the equipment. Average daily operations and maintenance labor hours were estimated based on knowledge of the complexity and attention required for each process. Biosolids hauling was calculated based on the modeled future max month solids production and an assumed cake dryness performance from the dewatering equipment.

Table 6.11 presents the unit costs used to calculate annual O&M costs.

Table 6.11 Operation and Maintenance Unit Costs

Item	Estimated Cost	Notes
Electricity	$0.12/kilowatt-hour	Typical for industrial users in the area
Polymer	$3/lb active	Typical
Chlorine	$1/gallon	Typical
Labor	$40/hour	Wastewater treatment plant operator burdened labor rate, including benefits
Maintenance	4-20 percent of equipment cost	Assumes a replacement interval, dependent on the type of equipment.
Biosolids Hauling and Disposal	$50/WT	Typical, however, unit costs can be highly variable and market driven.

6.4.3.3 Net Present Value Life Cycle Costs

The net present value or present-worth cost represents the value of the total cash flow occurring over the 20-year lifetime of the project in current dollars, including both capital and O&M costs. A discount rate of three percent was used to bring future costs back to present value. The basis for selecting a discount rate depends on the expected rate the City can secure funding for future projects.

6.4.4 Financial Results

Figure 6.16 presents the capital cost for the total project for each alternative, broken down by process element. Appendix H provides a table of the direct and indirect capital costs for each alternative configuration.

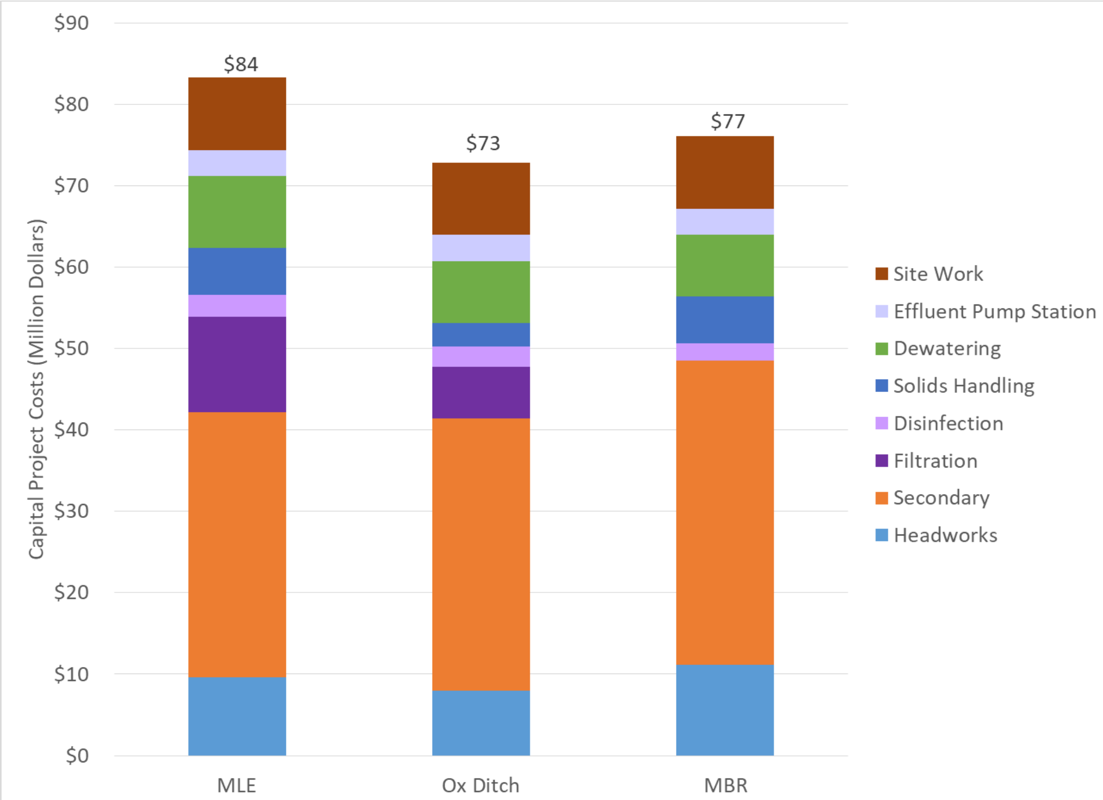

Figure 6.16 Comparison of Alternative Capital Project Costs

The following summarize findings from the capital project costs:

- The oxidation ditch alternative has the lowest capital cost and the MLE has the highest capital cost of the three alternatives.
- The cost for the headworks for the ox ditch is slightly lower because it does not include grit removal and slightly higher for MBR because it includes a new perforated screen.
- Although the oxidation ditch requires larger basin volumes resulting in more earthwork and concrete, there is less mechanical equipment so the secondary process cost is on par with the MLE alternative.
- Although the MBR basins are smaller than the other alternatives and don't require clarifiers, the cost for additional components, such as the membranes and chemical system, make it more expensive than the other secondary processes.
  - However, when considering the filtration process as well, the MBR process is less expensive than the other secondary and filtration alternatives.
- The cost for cloth-media filters is lower than sand filters.
- The solids handling costs for the oxidation ditch are lower than the other alternatives. Because the ox ditch has a longer SRT, its stabilization requirements are less than the other alternatives, which results in a smaller aerated sludge basin.
- The disinfection, dewatering, pump station, and site work costs are similar for the alternatives.

Figure 6.17 presents the annual O&M costs for the three alternatives, with a breakdown of the secondary process costs, which comprises the majority of O&M costs. Appendix J presents a table of the O&M for each element used to develop annual costs.

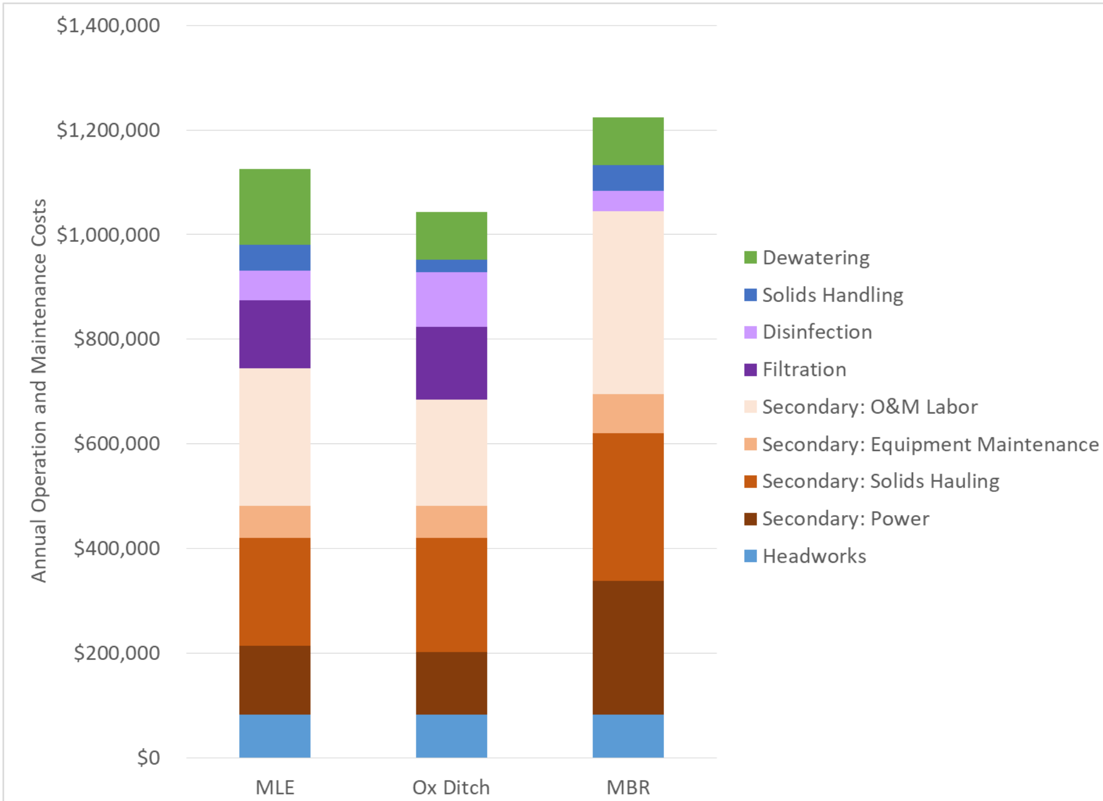

Figure 6.17 Comparison of Alternative Annual Operations and Maintenance Costs

The following summarize the findings from the annual O&M costs:

- The oxidation ditch has the lowest anticipated O&M cost, followed by MLE, then MBR.
- The O&M costs for the headworks are roughly the same.
- The MBR power cost is higher because of the additional pumping and air scour requirements.
- The process model predicted slightly higher solids production for the MBR process, resulting in higher solids hauling costs.
- The equipment maintenance costs are modestly higher for the membranes than for the other secondary alternatives.
- Based on the complexity of the processes, 1.5 full-time employees (FTE) were estimated for the oxidation ditch process, 2 FTEs for the MLE process, and 3 FTEs for the MBR. Additional FTEs may be needed on site for other processes common to alternatives, such as headworks, solids handling, and dewatering.
- The O&M costs for UV disinfection are roughly half of the chlorine disinfection costs due to the cost of chemicals.
- The power requirements for solids handling are lower for the oxidation ditch process because the solids handling basin is smaller and requires less mixing and aeration.

- The dewatering centrifuge (MLE alternative) has a higher power cost and polymer consumption but produces a drier cake compared to the dewatering screw press (ox ditch and MBR alternative).

Figure 6.18 combines the previous capital project costs and O&M costs to present the 20-year life cycle costs.

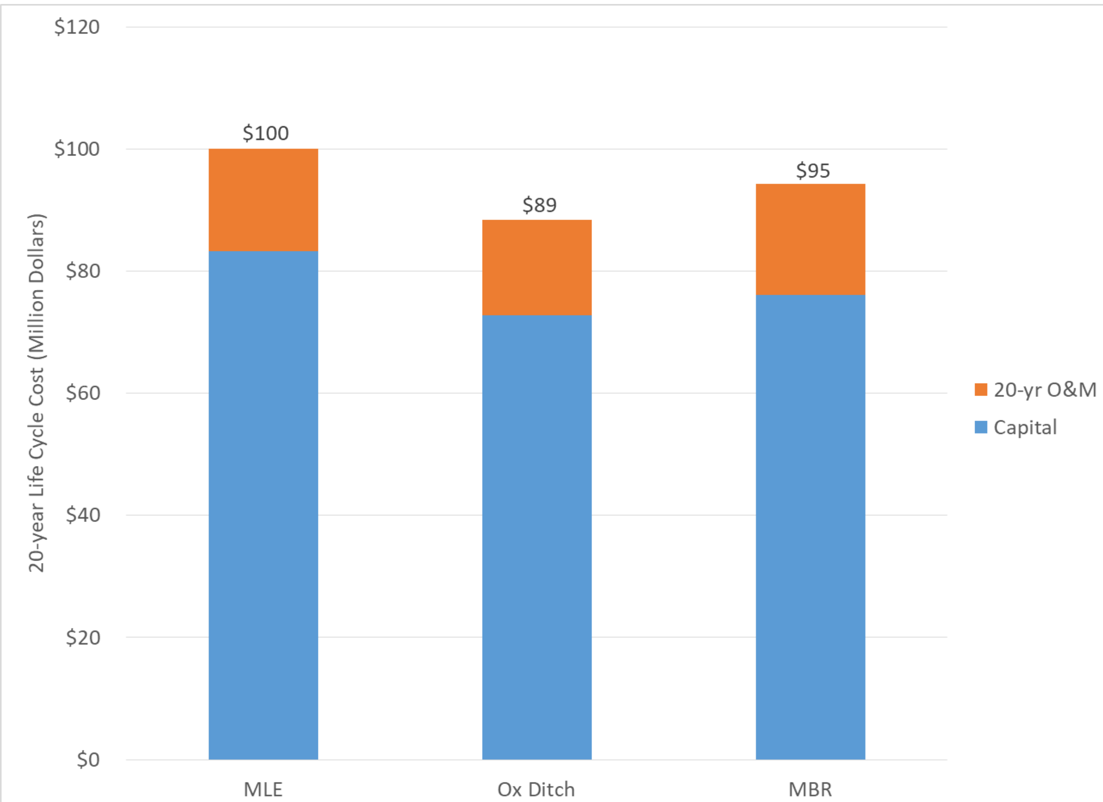

Figure 6.18 Comparison of Alternative Life Cycle Costs

The oxidation ditch process has the lowest capital cost and O&M cost, and therefore the lowest life cycle cost, estimated to be around $89M. The MLE and MBR life cycle costs are within 15 percent of the oxidation ditch.

Appendix K presents separate life cycle analysis for dewatering, filtration, and disinfection alternatives. The tables and figures presented in Appendices J and K show that the screw press, cloth-media filters, and UV have lower life cycle costs than the alternatives they were compared against.

6.4.5 Non-Financial Evaluation Methodology

The non-financial evaluation of alternatives undergoes the following process:

1. Develop a list of criteria and weight based on relative importance.
2. Score each alternative from 1 to 3 based on the performance relative to each criteria.
3. Multiply criteria weight by alternative's score to develop total score for each alternative.

Non-financial criteria include technical, environmental, and social considerations. Table 6.12 presents the non-financial criteria and their descriptions.

Table 6.12 Non-Financial Evaluation Criteria

Category	Criteria	Considerations
Technical	Simplicity/ Ease of O&M	• Is staff already familiar with the process or will it require substantial staff training or hiring specialized staff? • Will the labor hours required to operate and maintain the system increase significantly? • Can maintenance be performed by staff or will maintenance need to be contracted out? • Will the alternative require a third party operator? • Are parts easily obtainable?
	Impacts on Facility Infrastructure/ Footprint	• Is the alternative modular / does it provide flexibility to easily increase capacity? • Does the alternative avoid stranding assets (before the end of their useful life)? • Does the alternative maintain an efficient site layout?
	Ease of Construction/ Permitting	• How difficult will it be to fit/integrate the technology with existing equipment? • How difficult will it be to continue operations of existing processes during construction? • How long will it take to implement?
	Process Impacts and Risks	• Will the alternative affect other treatment processes (positively or negatively)? • What are the impacts if the process fails?
Environmental	Flexibility to Meet Future Regulations	• Can the alternative be easily modified to meet stricter nutrient limits (nitrogen or phosphorus) or recycled water objectives?
Social	Facility Safety	• Prioritize worker safety and maintain an engaging work environment at RWRF facilities. • Does the alternative introduce more frequent interaction with hazardous working conditions, such as toxic chemicals?
	Community Acceptability	• Does the alternative introduce significant odors, noise, or local truck traffic that may be a nuisance to the local community

The non-financial evaluation criteria summarize the important considerations for a new wastewater process. Inherently, some criteria are more important than others. Criteria weighting was established to determine relative importance. A value of one, two, or three was assigned to each criteria based on their importance, with a higher score indicating more importance. The score for each criterion was normalized to the total to determine each criterion's weight percentage. Table 6.13 presents the criteria weights and brief justifications.

Table 6.13 Non-Financial Evaluation Criteria Weights

Evaluation Criteria	Importance (1-3)	Weight (%)	Notes
Simplicity/ Ease of O&M	3	20	Transitioning to a new treatment process will require new skills and certification. A process without a steep learning curve is needed to ensure success.
Process Impacts and Risks	3	20	It is important to consider how each process interacts with one another and that there is flexibility to meet discharge limits even if there is a process upset.
Community Acceptability	3	20	Complaints regarding odors have been submitted in the past. It is important to address past problems and minimize their future impacts.
Facility Safety	2	13	It is important to maintain safe working conditions and not introduce avoidable risks. Site conditions with inherent risks will include risk prevention and safety measures.
Flexibility to Meet Future Regulations	2	13	Alternatives will comply with the General Permit limits. Although it is important to adapt to future conditions, stricter regulations aren't anticipated anytime soon.
Impacts on Facility Infrastructure/ Footprint	1	7	The existing site is not constrained for space and has room to expand.
Ease of Construction/ Permitting	1	7	Constructability and permitting should not be a concern with a competent design engineer and construction manager.
Total	**15**	**100**	

6.4.6 Non-Financial Evaluation Results

The alternative treatment configurations were scored between one and three for how well they match the description of each criterion. Table 6.14 presents the alternative scoring and explanations. The alternative's scores for each criterion were then multiplied by the criteria weight then summed to determine the final weighted scores for the alternatives, which is illustrated in Figure 6.19.

Table 6.14 Non-Financial Evaluation Scoring

Evaluation Criteria	Weights	Raw Scores (1-3) MLE	Ox Ditch	MBR	Notes
Technical					
Simplicity / Ease of O&M	**20%**	2	3	1	Oxidation ditch has the least amount of equipment and is the easiest to operate. MBR has the most equipment and chemical addition.
Process Impacts and Risks	**20%**	2	3	2	The larger basin volume of the oxidation ditch is less susceptibility to varying influent conditions.
Impacts to Facility Infrastructure / Footprint	**7%**	2	1	3	Each alternative requires common facility upgrades. The ox ditch requires the largest basins, which could cause site constraints for future buildout. Conversely, MBR requires the smalles tanks.
Ease of Construction / Permitting	**7%**	3	3	3	Differences in the construction and permitting process among the alternatives are negligible. The three alternatives are very common and no unique implementation challenges are foreseen.
Environmental					
Flexibility to Meet Future Regulations	**13%**	2	2	3	MLE is slightly easier to modify to meet stricter nutrient limits. MBR is easier to upgrade to recycled water since it would only require disinfection. Because of the longer SRT, the oxidation ditch effluent would be easier to filter.
Social					
Community Acceptability	**20%**	2	2	3	Activated sludge processes do not produce objectionable odors, compared to the existing process. The MBR process may be viewed more favorably by the community because of its ability to produce a higher quality effluent and develop recycled water.
Facility Safety	**13%**	3	3	2	The ox ditch and MLE alternatives do not introduce working conditions with greater risk than the existing process. The MBR process requires chemical addition, which involves additional safety considerations.
Total Weighted Normalized Scores		2.20	2.53	2.27	

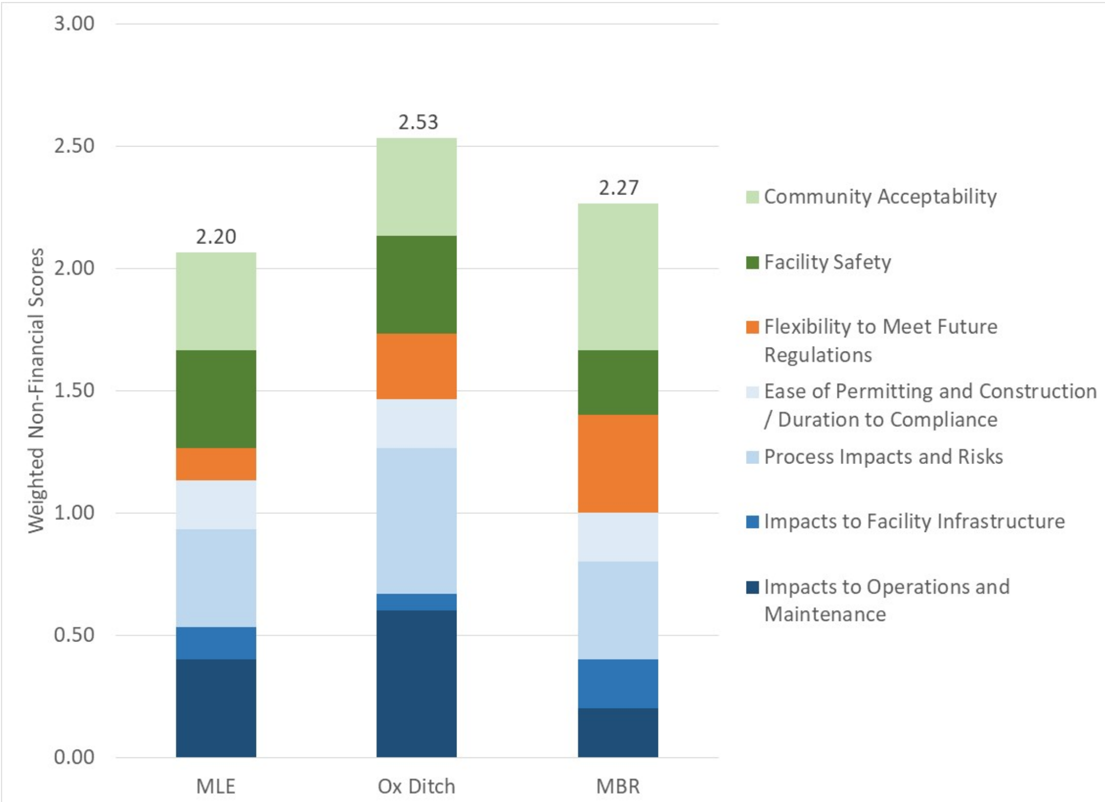

Figure 6.19 Non-Financial Evaluation Results

The oxidation ditch treatment configuration scored highest on the non-financial evaluation because it is the simplest process to operate and maintain and its size means it is less susceptible to varying influent conditions and more robust to changes in operating conditions. The MBR alternative is an attractive option if the City decides to implement recycled water. However, the burden caused by the complexity of the O&M of the membranes and chemical system may not be justified without the production of recycled water. The MLE alternative adequately meets the objectives of the evaluation criteria, however, it is an alternative better suited for larger facilities that may not have the space needed to provide oxidation ditches.

Chapter 7

RECOMMENDED PROJECT AND IMPLEMENTATION PLAN

7.1 Recommended Project

As presented in Chapter 6, there are three potential secondary treatment processes identified that are capable of meeting effluent discharge limits specified in the recently adopted General Permit. Based on an evaluation of treatment performance, economic and non-economic factors, the recommended project is the oxidation ditch process and solids handling facilities, while maintaining the existing percolation ponds for effluent disposal. Figure 7.1 presents the process flow diagram of the recommended project. Transitioning from a pond-based treatment plant to a mechanical plant will require operator training to not only achieve higher certification, but to better understand the biological process and associated mechanical equipment. The simplicity of the oxidation ditch process compared to the other alternatives is a key consideration.

Based on discussions with the City, there is not a strong driver to develop a recycled water system. The analysis in Chapter 5: Effluent Reuse and Disposal shows that the anticipated recycled water demands for landscape irrigation in the area would only account for roughly one quarter of the annual projected effluent flows. Furthermore, the estimated capital cost for a recycled water system is around $20M, including tertiary treatment, recycled water storage, pumping, and distribution. Additionally, annual operations and maintenance (O&M) costs for recycled water system components are expected to be hundreds of thousands of dollars, when including labor costs.

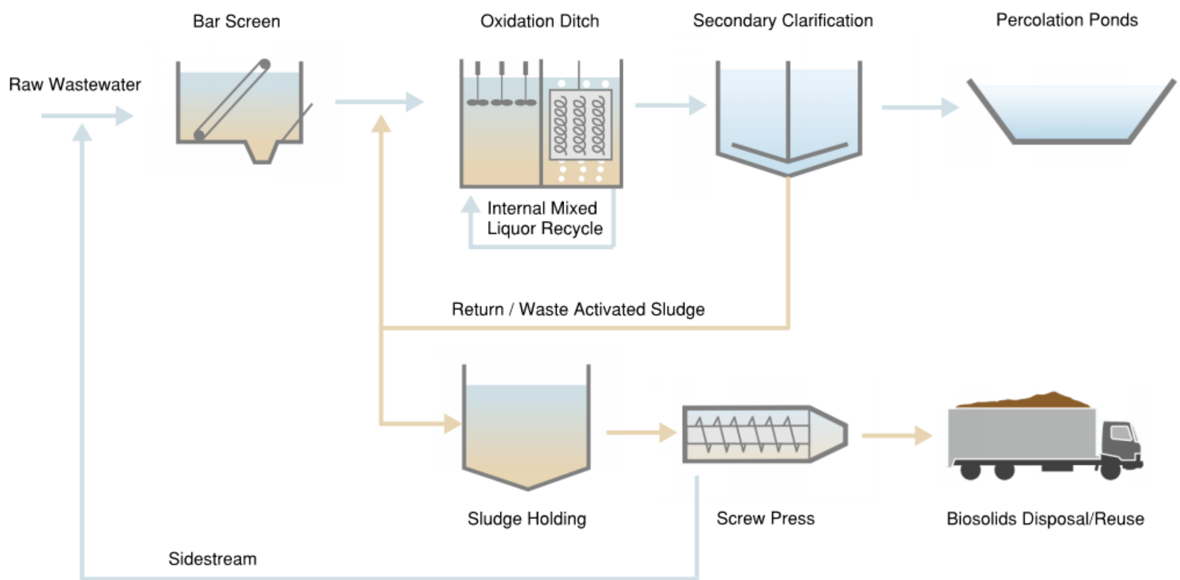

Figure 7.1 Recommended Project Process Flow Diagram

7.2 Discussion of Cost Saving Measures

The alternative treatment trains presented in the previous chapter provided an equal level of treatment and life span of new infrastructure. This was done to be able to provide a relative comparison to determine the treatment technologies that best fit the City's objectives. However, after establishing the recommended treatment technology (oxidation ditch secondary effluent), the following sections discuss options for potential cost saving measures.

7.2.1 Reuse of Existing Headworks

The MLE alternative required grit removal, while the MBR alternative required grit removal and a perforated fine screen. However, the existing fine screen without grit removal is sufficient for the oxidation ditch process. Grit is less harmful to oxidation ditches compared to the other alternatives because of the size of the basins and the type of mechanical equipment.

A headworks structure also provides flow metering and flow splitting. The existing headworks has a Parshall flume and ultrasonic level sensor for flow metering, the condition of which needs to be assessed in greater detail. If the flow metering in the existing headworks needs rehabilitation, the existing structure may be able to be retrofitted to provide a new Parshall flume and ultrasonic level sensor. A Parshall flume is a fixed, hydraulic structure within the open channel of the headworks. Converging side walls accelerate the water to a supercritical velocity. By doing so, the upstream water depth at a given point correlates to a specific flow.

Rather than reutilize the existing gates at the headworks to split flow to the new oxidation ditch structure, the headworks structure can be modified so that all flow is sent to a new flow splitting structure attached to the oxidation ditches.

One of the most important considerations for the viability of reusing the existing headworks is the integration of the structure with the hydraulic profile across the new basins. Additional infrastructure from the proposed process will introduce higher headloss. It is critical that the headloss does not back up and flood the headworks structure or Parshall flume. Given the size of the treatment plant, the process should be able to flow by gravity from the headworks to the existing disposal fields. Figure 7.2 presents a preliminary hydraulic profile for the new treatment plant. The hydraulic profile presents the water surface elevations and critical infrastructure elevations at the projected 2040 peak hour flow and average annual flow. Headloss from the headworks structure to the effluent disposal fields at peak hour flow is approximately 12 feet. The calculated headloss allows for the integration of the existing headworks structure with the new treatment plant.

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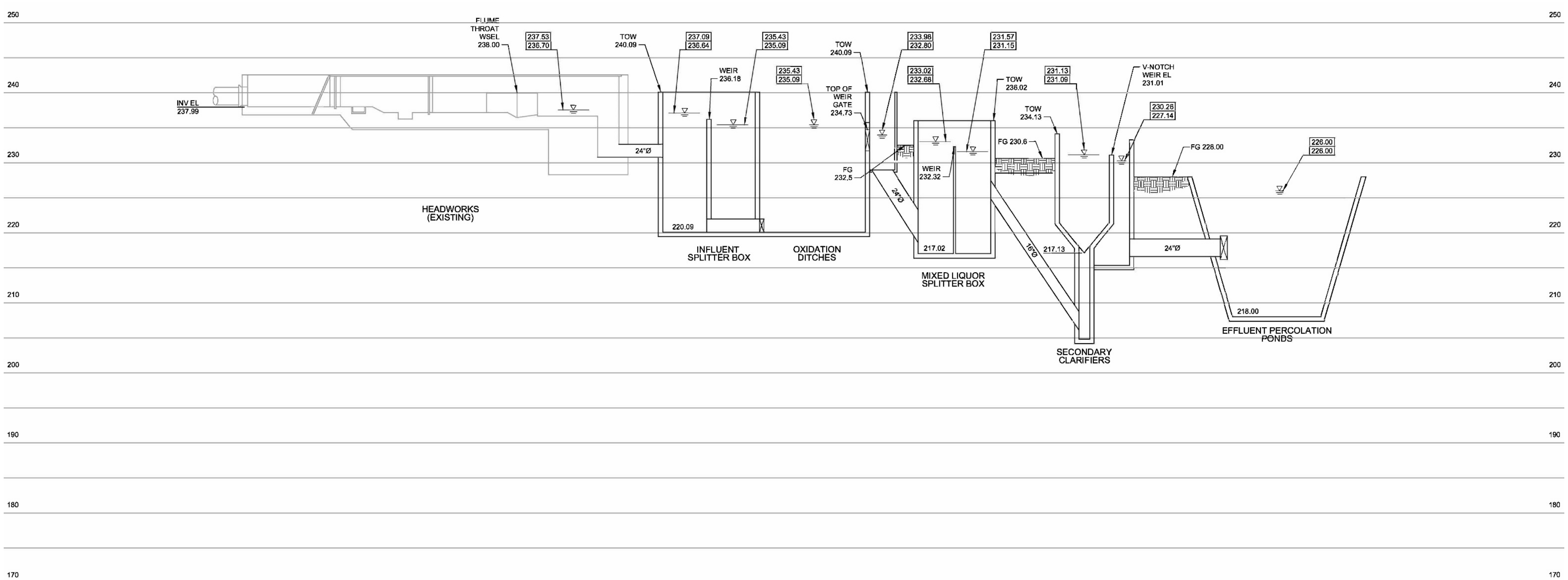

LEGEND

XX.X — WSEL AT DESIGN PEAK HOUR FLOW OF 5.0 MGD
XX.X — WSEL AT DESIGN AVERAGE ANNUAL FLOW OF 1.80 MGD

TOW = TOP OF WALL
TOP = TOP OF PIPE

FG = FINISHED GRADE

NOTES TO DESIGNER

1. INFORMATION PRESENTED IS PRELIMINARY AND SUBJECT TO REFINEMENT DURING FINAL DESIGN. IN THE EVENT OF CONFLICTS, MECHANICAL DWGS SHALL GOVERN.
2. EXISTING ELEVATIONS AT THE HEADWORKS NEED TO BE CONFIRMED.
3. PEAK HOUR FLOW BASED ON PEAKING FACTORS ESTABLISHED IN THE COLLECTION SYSTEM MASTER PLAN.
4. EXISTING SECONDARY EFFLUENT PIPE MAY BE USED DURING DRY WEATHER FLOW CONDITIONS.
5. PEAK AND AVERAGE FLOW CONDITIONS BOTH ASSUME A RETURN ACTIVATED SLUDGE FLOW 50% OF THE INFLUENT FLOW.

Figure 7.2 Hydraulic Profile

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7.2.2 Clarifiers

7.2.2.1 Reuse of Primary Clarifiers

The existing facility has three primary clarifiers of different diameters and depths. The recommended project includes three equally sized secondary clarifiers. The existing primary clarifiers have a side water depth of about eight feet. Modern primary and secondary clarifiers are designed with deeper side water depths, up to 16 feet. Previous studies have shown that as the side water depth increases, the effluent TSS concentration is lower and less variable. A side water depth of less than 12 feet can start to impact the performance of the clarifier.

Although the structural integrity of the existing primary clarifiers is sufficient to support continued operation, it is recommended to abandon and replace with new clarifier structures to ensure proper performance. Rehabilitation of the existing structures to support a deeper side water depth while maintaining the necessary hydraulic conditions would not be practical and is cost prohibitive.

7.2.2.2 Phasing of Secondary Clarifiers

The analysis in the previous chapter determined two 50-foot diameter clarifiers are needed to handle the peak hour flow in 2025 and three clarifiers are needed in 2040. It was assumed that three clarifiers would be constructed initially with the third clarifier in standby until the peak flows increase.

Clarifiers are sized to handle peak hour flows caused by wet weather events. However, the climate around Greenfield has distinct wet and dry seasons with summer months typically receiving no precipitation. One 50-foot diameter clarifier can handle approximately 1.75 mgd.

One option would be to construct two clarifiers as part of the initial project. During dry months, one clarifier could be taken out of service for routine maintenance and repairs. Then, as the dry season ends, both clarifiers would be brought online to treat peak hour flows. As flows increase, the third clarifier would be constructed when either one clarifier is insufficient to handle dry weather flows or when two clarifiers are insufficient to handle wet weather flows.

Historical hourly flow was not available for this project. The peak hour flow peaking factor was based on a one-month wastewater flow monitoring study done by Wallace Group as part of the 2016 Wastewater Master Plan. The capacity of the clarifiers is directly related to the peak flows. The City should begin collecting hourly flow data to confirm flow peaking factors, which can be used to justify delayed construction of a third clarifier.

The other factor critical to the clarifier size is the sludge volume index (SVI). The SVI measures the settleability of the sludge over a fixed period. A higher SVI indicates poor settleability. The sizing of the clarifiers was based on a conservative SVI value of 150 mL/g. The timeline for needing a third clarifier will be dependent on the SVI of the oxidation ditch sludge. Once the new clarifiers are constructed and the treatment process has acclimated, the SVI, hourly flows, and clarifier performance should be tracked closely to determine the implementation schedule for a third clarifier.

Phased construction can help reduce the initial project cost and may be a viable solution if excess capacity is not needed for many years or if future conditions are uncertain. However, if the capital is available and the capacity is be needed in the near-term, constructing for anticipated growth is more cost effective long-term. Phased construction requires multiple projects, which increases costs for things such as design, construction management, contractor mobilization, testing, etc.

7.2.3 Phasing and Repurposing of Aerated Sludge Holding Tanks

The recommended treatment project includes a 500,000 gallon aerated sludge tank, which provides a 10 day holding time at 2040 loads. The aerated sludge tank helps reduce volatile solids and provides operational flexibility for dewatering. A smaller aerated sludge tank could be provided, but the sludge quality and dewatering performance becomes more difficult to balance with a holding time less than five days.

During the site visit, it was determined that the aerobic digester is in good condition and could be utilized for several more years. In an effort to minimize stranded assets, the existing digester volume could be repurposed to provide sludge holding volume for the future treatment plant. The existing digester has an operational volume of around 75,000 gallons. Therefore, another tank of similar size would need to be constructed to provide at least a 5 day sludge holding time at startup conditions. As sludge flows increase with service area expansion, additional tanks would need to be constructed. Phased construction, as discussed in the previous section can help reduce the capital cost for the initial project but increases the total cost to provide equivalent capacity.

Retaining the existing aerobic digester for the new treatment plant would require operation of multiple sludge holding tanks. If the existing digester were to be abandoned, a single, larger sludge holding tank would be constructed, which would be easier to operate and maintain than multiple tanks. Additionally, a new tank would likely be constructed mostly below grade, which would provide less risk for facility staff compared to the existing above ground tank.

7.3 Funding Opportunities

There are two types of costs associated with the recommended program: capital costs required to plan, design, and build the facilities and infrastructure elements; and operational costs required to maintain, operate, and repair those facilities and infrastructure elements.

Capital costs are funded through a variety of sources that range from traditional funding options such as internal user charges and bond financing, to non-traditional funding sources such as grants, loans, and market-based programs. The sections that follow outline the mechanisms available to recover both capital and O&M costs.

The main instruments available for funding the capital costs include:

- **Pay-as-you-go (PAYGO) financing** — upfront collection of project costs from existing and new users for future capital improvement projects. It is common for utilities to fund major capital expansions through other methods, particularly bond financing, to avoid the burden that PAYGO's high upfront cash requirement places on rate or reserve funds.
- **Debt financing** — acquisition of funds through borrowing mechanisms such as revenue bonds, general obligation bonds, assessment districts, and other financing mechanisms.
- **Grants and loans** — alternate sources of funds from public agencies at no or minimal interest cost. Examples include federal, state, and local programs that provide funding at zero interest for projects that meet select criteria. Typically grant and low-interest loan programs do not pay for operation and maintenance costs.

- **Market based programs** — refers to financing through funds obtained from tax credits, purchase agreements, voluntary programs, and trading and offset programs.

Operating revenues remaining after operating expenses and debt service obligations have been met can be a significant source of funding for capital expenses today or can be placed in reserves for future projects. Financing methods such as grants and loans can be combined with rate and reserve funding to develop a complete funding plan. Most agencies fully fund operational costs through user rates and other recurring annual sources of revenue, and not funded through debt.

7.3.1 Pay-As-You-Go Financing

Pay-as-you-go (or PAYGO) financing involves periodic collection of capital charges or assessments from customers within the utility's jurisdiction for funding future capital improvements. These revenues are accumulated in a capital reserve fund and are used for capital projects in future years. PAYGO financing could be used to finance 100 percent or only a portion of a given project, depending on a number of factors.

Overall, total costs are substantially lower when employing a PAYGO financing approach due to the avoidance of interest payments incurred from bond funding, along with the associated transaction costs (e.g., legal fees, underwriters' discounts, etc.). However, it is often challenging to employ this funding approach for large new or replacement projects, due to the high amount of capital that is needed on-hand in reserves, or from rate-based cash flow. If the program is reserve funded, the agency must already have sufficient cash-on-hand designated for such a project. If the program is rate funded, it could significantly increase the agency's rates and fees if the program represents a sizeable increase in capital needs.

7.3.2 Financing Options

7.3.2.1 Debt Financing

There are several options for debt financing of reclaimed water projects, ranging from the issuance of short- or long-term bonds.

Revenue Bonds

Revenue bonds are historically the principal method of incurring long-term debt. This method of debt obligation requires specific non-tax revenues such as user charges, facility income, and other funds, pledged to guarantee repayment. There is often no legal limitation on the amount of authorized revenue bonds that may be issued, but from a practical standpoint, the size of the issue must be limited to an amount where annual interest and principal payments are well within the revenues available for debt service on the bonds. Revenue bond covenants generally include coverage provisions, which require that revenue from fees minus operating expenses be greater than debt service costs.

Certificates of Participation

Certificates of participation provide long-term financing through a lease agreement that does not require voter approval. The legislative body of the issuing agency is required to approve the lease arrangement by a resolution. The lessee (the City) would be required to make payments typically from revenues derived from the operation of the facilities. The amount financed may include reserves and capitalized interest for the period that facilities will be under construction. Within the State of California, most municipal utility bonds are issued in the form of certificates of participation rather than traditional revenue bonds.

General Obligation Bonds

General obligation (GO) bonds are municipal securities secured by the issuer's pledge of its full faith, credit, and taxing power. GO bonds are backed by the general taxing authority of local governments and are often repaid using utility revenues when issued in support of a sewer or water enterprise fund. In the event that GO bonds are issued for this project, the agency must have the necessary taxing capacity to issue the bonds.

Assessment District Bonds

Financing by this method involves initiating assessment proceedings. Assessment proceedings are documents in "Assessment Acts" and "Bond Acts." An assessment act specifies a procedure for the formation of a district (boundaries), the ordering, and making of an acquisition or improvement, and the levy and confirmation of an assessment secured by liens on land. A bond act provides the procedure for issuance of bonds to represent liens resulting from proceedings taken under an assessment act. Procedural acts include the Municipal Improvements Acts of 1911 and 1913. The commonly used bond acts are the 1911 Act and the Improvement Bond Act of 1915. The most prevalent procedure is a combination of the 1913 Improvement Act with the 1915 Bond Act. Charges for debt service can be included as a special assessment on the annual property tax bill. The procedure necessary to establish an assessment district may vary depending on the acts under which it is established and the District size.

7.3.2.2 State Grants and Loans

Federal, State, and local grant and loan funding sources are available for the planning, design and construction of wastewater and recycled water projects. Grants and low interest loans funding programs, which are highly competitive, typically target specific types of project and/or have specific objectives that a project must achieve and often require projects to meet as many objectives as possible, including:

- Aging infrastructure.
- Protection of surface water and groundwater sources.
- Betterment of disadvantaged communities.
- Regulatory compliance.
- Regional partnerships/consolidation.
- Water conservation.
- Renewable energy improvements.

The City of Greenfield's wastewater treatment plant project provides crucial upgrades to the wastewater treatment processes and infrastructure, improving reliability of service to the community, ensuring regulatory compliance, protects surface water resources, as well as benefiting a disadvantaged community.

7.3.2.3 Overview of Low Interest Loans and Grants

With Federal and State budget constraints and an overall increased interest in grants and low interest loan programs, sources of low interest loan financing and grant funding are more limited and/or more competitive to secure. Despite the competitive nature of alternate funding, available Federal, State and Local funding sources should be considered as a potential funding mechanism to help reduce the overall costs of the project to the City.

The larger funding programs [e.g. Water Infrastructure Finance and Innovation Act (WIFIA), State of California's Clean Water State Revolving Fund (CWSRF), and California Infrastructure and Economic Development Bank (IBank)] provide some of the best opportunities to obtain larger sources of funding. While programs such as the Bureau of Reclamation's Drought Resiliency Program, Title XVI Water Reclamation and Reuse Program, and Water and Energy Efficiency programs provide relatively large sources of grant funding. Smaller grants and loans can also be pursued as they are helpful in building relationships with funding agencies and reducing the financial burden on the City. In addition, grant and low interest loan funding helps to demonstrate that the City is doing their fiduciary responsibility to ratepayers by seeking alternative sources of funding.

While grant programs have the obvious advantage over loans in that they do not require repayment, there are numerous factors that should be considered in the pursuit of grant funding, including:

- **Project Specific.** Most grants target a specific type of project or purpose. For a project to be competitive, it needs to meet the intent or priorities of the program.
- **Established Application Timelines.** Application timing is critical for most grant and loan programs. While some funding agencies accept applications on a rolling basis, others have prescribed submission dates. Typically grant programs release funding announcements once a year within a 45-60 day window to apply, while some vary year to year pending appropriations. Low interest loan programs are traditionally on a rolling basis; however the EPA's WIFIA program releases its funding announcement once a year. In addition, the State of California's CWSRF requires the submittal of complete as possible application packages by December 31st for consideration for the following year's Intended Use Plan. Grant tracking and identification of required documentation is critical to align an agency for a funding program.
- **Project Readiness.** An assessment of project document readiness is important to ensure the appropriate level of documentation (e.g., engineering, environmental, and financial) is available to support the grant or loan application.
- **Funding Restrictions.** Limited programs allow for the retroactive funding of design and construction work, and some programs will only fund activities that are conducted post selection for award or even require entering into an agreement prior to starting work activities. In addition, most funding agencies require demonstration of the ability to repay loans or to provide for the match funding for grants, as well demonstrate the ability to construct, operate, and maintain the project without grant funding.
- **Application Timing.** In general, agencies should plan on submitting a loan or grant application 6 to 12 months in advance of when funding is needed.
- **Does not cover the full cost of the project.** Most grant programs do not cover the full cost of the project, requiring the sponsoring agency to provide a minimum cost share ranging from 25 to 75 percent (in-kind donations are applicable matches). Often there is also a minimum funding requirement. Some agencies secure loan financing for the entire project and in parallel pursue appropriate grants where the entity will be competitive.

- **Grant award or funding authorization is NOT a promise of grant reimbursement.** Grant reimbursements are subject to annual budget and appropriations process and thus disbursement of grant funds on schedule is not guaranteed. Federal grants typically require investment of additional resources to obtain lobbying support.
- **Low interest loans and grants are typically reimbursements for expenditures incurred requiring an agency to have a funding source for initial payments.** Most grants are reimbursements and not cash up front. This requires that a source of funding be available for the construction of the project. In addition, with some programs it may take a year or two after project completion to receive reimbursements, especially in difficult economic times.

Both Federal and State low interest loans and grant programs are competitive, and the application process can be time-consuming and require an investment to pursue funding. More so, as grant funds are limited and highly competitive; require a challenging qualification process; are not typically a long-term funding solution; and may expire after a specified time, an assessment of the appropriateness of pursuing a specific grant should be conducted to verify the investment is worthwhile.

A detailed list of potential Federal and State funding programs to evaluate further for the City of Greenfield's wastewater treatment plant improvements are summarized in Appendix L.

7.3.3 Summary of Funding Opportunities

Based on the purpose of the WWTP Project, the following Federal programs are likely viable funding sources for the future WWTP upgrades:

- EPA's WIFIA Program.
- EDA' Public Works and Economic Adjustment Assistance Programs.
- USBR's WaterSMART Water and Energy Efficiency Grant Program.

In addition, should the City decide to implement a recycled water program, potential funding sources include USBR's Water Marketing Grant and Title XVI/WIIN Water Reclamation Funding.

In addition, the following State funding programs are likely viable funding sources for the WWTP upgrades project:

- SWRCB's Clean Water State Revolving Fund (CWSRF) Program.
- SWRCB's Small Community Clean Water/Wastewater Funding.
- SWRCB's Proposition 1, Groundwater Grant Program (if there are groundwater impacts).
- Department of Water Resources Proposition 68, Sustainable Groundwater Management Grant Program.
- State of California's Infrastructure SRF Program (IBank).

Additional State funding sources, such as ECCA, have been included on the matrix should the City consider alternative energy generation in future projects.

7.4 Implementation Schedule

Table 7.1 provides a breakdown of the total project cost by process area.

Table 7.1 Breakdown of Recommended Project Capital Costs

Process	Capital Project Cost ($ Millions)
Oxidation Ditch	$23.2
Secondary Clarifiers	$10.2
Solids Handling	$2.9
Dewatering	$7.6
Site Work(1)	$8.9
Total	**$52.8**

Notes:
(1) Site work includes demolition of existing infrastructure, earthwork needed to regrade around new infrastructure, dredging, and hauling of solids in the treatment ponds, and earthwork to convert the existing effluent disposal fields to percolation ponds.

Figure 7.3 presents the implementation schedule and cash flow curve for the recommended project.

7.5 Next Steps

The following provides a summary of actions the City will need to take in order to bring this project to fruition. The phases outlined in Figure 7.3 Implementation Schedule are interrelated, and information from one phase will be needed in order to complete subsequent stages of the project.

7.5.1 Funding Opportunities

The most important near-term action is understanding the funding landscape for the project. As shown in Figure 7.3, a rate study is required to establish updated rates and obtain public review and approval. In addition, beginning conversations with funding agencies now to finalize which grants and loans the City will pursue is critical. As noted in Section 7.3, some of the funding applications are due by the end of the year, so starting these applications now is required in order to meet these deadlines.

The cash flow curve outlined in Figure 7.3 shows $30M in spending in 2025. Having a clear understanding of the project funding opportunities and timing will allow the City to confirm funds will be available when they are needed to meet the project costs necessary to keep the project on schedule.

7.5.2 Environmental Requirements

The City also needs to bring their environmental consultant on board so the appropriate environmental documentation is prepared in a timely fashion. As an example, if the City would like to pursue USDA funding alternatives, the CEQA process needs to be fully complete and the notice of determination filed before the City can even submit a USDA funding application package for consideration. It takes approximately one year to complete CEQA documentation for a new wastewater treatment plant.

7.5.3 Base Flood Elevation

As noted in Section 2.6, if the City decides to construct new treatment structures within the existing facility site, it is likely that the base flood elevation (BFE) will need to be determined for the site and a Conditional Letter of Map Revision prepared. This work will require close coordination with both local and Federal agencies and should be started now to allow adequate time for the technical work to be performed and agency coordination to occur.

7.5.4 Report of Waste Discharge

The City recently received a notice of public hearing from the Central Coast RWQCB (Appendix M). The RWQCB is in the process of terminating individual orders upon enrollment in the General Order. Adoption of the order will not immediately change the City's current permit, but the process to shift will occur over the next 1 to 2 years. Given this timeframe, it would be appropriate for the City to begin preparing its Report of Waste Discharge (ROWD) for the new treatment plant within the next six months. This will allow enough time for the document to be prepared and ready for the Central Coast RWQCB review when they begin the permit transition process for the City.

PROJECTED IMPLEMENTATION SCHEDULE			2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Cost (Millions)
	Projects	Cost (Millions)	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	
	Recommended Treatment Project	$52.8												$52.8
1	Rate Study/Proposition 218	$0.3												
2	Environmental Analysis	$0.6												
3	Designer Procurement	$0.3												
4	Preliminary Design	$0.6												
5	Final Design	$2.2												
6	Bidding and Award	$0.6												
7	Mobilization	$0.6												
8	Construction	$40.7												
9	Testing and Commissioning	$1.1												
10	Construction Management	$4.8												
11	Engineering Services during Construction	$1.1												
12	Project Closeout	$0.6												

LEGEND	Planning	Procurement	Design	Bidding and Award	Construction	Project Closeout

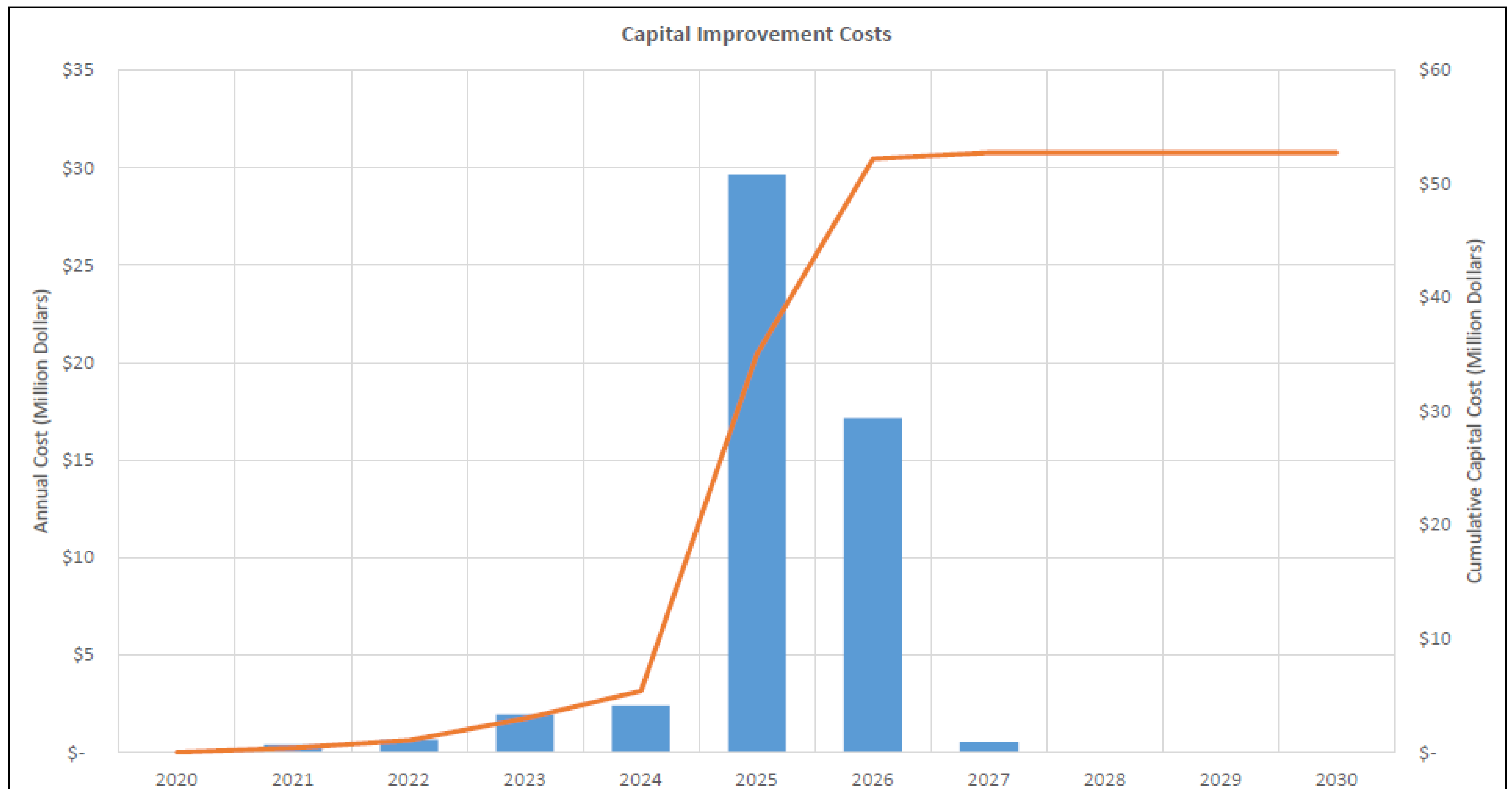

Figure 7.3 Implementation Schedule

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Appendix A
EXISTING WDR AND MRP

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
81 Higuera Street, Suite 200
San Luis Obispo, California 93401

WASTE DISCHARGE REQUIREMENTS ORDER NO. R3-2002-0062

Waste Discharger Identification No. 3 2750105001
Proposed for Consideration at the May 31, 2002 Meeting

For

CITY OF GREENFIELD
WASTEWATER TREATMENT PLANT
MONTEREY COUNTY

The California Regional Water Quality Control Board, Central Coast Region (Regional Board), finds that:

FACILITY OWNER AND LOCATION

1. The City of Greenfield (hereafter "Discharger") owns and operates the Greenfield Wastewater Treatment Plant (hereafter "Facility").

2. The Facility is located along Walnut Avenue approximately 1.5 miles northeast of the City of Greenfield. The Facility is in the southwest ¼ of Section 21, the northeast ¼ of section 29, northwest ¼ of section 28, and southeast ¼ of section 20, Township 18 South, Range 07 East, of the Mount Diablo Base & Meridian along the west bank of the Salinas River, as shown on Attachments "A".

PURPOSE OF ORDER

3. On October 29, 2001, John Alves, Deputy City Manager and Public Works Director for the City of Greenfield submitted a Report of Waste Discharge for authorization to continue discharging treated domestic wastewater within the Salinas River sub-basin.

4. Order No. R3-2002-0062 revises waste discharge requirements for the Facility that are intended to:
   a) allow the discharge described in the Dischargers Report of Waste Discharge,
   b) uphold State water quality standards and,
   c) revise the Monitoring and Reporting Program.

SITE/FACILITY DESCRIPTION

5. The Discharger provides sewage service to the City of Greenfield and has direct responsibility for the wastewater collection system.

6. The Facility is located on 80 acres and includes pretreatment headworks, two primary clarifiers, one aerobic sludge digester, three oxidation ponds, two percolation ponds, and 13 acres of spray field disposal, as shown in Attachment "B".

Discharge Type

7. The Facility discharges treated domestic wastewater.

8. Analysis of the City water supply, submitted with the Discharger's October 2001 Self Monitoring Report, identifies the following:

Constituent	City Water Supply October 3, 2001
Total Dissolved Solids	400
Sodium	42
Chloride	33
Sulfate	110
Boron	0.14

9. Analysis of the Facility's wastewater effluent, submitted with the Discharger's October 2001 Self Monitoring Report, identifies the following:

Constituent	WTTP Effluent October 3 2001
Total Dissolved Solids	660
Sodium	140
Chloride	140
Sulfate	88
Boron	0.49

Design and Current Capacity

10. Pretreatment occurs at the headworks and consists of a manual vertical bar screen followed by two comminuters in parallel.

11. Treatment consists of two primary clarifiers in parallel, three oxidation ponds, two percolation ponds, and 13 acres of spray irrigation and an aerobic sludge digester.

12. Following recommendations made by the Discharger's consultant in 1992, the Facility's capacity was increased to 1.0 million gallons per day (MGD).

13. The Facility, from January 2000 through December 2000, treated an average flow of 0.853 MGD. The peak month, average daily flow, occurred during July 2000 and averaged 0.91 MGD.

14. The Discharger plans to expand the Facility to a design capacity of at least 1.5 MGD. Expected additions include the following: a primary clarifier, a sludge pump, a sludge digester, an aeration pond, and land for effluent disposal.

Wastewater Disposal

15. Wastewater disposal occurs by percolation and evaporation within the ponds, and spray irrigation.

Solid Waste Disposal

16. Solid wastes generated from the treatment system consist of biosolids separated from the wastewater though the primary clarifiers. The biosolids are treated in a digestor and drying bed prior to being stored onsite adjacent to the spray irrigation areas.

Domestic Water Supply and Wastewater
Geology

17. The ponds and spray irrigation areas are located on relatively level topography consisting of sandy soils.

Hydrogeology

18. Monitoring reports submitted by the Discharger during 2001, indicate a depth to groundwater of ranging from 12 to 19 feet, with a northwest groundwater gradient.

Surface Water

19. The ponds and spay irrigation areas are located southwest of and adjacent to the Salinas River, which flows in a northwesterly direction to Monterey Bay. The ponds and spray irrigation areas are protected from the river by a levee designed to withstand a 100-year flood.

Land Uses

20. The Facility is surrounded by agricultural land.

Regional Basin Plan

21. The Water Quality Control Plan, Central Coast Basin (Basin Plan) was adopted by the Regional Board on November 19, 1989 and approved by the State Water Resources Control Board (State Board) on August 16, 1990. The Regional Board approved amendments to the Basin Plan on February 11, 1994 and September 8, 1994. The Basin Plan incorporates statewide plans and policies by reference and contains a strategy for protecting beneficial uses of State Waters. This Order implements the Basin Plan.

22. Historical beneficial uses of groundwater near the discharge include:

    a. Municipal and Domestic Water
    b. Agricultural Water Supply
    c. Industrial Water Supply

23. Present and anticipated beneficial uses of the Salinas River between Nacimiento River and Chualar include:

    a. Municipal and Domestic Supply

b. Agricultural Supply
c. Industrial Process Supply
d. Industrial Service Supply
e. Groundwater Recharge
f. Water Contact Recreation
g. Non-Contact Water Recreation
h. Wildlife Habitat
i. Cold Freshwater Habitat
j. Warm Freshwater Habitat
k. Migration of Aquatic Organisms
l. Spawning, Reproduction, and/or Early Development
m. Rare, Threatened, or Endangered Species
n. Commercial and Sport Fishing

MONITORING PROGRAM

24. Monitoring and Reporting Program No. R3-2002-0062 is a part of the proposed Order. The Monitoring Program requires routine water supply, pond, influent, effluent, groundwater, solids/biosolids, facility, inflow/infiltration, and salt monitoring to verify compliance and protection of groundwater quality.

25. Monitoring reports are due quarterly, January, April, July, and October. An annual report summarizing the year's events and monitoring is due in January.

ENVIRONMENTAL ASSESSMENT

26. These waste discharge requirements are for an existing facility and are exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000, et. seq.) in accordance with Section 15321, Article 19, Chapter 3, Division 6, Title 14 of the California Code of Regulations.

Total Maximum Daily Load

27. Total maximum daily load (TMDL) allocations will be developed for impaired surface waters in the Salinas River Basin. TMDL documents will allocate responsibility for constituent loading throughout the watershed. Draft TMDL documents are anticipated by June 2003 for siltation, June 2004 for nutrients and pesticides, and June 2009 for salinity. During development of the TMDL source assessment and implementation plan, if Regional Board staff find constituent contributions from waste discharged may adversely impact beneficial uses or exceed water quality objectives, TMDL documents may require changes in Waste Discharge Requirements. Waste Discharge Requirements may be modified to implement applicable TMDL provisions and recommendations.

EXISTING ORDERS/GENERAL FINDINGS

28. The discharge was previously regulated by Waste Discharge Requirements Order No. 89-19, adopted by the Regional Board on February 10, 1989. The Regional Board has regulated this discharge since 1965.

29. Discharge of Waste is a privilege, not a right, and authorization to discharge is conditional upon the discharge complying with provisions of Division 7 of the California Water Code and any more stringent effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance.

30. On March 14, 2002, the Regional Board notified the Discharger and interested parties of its intent to issue waste discharge requirements for the discharge and has provided them with a copy of the proposed Order and an opportunity to submit written views and comments.

31. After considering all comments pertaining to this discharge during a public hearing on May 31, 2002, this Order was found consistent with the above findings.

IT IS HEREBY ORDERED, pursuant to authority in Sections 13263 and 13267 of the California Water Code, that the City of Greenfield their agents, successors, and assigns, may discharge waste at the above-described Facility providing compliance is maintained with the following:

All technical and monitoring reports submitted pursuant to this Order are required pursuant to Section 13267 of the California Water Code. Failure to submit reports in accordance with schedules established by this Order, attachments to this Order, or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer, may subject the discharger to enforcement action pursuant to Section 13268 of the California Water Code.

Note:
Other prohibitions and conditions, definitions, and the method of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated January 1984. Superscripted terms are defined in Section, D. Definitions.

A. PROHIBITIONS

1. Discharge of treated wastewater to areas other than disposal areas shown in Attachment "B", is prohibited.

2. Discharge of any wastes including overflow, bypass, seepage, and overspray; from transport, treatment, storage, or disposal systems to adjacent drainageways or adjacent properties not listed in this Order is prohibited.

3. Bypass of the treatment facility and discharge of untreated or partially treated wastes directly to the designated disposal area is prohibited.

B. SPECIFICATIONS

Effluent

1. Daily wastewater flow averaged over each month shall not exceed 1.0 MGD, until Facility improvements are complete (with design capacity supported by sufficient documentation), and approved by the Executive Officer.

2. Upon completion of Facility improvements, documented design capacity, and approval by the Executive Officer, daily wastewater flow, averaged over each month, shall not exceed the design flow documented and approved.

Groundwater Protection

3. The discharge shall not cause groundwater to exceed the following limitations:

Constituents	Units*
pH	Between 6.5 - 8.4
TDS	1,500 mg/l
Sodium	150 mg/l
Chloride	250 mg/l
Sulfate	850 mg/l
Boron	0.5 mg/l

*as measured in groundwater downgradient of the disposal area

4. The discharge shall not cause nitrate concentrations in groundwater downgradient of the disposal area to exceed 8 mg/l (as N).

5. The discharge shall not cause a significant increase of mineral constituent concentrations in underlying groundwater, as determined by comparison of samples collected from wells located upgradient and downgradient of disposal areas.

6. The discharge shall not cause concentrations of chemicals and radionuclides in groundwater to exceed limits set forth in Title 22, Chapter 15, Articles 4 and 5 of the California Administrative Code.

System Operation

7. Treatment and disposal areas shall be fenced and posted (English and Spanish) to advise the public that the Facility contains domestic wastewater.

8. Extraneous surface drainage shall be excluded from the wastewater treatment and disposal facilities.

9. Treatment and disposal ponds shall have a freeboard greater than two feet at all times.

Wastewater Disposal

10. Effluent shall not be discharged within 100 feet of any existing water supply well.

11. Disposal ponds shall be alternated to permit emptying for maintenance purposes.

12. Disposal ponds shall be dried and disced at least annually.

13. Wastewater application to spray irrigation areas shall be managed to prevent ponding.

14. Wastewater application to spray irrigation areas shall not take place during rains.

15. Wastewater application to spray irrigation areas shall not result in runoff beyond the property boundary, to surface waters or to drainage courses that are tributary to surface waters.

16. Spray irrigation areas shall be operated using a regular rotation. Rotation from one irrigation area to another shall occur at least weekly. Between applications, irrigated areas shall be allowed to dry to approximately the field moisture condition of non-irrigated areas.

Solid Waste

17. All solids generated from the screening and treatment process must be reclaimed or disposed of in a manner acceptable to the Executive Officer.

Storm Water

18. All storm water contacting domestic wastewater shall be contained onsite.

Inflow/Infiltration

19. Best management practices shall be implemented to minimize the inflow and infiltration of storm water and/or unauthorized wastewater into the Facility.

C. PROVISIONS

1. Order No. 89-18, "Waste Discharge Requirements for City of Greenfield, Monterey County," adopted by the Regional Board on February 10, 1989, is hereby rescinded.

2. The Discharger shall comply with "Monitoring and Reporting Program (MRP) No. R3-2002-0062, as specified by the Executive Officer.

3. The Discharger shall comply with all applicable items of the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements," dated January 1984.

4. All discharges from the Facility shall comply with lawful requirements of the municipalities, counties, irrigation districts, drainage districts, and other local agencies regarding discharges of waste to land and surface waters within their jurisdiction.

5. The Discharger shall evaluate salt management practices and implement a long term Salt Management Program to access and reduce salt loading to the Facility. By March 1, 2003, the Discharger shall submit a report to the Executive Officer identifying findings and making recommendations as needed to manage salts.

6. The Discharger shall submit an engineering report to the Executive Officer not later than November 30, 2002 addressing:
   a. Whether the hydraulic gradient for groundwater below the Facility is consistent with the configuration of the monitoring wells;

   b. Whether current groundwater monitoring wells adequately represent groundwater upgradient and downgradient of the Facility.

   If the current groundwater monitoring system is inadequate, the Discharger shall propose a revised groundwater monitoring system with an implementation schedule.

7. The Discharger shall submit an engineering report to the Executive Officer, not later than March 1, 2003 evaluating various wastewater disposal options. The report shall consider recycling and reuse, and if viable, develop a schedule for phased implementation.

8. The Discharger shall give advance notice to the Regional Board of any planned changes in the permitted facility or waste management activities that may result in noncompliance with this Order.

9. This Order may be reopened to address any changes in State or Federal plans, policies, or regulations that would affect the quality requirements for the discharges.

10. In the event of any change in control or ownership of land or facilities presently owned or utilized by the Discharger, the Discharger shall notify the succeeding owner(s) or operator(s) of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Board.

11. Pursuant to Title 23, Chapter 3, Subchapter 9, of the California Administrative Code, the Discharger must submit a written report to the Executive Officer not later than September 22, 2011, addressing:

    a. Whether there will be changes in the continuity, character, location, or volume of the discharge;

    b. Whether, in their opinion, there is any portion of the Order that is incorrect, obsolete, or otherwise in need of revision; and

    c. A summary of all violations of Waste Discharge Requirements, Order No. R3-2002-0062, which occurred since adoption of the order along with a description of the cause(s) and corrective action taken.

I, Roger W. Briggs, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Central Coast Region, on May 31, 2002.

____

Roger W. Briggs, Executive Officer

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STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

81 Higuera Street, Suite 200
San Luis Obispo, California 93401-5411

MONITORING AND REPORTING PROGRAM NO. R3-2002-0062

Waste Discharge Identification No. 3 270105001
Proposed for Consideration at May 31, 2002 Meeting

For

CITY OF GREENFIELD
WASTEWATER TREATMENT PLANT
MONTEREY COUNTY

Reporting responsibilities are specified in Sections 13225(a), 13267(b), 13383, and 13387(b) of the California Water Code. This Discharge Monitoring Program is issued in accordance with Provision C.2 of Regional Board Order No. R3-2002-0062.

WATER SUPPLY MONITORING

Representative samples of the City water supply shall be collected and analyzed for the constituents and at the frequency specified below:

Parameter/Constituent	Units	Sample Type	Minimum Sampling and Analyzing Frequency
General Minerals*	mg/l	Grab	Annually (September)

* General Mineral analyses shall include the following constituents: Calcium, Magnesium, Sodium, Sulfate, Carbonate, Bi-Carbonate, Chloride, Total Hardness, Total Alkalinity, Total Dissolved Solids, pH, Electrical Conductivity, Boron, Iron, and Nitrate (as N). Sampling results for the Department of Health Services may be submitted to satisfy this requirement.

INFLUENT MONITORING

Representative samples of the influent shall be collected and analyzed for the constituents and at the frequencies specified below:

Parameter/Constituent	Units	Sample Type	Minimum Sampling and Analyzing Frequency
Flow Volume	MGD	Metered	Daily
Maximum Daily Flow	MGD	Metered	Monthly
Mean Daily Flow	MGD	Calculated	Monthly
BOD_5	mg/l	24 hr Composite	Quarterly (Dec., March, June, Sept.)
Total Suspended Solids	mg/l	24 hr Composite	Quarterly (Dec., March, June, Sept.)
Settleable Solids	ml/l	Grab	Quarterly (Dec., March, June, Sept.)
pH	-	Grab	Quarterly (Dec., March, June, Sept.)
Total Dissolved Solids	mg/l	24 hr composite	Annual (September)
Sodium	mg/l	24 hr composite	Annual (September)
Chloride	mg/l	24 hr composite	Annual (September)
Sulfate	mg/l	24 hr composite	Annual (September)
Boron	mg/l	24 hr composite	Annual (September)

POND MONITORING

Representative samples of wastewater contained in each treatment and disposal pond shall be collected and analyzed for the constituents and at the frequency specified below:

Constituent	Units	Sample Type	Minimum Sampling and Analyzing Frequency
pH	-	Grab*	Weekly
Dissolved Oxygen	mg/l	Grab*	Weekly

* Grab sample to be taken at one-foot depth.

EFFLUENT MONITORING

Representative samples of wastewater being discharged to the spray irrigation areas shall be collected and analyzed for the constituents and at the frequencies specified below:

Constituent	Units	Sample Type	Minimum Sampling and Analyzing Frequency
pH	-	Grab	Quarterly (Dec., March, June, Sept.)
BOD_5	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Total Suspended Solids	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Settleable Solids	ml/l	Grab	Quarterly (Dec., March, June, Sept.)
Total Dissolved Solids	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Sodium	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Chloride	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Boron	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Sulfate	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Nitrite (as N)	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Nitrate (as N)	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Total Kjeldahl Nitrogen (as N)	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Total Nitrogen (as N)	mg/l	Grab	Quarterly (Dec., March, June, Sept.)
Aluminum	mg/l	Grab	Annually (September)
Antimony	mg/l	Grab	Annually (September)
Arsenic	mg/l	Grab	Annually (September)
Barium	mg/l	Grab	Annually (September)
Berylium	mg/l	Grab	Annually (September)
Cadmium	mg/l	Grab	Annually (September)
Chromium	mg/l	Grab	Annually (September)
Copper	mg/l	Grab	Annually (September)
Cyanide	mg/l	Grab	Annually (September)
Flouride	mg/l	Grab	Annually (September)
Lead	mg/l	Grab	Annually (September)
Mercury	mg/l	Grab	Annually (September)
Nickel	mg/l	Grab	Annually (September)
Selenium	mg/l	Grab	Annually (September)
Thalium	mg/l	Grab	Annually (September)
Zinc	mg/l	Grab	Annually (September)
VOCs	mg/l	Grab	Once/5 years (September)
PCBs	mg/l	Grab	Once/5 years (September)
Pesticides	mg/l	Grab	Once/5 years (September)

SOLIDS/BIOSOLIDS MONITORING

The Discharger shall submit a summary of activities regarding solids handling with each quarterly monitoring report. Prior to biosolid removal or change in disposal practices (location, process, frequency), the Discharger shall submit all disposal information to the Executive Officer for approval. Representative samples of the biosolids to be disposed off shall be collected and analyzed for the constituents and at the frequencies specified below:

Parameter/Constituent *	Units	Sample Type	Minimum Sampling and Analyzing Frequency **
Quantity	Tons or yds^3	Measured during removal	Each load
Moisture Content	%	Grab	Prior to transport/disposal
Nitrate (as N)	mg/kg	Grab	Prior to transport/disposal
Total Phosphorus	mg/kg	Grab	Prior to transport/disposal
pH	pH units	Grab	Prior to transport/disposal
Grease & Oil	mg/kg	Grab	Prior to transport/disposal
Arsenic	mg/kg	Grab	Prior to transport/disposal
Antimony	mg/kg	Grab	Prior to transport/disposal
Barium	mg/kg	Grab	Prior to transport/disposal
Beryllium	mg/kg	Grab	Prior to transport/disposal
Boron	mg/kg	Grab	Prior to transport/disposal
Cadmium	mg/kg	Grab	Prior to transport/disposal
Cobalt	mg/kg	Grab	Prior to transport/disposal
Copper	mg/kg	Grab	Prior to transport/disposal
Chromium, VI & Total	mg/kg	Grab	Prior to transport/disposal
Lead	mg/kg	Grab	Prior to transport/disposal
Mercury	mg/kg	Grab	Prior to transport/disposal
Molybdenum	mg/kg	Grab	Prior to transport/disposal
Nickel	mg/kg	Grab	Prior to transport/disposal
Selenium	mg/kg	Grab	Prior to transport/disposal
Silver	mg/kg	Grab	Prior to transport/disposal
Thallium	mg/kg	Grab	Prior to transport/disposal
Tin	mg/kg	Grab	Prior to transport/disposal
Vanadium	mg/kg	Grab	Prior to transport/disposal
Zinc	mg/kg	Grab	Prior to transport/disposal
Pesticides	mg/kg	Grab	Prior to transport/disposal***
Organic Lead	mg/kg	Grab	Prior to transport/disposal***
PCBs	mg/kg	Grab	Prior to transport/disposal***

* Characterization required by disposal facility may be submitted in place of this list.

** If no need for sludge/biosolids removal occurs during a given year, the Discharger will have no obligation for biosolids monitoring. Reporting in this case shall explain the absence of this monitoring.

*** At least once every 5 years prior to transport or disposal.

NOT Applicable

RECEIVING WATER MONITORING

Representative samples of groundwater shall be collected from shallow wells upgradient and downgradient of disposal areas. To ascertain compliance with Waste Discharge Requirements in establishing new, or verifying existing upgradient and downgradient monitoring wells, the monitoring network shall be supported by sufficient, as determined by the Executive Officer, geologic and hydrogeologic documentation. Samples of groundwater shall be collected and analyzed for the constituents and at the frequencies specified below:

Parameter/Constituent	Units	Sample Type	Minimum Sampling and Analyzing Frequency
Depth to Groundwater	feet	Measured	Semi-Annually (March and September)
pH	-	Grab	Semi-Annually (March and September)
Total Dissolved Solids	mg/l	Grab	Semi-Annually (March and September)
Sodium	mg/l	Grab	Semi-Annually (March and September)
Chloride	mg/l	Grab	Semi-Annually (March and September)
Boron	mg/l	Grab	Semi-Annually (March and September)
Sulfate	mg/l	Grab	Semi-Annually (March and September)
Nitrite (as N)	mg/l	Grab	Semi-Annually (March and September)
Nitrate (as N)	mg/l	Grab	Semi-Annually (March and September)
Total Kjeldahl Nitrogen (as N)	mg/l	Grab	Semi-Annually (March and September)
Total Nitrogen (as N)	mg/l	Grab	Semi-Annually (March and September)

FACILITY MONITORING

The Discharger shall make at least bi-weekly inspections of the treatment and disposal systems. During the inspections, the Discharger shall note compliance status with this Order, particularly Discharge Prohibitions A.1, 2, and 3. A log of these inspections shall be maintained and a summary of observations made during the inspections shall be submitted with each quarterly monitoring report.

INFLOW/INFILTRATION MONITORING

The Discharger shall submit a summary of activities regarding its Best Management Practices for inflow/infiltration control with the annual monitoring report. The summary should address investigations into inflow/infiltration, and efforts to reduce inflow/infiltration to the City of Greenfield Wastewater Treatment Plant.

SALT MONITORING

The Discharger shall submit a summary of activities regarding its Salt Management Program with the annual monitoring report. The summary should address investigations into salt loading sources, and efforts to reduce salt loading to the City of Greenfield Wastewater Treatment Plant.

REPORTING

Monitoring reports are required quarterly, by the 30th of January, April, July, and October, and shall contain all data collected or calculated over the previous three months. Pursuant to Standard Provisions and Reporting Requirements, General Reporting Requirement C.16, an annual report is required by the 30th of January along with the 4th quarter monitoring report.

IMPLEMENTATION

This monitoring and reporting program shall be implemented immediately.

ORDERED BY Bradley E. Hagemann
FOR Executive Officer

6/5/02
Date

S:\WB\Central Watershed\WDRs\City of Greenfield\Order R3-2002-0062, MRP, 3-13-2002.doc

Appendix B

GENERAL PERMIT WDR AND MRP

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California Water Boards

Protecting California's Water

CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD

895 Aerovista Place, Suite 101
San Luis Obispo, California 93401

GENERAL WASTE DISCHARGE REQUIREMENTS
ORDER NO. R3-2020-0020

FOR
DISCHARGES FROM DOMESTIC WASTEWATER SYSTEMS WITH FLOWS GREATER THAN 100,000 GALLONS PER DAY

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

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Contents

Tables

Attachments

I. List of Frequently Used Acronyms and Abbreviations

Antidegradation Policy	State Water Board Resolution No. 68-16
Basin Plan (BP)	Water Quality Control Plan for the Central Coastal Basin
CFR	Code of Federal Regulations
CEQA	California Environmental Quality Act
CWC	California Water Code
DDW	State Water Resources Control Board, Division of Drinking Water
e.g.	Latin *exempli gratia* (for example)
General Permit	General Waste Discharge Requirements Order No. R3-2020-0020
MCL	Maximum contaminant level
mg/L	Milligrams per liter
MRP	General Monitoring and Reporting Program
N	Nitrogen
NPDES	National Pollutant Discharge Elimination System
Central Coast Water Board	Central Coast Regional Water Quality Control Board
Recycled Water Policy	State Water Board’s Policy for Water Quality Control for Recycled Water
RV	Recreational vehicle
State Water Board	State Water Resources Control Board
title 22	California Code of Regulations, title 22, division 4, chapter 3
USEPA	United States Environmental Protection Agency
WDRs	Waste Discharge Requirements
Wastewater System	Wastewater treatment and disposal system

II. Findings

The Central Coast Regional Water Quality Control Board (Central Coast Water Board) finds that:

A. Background Information

1. California Water Code section 13260(a) requires that any person discharging waste or proposing to discharge waste within any region, other than to a community sewer plant, that could affect the quality of the waters of the state, file a report of waste discharge to obtain coverage under waste discharge requirements (WDRs) or a waiver of WDRs. “Waste” is defined in California Water Code section 13050(d). A report of waste discharge is also referred to as an application.
2. Discharges to land from domestic wastewater treatment and disposal systems (Wastewater Systems) have certain common characteristics, such as similar wastes, concentrations of wastes, disposal techniques, flow ranges, and they use the same or similar treatment methods. These types of discharges are

appropriately regulated under a general waste discharge requirements permit[1]. Currently many of the Wastewater Systems in the central coast region are regulated through individual permits. Once effective, this General Waste Discharge Requirements Order No. R3-2020-0020 for Discharges from Domestic Wastewater Systems with Flows Greater than 100,000 Gallons per Day (General Permit) will allow for enrollment of domestic Wastewater Systems and reduce the need for individual permits.

3. For the purposes of this General Permit, the term "Wastewater Systems" shall mean the collection system, treatment equipment, pumping stations, treatment ponds, biological treatment systems, chemical treatment systems, clarifiers, sand/media filters, disinfection systems, recycled water systems (including distribution systems), storage ponds, land application areas, disposal ponds, and other systems associated with the collection, treatment, storage, and disposal of wastewater.

4. Wastewater Systems with monthly average flow rates[2] of more than 100,000 gallons per day that discharge to land are eligible for coverage under this General Permit. Wastewater Systems are typically located at commercial or residential subdivisions, communities, cities, and correctional facilities. An owner and/or operator of a Wastewater System(s) is referred to as a Discharger(s) in this General Permit.

5. Wastewater Systems with monthly average flow rates of 100,000 gallons per day or less may be regulated by State Water Resources Control Board (State Water Board) Order WQ 2014-0153-DWQ. Wastewater Systems regulated by Order WQ 2014-0153-DWQ may continue that coverage unless otherwise directed by the Central Coast Water Board Executive Officer.

6. Domestic wastewater treatment may include ponds (e.g., facultative, aerobic, anaerobic); constructed wetlands; aerobic treatment systems (e.g., activated sludge; sequencing batch reactors; extended aeration; membrane biological reactors, etc.); biofiltration (e.g., attached growth system, trickling filters, etc.); filtration; clarification; settling; and disinfection systems. The level to which wastewater is treated must be based upon the receiving water quality at the wastewater disposal location.

7. Disposal options for treated effluent may include land application, disposal ponds (evaporation/percolation ponds), non-potable onsite water reuse[3] or another engineered alternative approved by the Executive Officer.

8. This General Permit allows the production and onsite use of non-potable recycled water (as defined in California Water Code section 13050(n)) and requires all recycled water to comply with the applicable requirements described in California Code of Regulations, title 22, division 4, chapter 3, (title 22). Compliance with title

[1] The terms "permit" and "waste discharge requirements" are used in this document and are referring to a set of requirements for a permitted discharge of wastewater to land.
[2] See Attachment A for a definition of monthly average flow rate.
[3] Water reuse refers to water reclamation and water recycling for non-potable uses. See Attachment A.

22 water recycling criteria and title 17 sanitation requirements will be determined by the State Water Board Division of Drinking Water (DDW), who are responsible for reviewing and approving title 22 Engineering Reports. Should a recycled water producer choose to use recycled water offsite, that use is regulated under State Water Board Order WQ 2016-0068-DDW, Water Reclamation Requirements for Recycled Water Use.

9. The discussion in this General Permit of treatment, disposal, and water reuse is not intended to limit the selection of alternatives available to the wastewater system designer.

10. This General Permit implements the Water Quality Control Plan for the Central Coastal Basin (Basin Plan)[4] and therefore requires Dischargers to comply with all applicable requirements in the Basin Plan, including any prohibitions and water quality objectives, governing the discharge of treated wastewater.

11. Wastewater and treated wastewater quality vary depending upon source water quality, the activities generating the wastewater, water conservation efforts, inflow and infiltration, and treatment technology. Some examples of typical domestic wastewater and treated wastewater characteristics are presented in Table 1. Peer reviewed published wastewater books and/or United States Environmental Protection Agency (USEPA) wastewater publications may also be used to characterize wastewater characteristics. Water conservation efforts by some communities in recent years has resulted in increased wastewater strength.

Table 1: Summary of Domestic Wastewater Characteristics

Constituent	Units [1]	Typical Domestic Wastewater	Secondary Treatment Effluent
Biochemical Oxygen Demand, 5-Day	mg/L	200-488 [2] [6] [7]	30-45 [3]
Total Suspended Solids	mg/L	200-389 [2] [6]	30-45 [3]
Ammonia (as N)	mg/L	6-41 [2] [6]	0-65 [4]
Nitrite and Nitrate (as N)	mg/L	<1 [2] [6]	0-65 [4]
Total Nitrogen	mg/L	35-100 [2] [6]	5-35 [5]
Total Phosphorus	mg/L	5.6-12 [2] [6]	0-10 [5]

[1] mg/L denotes milligrams per liter
[2] Table 4-3, USEPA Wastewater Treatment/Disposal for Small Communities, Manual, September 1992, EPA/625/R-92/005.
[3] 40 CFR section 133.102.
[4] Value highly variable depending upon treatment technology.
[5] USEPA Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants. https://www.epa.gov/nutrient-policy-data/case-studies-implementing-low-cost-modifications-improve-nutrient-reduction.
[6] Tchobanoglous et. al., (2014) Wastewater Engineering Treatment Resource Recovery, Fifth Edition, Metcalf & Eddy/AECOM, McGraw-Hill Education, page 221, Table 3-18.

[4] Please refer to the current Water Quality Control Plan for the Central Coastal Basin adopted by the Central Coast Water Board. https://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/

[7] Data reported in the City of Santa Maria Wastewater Treatment Plant 2019 Annual Laboratory Report to the Central Coast Water Board.

12. Discharges from holding tanks (e.g., recreation vehicles [RV], portable toilets, airplane wastewater, etc.) may contain chemicals that can pollute water. Some commercially available products used to control holding tank/portable toilet odors may contain harmful chemicals such as formaldehyde, zinc, or phenol. The harmful chemicals can kill the bacteria in the Wastewater System and cause wastewater to be inadequately treated. Inadequately treated wastewater may cause additional problems such as disposal system failure, surfacing wastewater, and potential exposure and health risks.

13. The USEPA recommends *Escherichia coli* (E. coli) and enterococci bacteria, which exist in fecal material from humans and other warm-blooded animals, as the best indicators of health risk from water contact[5]. Because both bacteria are present in domestic wastewater, there is no need to monitor separately for them in wastewater effluent. The effectiveness of disinfection procedures is similar for both bacteria, therefore total coliform[6], which is a less expensive analysis, is appropriate to determine if wastewater effluent is effectively disinfected for bacteria. Total coliform monitoring is also required for recycled water production consistent with title 22.

14. Beneficial uses for groundwater are determined by the Central Coast Water Board and are listed in the Basin Plan. Beneficial uses for groundwater are municipal supply (MUN), industrial service supply (IND), and agricultural supply (AGR). Some beneficial uses only apply to certain geographic areas within the central coast region.

15. The Basin Plan establishes water quality objectives to protect beneficial uses. The objectives may be narrative, numerical, or both. This General Permit requires the Discharger to comply with those objectives in receiving waters.

B. Treated Wastewater Disposal

1. Treated wastewater disposal occurs by different methods. Treated wastewater is often percolated and/or evaporated from ponds and spreading basins or land applied to the ground surface by spray or drip methods. The disposal method will depend upon the amount of wastewater generated, the quality of the wastewater, land availability, site characteristics, and the receiving water.

   i. Untreated wastewater discharged to an unlined pond for treatment, storage, or disposal (e.g., percolation pond) has the potential to degrade water quality to an unacceptable extent or result in nuisance odors.

      Reducing the volume of wastewater percolated from a treatment, storage, or evaporation pond by lining the pond with a synthetic or low permeability liner

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[5] USEPA Internet page accessed June 10, 2014 http://water.epa.gov/type/rsl/monitoring/vms511.cfm

[6] *Escherichia coli* is a subset of fecal coliforms and fecal coliforms are a subset of total coliforms.

can control the percolation rate and reduce the potential threat to water quality from the percolated wastewater.

Discharging high quality, treated wastewater to an adequately designed percolation pond (e.g., adequately sized with appropriate percolation rates and sufficient separation to groundwater) will reduce the potential threat to surface water and groundwater quality from the percolated wastewater.

Overloading a wastewater pond with waste that elevates biochemical oxygen demand can result in nuisance odor generation. Source control of biochemical oxygen demand, additional pretreatment prior to discharge to the pond, or mechanical aeration of wastewater in the pond are typically used to prevent a pond from generating nuisance odors.

Burrowing animals can result in rapid failure of a containment berm and containment berms should be managed to mitigate any associated impacts.

ii. When land application of treated wastewater is selected as a disposal method, adequate acreage must be available to allow application rates that will not create nuisance conditions (e.g., vectors, nuisance odors, offsite discharge, ponding, etc.), degrade water quality, or impact public health.

Hydraulic loading of a land application area must be controlled to prevent offsite wastewater discharge and impacts to either surface or groundwater.

2. Wastewater discharged to land near a surface waterbody has the potential to impact surface water quality via runoff, surfacing effluent, or underflow to a gaining stream. The Central Coast Water Board Executive Officer may require additional monitoring to evaluate the potential for surface water degradation from discharge of treated effluent that would be incorporated into a revised monitoring and reporting program.

3. Setbacks from wastewater treatment areas, land application by spray or drip methods areas, or wastewater impoundment areas from domestic wells, water courses (perennial or ephemeral), lakes/reservoirs, wetlands, and property lines are required in this General Permit. Setbacks are included as a means of reducing potential impacts to water quality associated with wastewater. Setbacks provide attenuation of such impacts through physical, chemical, and biological processes. The setbacks required in this General Permit are based on the title 22 water recycling criteria, the California Well Standards, the California Plumbing Code, and commonly imposed setbacks by regulatory agencies.

C. Recycled Water

1. Use of recycled water in lieu of potable water is encouraged by the State Water Board. The State Water Board's Water Quality Control Policy for Recycled Water (Recycled Water Policy) states the following goals (in part):

   i. Increase the use of recycled water.

   ii. Reuse dry weather direct discharges of treated wastewater to enclosed bays, estuaries and coastal lagoons, and ocean waters that can be viably put to a beneficial use.

iii. Maximize the use of recycled water in areas where groundwater supplies are in a state of overdraft, to the extent that downstream water rights, instream flow requirements, and public trust resources are protected

2. The Recycled Water Policy calls on local water and wastewater entities together with other stakeholders who contribute salt and nutrients to a groundwater basin or sub-area, to fund and develop salt and nutrient management plans to comprehensively address all sources of salts and nutrients. The comprehensive salt and nutrient management plans should be implemented to manage salts and nutrients consistent with the Recycled Water Policy. It is the intent of the Recycled Water Policy that every groundwater basin/sub-basin in California ultimately has a salt and nutrient management plan. One way to address salt and nutrient issues is through the development of regional or sub-regional salt and nutrient management plans. Dischargers may be directed to perform or participate in salt and nutrient management plan planning activities as described in the Provisions of this General Permit.

D. Pretreatment Program for Publicly Owned Treatment Works

1. Under California Code of Regulations, title 23, section 2233, subdivision (a), WDRs for publicly owned treatment works treating or designed to treat an average dry weather flow of five million gallons per day or more of community wastewater must include provisions that the discharger must have and enforce an adequate pretreatment program approved by the appropriate regional board. A regional board may determine that it is appropriate to require a local pretreatment program for publicly owned treatment works treating or designed to treat an average dry weather flow of less than five million gallons per day. A pretreatment program is a regulatory program administered by the discharger that implements national pretreatment standards. USEPA in accordance with section 307(b) and (c) of the Clean Water Act promulgate these standards. This General Permit incorporates General Pretreatment Regulations of Codified Federal Regulation, Code of Federal Regulations, title 40, part 403, as reference.

2. Pretreatment programs are necessary for some facilities to prevent the introduction of pollutants/wastes which will interfere with the operation of the treatment works, pass through the treatment system, reduce opportunities to recycle and reuse domestic wastewater and sludge, or expose publicly owned treatment works employees to hazardous chemicals.

E. Antidegradation Analysis

1. State Water Board Resolution No. 68-16, the Statement of Policy with Respect to Maintaining High Quality of Waters in California (Antidegradation Policy) requires the following:

   i. Higher quality water will be maintained until it has been demonstrated to the state that any change will be consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of the water, and will not result in water quality less than that prescribed in the policies.

   ii. Any activity that produces a waste and discharges to existing high quality waters will be required to meet WDRs that will result in the best practicable treatment or control of the discharge necessary to ensure pollution or nuisance will not occur, and the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

2. The Antidegradation Policy requires maintenance of high quality of waters of the state unless limited degradation is consistent with the maximum benefit to the people of the state. When issuing a notice of applicability under this General Permit, the Central Coast Water Board Executive Officer must ensure that Dischargers implement best practicable treatment or control as necessary to maintain the highest water quality consistent with the maximum benefit to the people of the state.
3. This General Permit allows discharges to numerous groundwater basins/sub-areas, each with its own chemical characteristics. To the extent a discharge covered under this General Permit may be to high quality waters, this General Permit authorizes limited degradation consistent with the Antidegradation Policy as described in the findings below.
4. This General Permit authorizes discharges of domestic wastewater from Wastewater Systems, which are centralized facilities. Limited degradation of groundwater by some wastes associated with domestic wastewater effluent, after effective source control, treatment, and control measures are implemented, pursuant to this General Permit, is consistent with the maximum benefit to the people of the state because the technology, energy use, water recycling, and waste management at centralized Wastewater Systems are far more efficient than at individual wastewater systems that would otherwise be used to treat domestic wastewater. The impacts of centralized Wastewater Systems on water quality are typically less than the cumulative impacts from individual wastewater systems, which tend to be concentrated by location.
5. Wastes that have the potential to degrade groundwater include salts, nutrients, chemicals, and pathogens. In addition, excessive biochemical oxygen demand loading of treatment systems (e.g., pond systems, activated sludge systems, etc.) or land application areas may result in nuisance odors or anaerobic conditions, which are not favorable biological treatment conditions.
6. This General Permit includes effluent limitations and a process to determine how to apply these limits. Implementation of the applicable effluent limitations will result in the best practicable treatment or control for the wastewater, and corresponding monitoring requirements specified in this General Permit will ensure the best practicable treatment or control is effective and confirms that water quality will be maintained at a level that is protective of beneficial uses.
7. This General Permit also includes technology-based effluent limitations for biochemical oxygen demand and total suspended solids to create conditions that support nitrogen reduction and the protection of beneficial uses.
8. Compliance with the General Permit, the notice of applicability, DDW requirements, and any mitigation measures will ensure compliance with the Basin Plan necessary to ensure pollution or nuisance will not occur.

F. Title 27 Exemption

1. The wastewater treatment, storage, and disposal activities regulated by this General Permit are exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste* in California Code of Regulations, title 27, section 20005, et seq , which allows a conditional exemption from some or all of the provisions of title 27. The following exemptions apply:

   i. California Code of Regulations, title 27, section 20090(a), which exempts discharges of domestic sewage or treated effluent which are regulated by WDRs (e.g., this General Permit) issued pursuant to California Code of Regulations, title 23, division 3, chapter 9, or for which WDRs have been waived, and which are consistent with applicable water quality objectives, and treatment or storage facilities associated with municipal wastewater treatment plants, provided that residual sludge or solid waste from wastewater systems must be discharged only in accordance with the applicable State Water Board promulgated provisions of this division (California Code of Regulations, title 27, section 20090(a)).

   ii. California Code of Regulations, title 27, section 20090(b), which exempts discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or applied to the ground surface by spray, flood, or drip methods if the following conditions are met:

      a. The Central Coast Water Board has issued WDRs, reclamation requirements, or waived such issuance;

      b. The discharge is in compliance with the applicable water quality control plan; and

      c. The wastewater does not need to be managed according to California Code of Regulations, title 22, division 4.5, chapter 11, as a hazardous waste.

   iii. California Code of Regulations, title 27, section 20090(i), which exempts waste treatment in fully enclosed facilities, such as tanks, or in concrete lined facilities of limited areal extent, such as oil water separators designed, constructed, and operated according to American Petroleum Institute specifications.

G. California Environmental Quality Act

1. This General Permit is intended to cover both new and existing Wastewater Systems. Existing Wastewater Systems are those that were under construction or operating prior to the adoption date of this General Permit.

   i. The adoption of this General Permit for existing domestic Wastewater Systems is categorically exempt from the California Environmental Quality Act (CEQA) pursuant to California Code of Regulations, title 14, section 15301 (ongoing or existing projects), section 15302 (replacement or reconstruction of existing utility systems), and section 15303 (new construction or conversion of structures).

ii. Discharges from new domestic Wastewater Systems and expanded domestic Wastewater Systems may not be covered by this General Permit until after CEQA requirements have been satisfied. New or expanded systems are subject to further CEQA evaluation on a case-by-case basis by local agencies performing CEQA evaluations of proposed projects. The potential significant environmental impacts from discharges of domestic wastewater from new and expanded Wastewater Systems may be mitigated to less than significant impacts by compliance with this General Permit, the notice of applicability, and any mitigation measures adopted by local agencies.

H. Monitoring and Reporting Program

1. A General Monitoring and Reporting Program is included as Attachment D and includes monitoring for Wastewater Systems, water supply, influent, effluent, recreational vehicle discharge, recycled water, wastewater disposal, sludge/biosolids disposal, and groundwater. Required reporting includes electronic submittal of technical, quarterly, and annual reports.
2. The Central Coast Water Board is transitioning to using the GeoTracker database for waste discharge requirement monitoring and reporting programs. GeoTracker is the State Water Board's Internet-accessible database system used by the State Water Board, regional boards, and local agencies to track and archive compliance data from authorized or unauthorized discharges of waste to land, or unauthorized releases of hazardous substances from underground storage tanks. This system consists of a relational database, on-line compliance reporting features, a geographical information system (GIS) interface and other features that are utilized by the State Water Board, regional boards, local agencies, regulated industry, and the public to input, manage, or access compliance and regulatory tracking data.
3. California Water Code section 13267(b)(1) states:

   In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region … shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports and shall identify the evidence that supports requiring that person to provide the reports.

4. California Water Code section 13268 states:

   (a)(1) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of section 13399.2, or falsifying any information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).

   (b)(1) Civil liability may be administratively imposed by a regional board in accordance with article 2.5 (commencing with section 13323) of chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars ($1,000) for each day in which the violation occurs.

5. The technical and monitoring reports required by this General Permit, the notice of applicability, and the attached General Monitoring and Reporting Program are necessary to ensure compliance with this General Permit. The evidence supporting the need for the reports are contained in the information provided by the dischargers subject to this General Permit and in the files of the Central Coast Water Board. The burden, including costs, of providing the technical reports required by this General Permit bears a reasonable relationship to the need for the reports and the benefits to be obtained from the reports and is consistent with the best interest of the state in maintaining water quality. Prior to enrollment in this General Permit, the Central Coast Water Board will develop a facility-specific monitoring and reporting program to ensure that the burden and benefits fit the specific circumstances.
6. Failing to furnish the reports by the due date or falsifying information in the reports, are misdemeanors that may result in assessment of civil liability against the Discharger in accordance with California Water Code section 13268.
7. The Central Coast Water Board authorizes the Executive Officer to modify the attached General Monitoring and Reporting Program and to issue facility-specific monitoring and reporting programs to Dischargers tailored to the individual facility treatment and disposal systems consistent with the attached General Monitoring and Reporting Program framework and the Discharger’s notice of applicability. Facility-specific monitoring and reporting programs will ensure that the burden of the reports is reasonable.

I. Other Regulatory Requirements and Considerations

1. Dischargers that meet the criteria for coverage under State Water Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, or updated order, are required to enroll in State Water Board Order No. 2006-0003-DWQ.
2. California Water Code section 13263(a) requires the Central Coast Water Board to consider the factors in section 13241 when adopting WDRs. Consistent with California Water Code section 13241, the Central Coast Water Board, in establishing the requirements contained in this General Permit, considered factors including, but not limited to, the following:
   i. Past, present, and probable future beneficial uses of water.
   ii. Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
   iii. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
   iv. Economic considerations.
   v. The need for developing housing within the region(s).
   vi. The need to develop and use recycled water.
   vii. The need to support the human right to clean water.
   viii. The need to implement management strategies that adapt to climate change.

ix. The need to support disadvantaged communities' access to wastewater treatment and disposal.

3. Human Right to Water - California Water Code section 106.3, subdivision (a) provides that "that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitation purposes."

   Central Coast Water Board Resolution No. R3-2017-0004 recognizes the human right to water as a core value, affirms the realization of the human right to water and protecting human health as one of the Central Coast Water Board's top priorities, and also directs staff to conduct specific activities and prioritize regulatory programs to prevent and address discharges that could threaten human health by causing or contributing to pollution or contamination of drinking water sources.

   This General Permit incorporates the human right to water resolution by containing requirements that will protect the drinking water beneficial use.

4. Climate Change – This General Permit addresses the threat of climate change, sea-level rise, flooding, and fire by including provisions that require the Dischargers to assess and implement mitigation and adaptation strategies as necessary (section VI.A.3).

5. Disadvantaged Community Status – A disadvantaged community is a community with an annual median household income that is less than 80 percent of the statewide annual median household income. Data from the US Census American Community Survey Data from 2013 to 2017 identifies 12 cities and 36 Specific Census Tract or Block Group areas designated as disadvantaged communities in the central coast region. Being designated a disadvantaged community does make certain grant funds or loans accessible to these Wastewater Systems that serve these communities for the planning and implementation of actions to improve operations and upgrade the Wastewater Systems.

6. California Water Code section 13263(i) states, *the state board or regional board may prescribe general waste discharge requirements for a category of discharges if the state board or that regional board finds or determines that all the following criteria apply to the discharges in that category:*

   i. The discharges are produced by the same or similar operations.

   ii. The discharges involve the same or similar types of waste.

   iii. The discharges require the same or similar treatment standards.

   iv. The discharges are more appropriately regulated under general waste discharge requirements than individual waste discharge requirements.

   Wastewater Systems that will be regulated under this General Permit are consistent with the criteria listed above, and therefore, a General Permit is appropriate. All discharges regulated under this General Permit are produced by the same or similar operations, i.e., domestic wastewater. All discharges regulated under this General Permit consist of the same or similar types of wastes, specifically domestic wastewater, i.e., sewage, from households, commercial establishments, and industries consistent with the description of domestic wastewater treatment as defined in section II.A.6. Dischargers use similar treatment and disposal methods (e.g., screening, settling, biological/chemical treatment, clarification, and application to land through ponds, activated sludge, biofiltration, and sequencing batch reactors systems) and because the waste is similar, the discharges require the same or similar treatment standards.

Although the wastewater flows and strength of the Wastewater Systems that will be regulated under this General Permit vary in size and concentration of waste, the requirements of this General Permit are specific to the type of waste and necessary to protect water quality and associated beneficial uses. Individual WDRs are not necessary because the discharges are similar and discharge requirements would be similar if individual WDRs were issued. The variability of influent flow or concentration will be addressed in the design and operation of the Wastewater Systems such that the effluent discharged meets the limitations of the General Permit.

The discharges are more appropriately regulated under general waste discharge requirements rather than individual waste discharge requirements to ensure consistency between these similar operations, to more efficiently use the Central Coast Water Board's administrative functions because more time will be available to implement and oversee permit compliance, and to reduce administrative burdens on dischargers. Of the approximately 185 facilities that are regulated by individual permits in the central coast region, more than 40 facilities treat domestic wastewater with flows greater than 100,000 gallons per day. This General Permit regulating these higher flow domestic wastewater discharges is an effective way to update the waste discharge requirements for more than 40 facilities in the central coast region, while simultaneously creating permitting efficiency by decreasing the number of permits requiring development and regular updating.

7. The biochemical oxygen demand and total suspended solids effluent limitations contained in this General Permit are technology-based. USEPA has developed technology-based effluent limits for secondary treatment for use in National Pollutant Discharge Elimination System (NPDES) permits. However, pond treatment systems often cannot comply with the limits that apply to activated sludge treatment systems due to algae growth in the pond. In response, USEPA developed an equivalent to secondary treatment definition for alternative biological treatment technologies such as a trickling filter or wastewater treatment pond (Code of Federal Regulations, title 40, section 133.105). Although this General Permit only authorizes discharges to land, some of the secondary treatment standards are appropriate to demonstrate that wastewater is adequately treated.
8. Discharge to the waters of the state is a privilege, not a right, and authorization to discharge is conditional upon the discharges complying with provisions of division 7 of the California Water Code and any more stringent effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance.
9. This General Permit does not preempt or supersede the authority of municipalities, flood control agencies, or other local agencies to prohibit, restrict, or control discharges of waste subject to their jurisdiction.

10. To avoid multiple permits simultaneously imposing similar requirements on the same discharge, when a Wastewater System currently regulated by an individual permit enrolls in this General Permit, the existing individual permit is terminated upon issuance of a notice of applicability.

J. Public Participation

1. On February 12, 2020, the Central Coast Water Board held a public outreach meeting with Dischargers and interested persons to discuss the proposed development of a waste discharge requirement permit for the discharge of domestic wastewater with monthly average flow rates of greater than 100,000 gallons per day and solicited comments for consideration during the proposed General Permit development.
2. On June 18, 2020, the Central Coast Water Board notified facilities that currently have WDRs for domestic wastewater with design flows greater than 100,000 gallons per day and other interested persons of its intent to issue a general waste discharge requirements permit for the discharge of domestic wastewater flows of greater than 100,000 gallons per day and provided them with a copy of the proposed General Permit. The Central Coast Water Board has also provided them with an opportunity to submit written comments.
3. During the comment period, Central Coast Water Board staff held four public outreach meetings (on June 25, June 30, July 8, and July 15, 2020) using a virtual platform to facilitate interested persons' review of the draft General Permit. Central Coast Water Board staff presented key components of the draft General Permit and answered questions.
4. After the comment period, Central Coast Water Board staff held a public outreach meeting on September 14, 2020 using a virtual platform to facilitate interested persons' review of changes made to the draft General Permit in response to public comment. Central Coast Water Board staff presented key components of the draft General Permit and answered questions.
5. The Central Coast Water Board, in a public hearing held on September 25, 2020, has heard and considered all comments pertaining to the proposed discharge.
6. After considering all comments pertaining to this General Permit during a public hearing on September 25, 2020, this General Permit was found consistent with the above findings.
7. Any person aggrieved by this action of the Central Coast Water Board may petition the State Water Board to review the action in accordance with California Water Code section 13320 and title 23 California Code of Regulations sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., within 30 calendar days of the date of adoption of this General Permit at the following address, except that if the thirtieth day following the date of this General Permit falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day:

   State Water Resources Control Board
   Office of Chief Counsel

P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

Or by email at waterqualitypetitions@waterboards.ca.gov

For instructions on how to file a petition for review, see http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

K. Application Process (Applicable to New and Existing Wastewater Systems)

1. Dischargers seeking enrollment in this General Permit must submit an application (also referred to as a report of waste discharge) to the Central Coast Water Board. The application process is summarized in Attachment B. The Central Coast Water Board has procedures for electronic submittal of application documents. An application consists of:

   i. A completed Form 200, which is available at: http://www.waterboards.ca.gov/publications_forms/forms/docs/form200.pdf

   ii. An application fee that serves as the first annual fee. Fees are charged annually and are based on threat and complexity ratings, and the treatment technology employed. Threat and complexity ratings are defined in the fee schedule listed in California Code of Regulations, title 23, section 2200 and available at: https://www.waterboards.ca.gov/resources/fees/

   iii. A technical report that describes the wastewater generation, treatment, storage, and disposal. See Attachment C Permit Application Format.

2. Upon review of the application, Central Coast Water Board staff will determine if coverage under this General Permit is appropriate. The Central Coast Water Board Executive Officer will issue a notice of applicability when coverage under this General Permit has been authorized. The notice of applicability will contain the necessary site-specific monitoring and reporting requirements.

3. Although a Discharger may be eligible for coverage under this General Permit, the Central Coast Water Board Executive Officer may determine that the discharge would be better regulated by a waiver of WDRs, individual WDRs, or different general WDRs.

IT IS HEREBY ORDERED that upon adoption of this General Permit, pursuant to California Water Code sections 13263, 13267, and 13523, the Discharger, its agents, successors, and assigns, to meet the provisions contained in division 7 of the California Water Code and regulations adopted hereunder, must comply with the requirements in this General Permit. It is further ordered that where a Wastewater System discharge is currently regulated by an individual permit, that permit is terminated upon the enrollment of the Wastewater System into this General Permit.

III. Prohibitions

The following actions are prohibited:

1. The direct or indirect discharge of any wastewater to surface waters or surface water drainage courses. [CWC]

2. Discharge of untreated or partially treated wastewater. [CWC]

3. The treatment, storage, and/or disposal of waste in or at the Wastewater System that may cause or contribute to a condition of pollution, contamination, or nuisance as defined in California Water Code section 13050. [CWC]
4. The discharge of wastewater other than treated domestic[7] wastewater.
5. Bypass or overflow of treated or untreated waste.
6. The discharge of waste to land not owned, operated, or controlled[8] by the Discharger.
7. Discharge to any areas other than those designated in the notice of applicability.
8. The discharge of waste classified as hazardous (California Code of Regulations, title 23, section 2521(a)), or designated (California Water Code, section 13173). [CWC]
9. The Discharger's use of agricultural chemicals inconsistent with product labeling, storage instructions, or California Department of Pesticide Regulation requirements for pesticide[9] applications.
10. The discharge of waste in violation of, or not consistent with, the Basin Plan.
11. A physical connection between a recycled water system and a potable water system.
12. The production of recycled water in a manner different than described in the DDW conditionally accepted title 22 Engineering Report.
13. Transportation of undisinfected recycled water within a pipeline designated for the transport of disinfected tertiary treated recycled water. [DDW]
14. The production of recycled water for direct human consumption, indirect human consumption, or for processing of food or drink intended for human consumption. [DDW]
15. The use of equipment used to convey recycled water (e.g., tanks, piping, valves) also used for potable water supply.
16. The discharge of waste in concentrations which are toxic to human, animal, aquatic, or plant life.
17. Cause a statistically significant increase of mineral concentrations in underlying groundwater, as determined by comparison of samples collected from wells located upgradient and downgradient of the disposal area.
18. Cause groundwater to contain taste or odor producing substances in concentrations that adversely affect beneficial uses. [BP]
19. Cause groundwater to exhibit an instantaneous pH of less than 6.5 or greater than 8.4. [BP]

[7] See Attachment A.
[8] By property ownership or permanent easement.
[9] See Attachment A.

20. Cause nitrate as nitrogen concentrations in underlying groundwater to exceed 10 mg/L, total nitrogen to exceed Basin Plan water quality objectives, or background concentrations, whichever is less.
21. Cause groundwater to contain concentrations of chemical substances or its by-products in amounts that adversely affect any designated beneficial uses. [BP]
22. Cause groundwater to contain concentrations of:
    i. Organic chemicals more than the maximum contaminant levels (MCLs) for primary drinking water standards specified in California Code of Regulations, title 22, division 4, chapter 15, article 5.5, section 64444, Table 64444-A.
    ii. Inorganic chemicals more than the maximum contaminant levels for primary drinking water standards specified in California Code of Regulations, title 22, division 4, chapter 15, article 4, section 64431, Table 64431-A.
    iii. Inorganic chemicals (optimal fluoride levels) more than the maximum contaminant levels for primary drinking water standards specified in California Code of Regulations, title 22, division 4, chapter 15, article 4.1, section 64433.2, Table 64433.2-A.
    iv. Radionuclides more than the limits specified in California Code of Regulations, title 22, division 4, chapter 15, article 5, section 64443, Table 64443.

    This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. [BP]
23. Cause groundwater to contain concentrations of chemicals in amounts that adversely affect the agriculture beneficial use provided in Tables 3-1 and 3-2 of the Basin Plan. [BP]

IV. Specifications

A. All Wastewater Systems

1. The permitted flow rate of wastewater discharged to the headworks must be greater than or equal to 100,000 gallons per day as a monthly average. Headworks are defined as the facilities where wastewater enters a wastewater treatment plant. Headworks may include bar screens, comminutors, a wet well, and pumps.
2. Treatment and disposal of wastewater and sludge/solids/biosolids must demonstrate best practicable treatment or control for domestic wastewater. Best practicable treatment or control must be demonstrated by compliance with all the following:
    i. Compliance with this General Permit.
    ii. Compliance with the notice of applicability, which will specify the following (at a minimum):
        a. Wastewater System-specific flow or volume limit(s).
        b. Treatment and disposal methods provided in this General Permit.
        c. Disposal locations.

d. Applicable effluent limitations as described in this General Permit.

e. For Wastewater Systems that produce recycled water, requirements for operation of the Wastewater Systems and disinfection requirements specified in DDW's conditionally accepted title 22 Engineering Report.

f. Water quality related mitigation measures from an approved site-specific CEQA document addressing the Wastewater System (if one is prepared[10]).

iii. Approved technical reports required by this General Permit.

3. The siting, design, construction, operation, maintenance, and monitoring of the Wastewater System must comply with the requirements of the notice of applicability, the Basin Plan, and this General Permit.

4. Public contact with wastewater/recycled water must be precluded through use of fences, signs, and/or other appropriate means.

5. Technical reports required as part of the application must be stamped by a California licensed or credentialed professional.[11]

6. For new or expanding Wastewater Systems within or nearby the boundaries of a centralized wastewater district or regional service area, the Discharger must demonstrate a good faith effort to connect to the centralized system and provide evidence that connection to the system was not approved.

7. The Central Coast Water Board Executive Officer may require additional investigations or monitoring to demonstrate beneficial uses of water are protected.

8. Owners and/or operators of a Wastewater System that accepts wastes from RVs or other waste systems that utilize holding tanks (e.g., portable toilets, airplane wastewater, etc.) must ensure that such wastes do not deleteriously affect the wastewater system and adversely affect beneficial uses of groundwater with holding tank additives that may contain, among other chemicals, formaldehyde, zinc, or phenol. Use of holding tank chemicals must be discouraged by the Wastewater System owner/operator.

9. Once any of the following plans (see section VII.A and the General Monitoring and Reporting Program) is approved, no material changes can be made without approval by the Central Coast Water Board Executive Officer. The Discharger must notify the Central Coast Water Board in writing at least 90 days in advance of any proposed material change in any of the plans.

   i. Pretreatment Program Plan.

   ii. Operations and Maintenance Manual.

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[10] Discharges from new domestic Wastewater Systems and expanded domestic Wastewater Systems may not be covered by this General Permit until after CEQA requirements have been satisfied.

[11] For example, Professional Engineer or Registered Environmental Health Specialist, etc. performing work pursuant to their area of expertise.

iii. Climate Change Adaptation Plan.

iv. Salt and Nutrient Management Plan.

10. The Discharger must comply with the setbacks described in Table 2 unless an approved variance is obtained from the Central Coast Water Board Executive Officer. Setbacks provided in this General Permit are the distances of wastewater treatment areas, land application by spray or drip methods areas, or wastewater impoundment areas from domestic wells, water courses (perennial or ephemeral), lakes/reservoirs, wetlands, and property lines.

Some existing Wastewater Systems may not comply with the setbacks provided herein. The Central Coast Water Board Executive Officer may choose to enroll such existing, noncomplying Wastewater Systems in this General Permit after approving a variance.

For new or expanded facilities where a Wastewater System will not comply with the setbacks included in the General Permit, these systems will need further evaluation of the setbacks and approval of a variance by the Central Coast Water Board Executive Officer is required.

In some cases, more than one setback standard exists. For all existing, expanded, or new Wastewater Systems, the following procedures must be implemented when determining the appropriate setback.

i. When the setback requirement comes from title 22, approval of a variance must be obtained from both DDW and the Central Coast Water Board Executive Officer.

ii. When the setback comes from the California Well Standards, a reduced setback may be allowed based on site-specific conditions with approval from the Central Coast Water Board Executive Officer.

iii. When the setback comes from the Basin Plan, the Central Coast Water Board Executive Officer may allow a reduced setback based upon site-specific conditions.

iv. When the setback comes from the California Plumbing Code, the Central Coast Water Board Executive Officer may not approve a reduced setback.

Approval of a variance for setbacks that are not referenced to a requirement listed above will be based on professional judgment and may be revised by the Central Coast Water Board Executive Officer based on site-specific conditions.

Table 2: Summary of Wastewater System Setbacks [1]

Equipment or Activity	Domestic Well	Flowing Water Course [2]	Ephemeral Water Course [3]	Property Line	Lake, Wetland, or Reservoir [5]
Treatment System or Collection System [6]	100 [12] 50 [4]	50 [4]	50	5 [4]	200 [17] 50 [4]

Equipment or Activity	Domestic Well	Flowing Water Course [2]	Ephemeral Water Course [3]	Property Line	Lake, Wetland, or Reservoir [5]
LAND APPLICATION BY SPRAY OR DRIP METHODS					
Land Application Area (disinfected tertiary recycled water) [7] [10] [19]	50 [11]	25	50	25	200
Land Application Area (disinfected secondary-2.2 or secondary-23 recycled water) [8]	100 [14]	50	50	Spray - 100 [18] Drip - 50 [13]	200
Land Application Area (undisinfected secondary recycled water [9], undisinfected secondary treated wastewater)	150 [15]	100	100	Spray - 100 [18] Drip - 50 [13]	200
WASTEWATER IMPOUNDMENT (TREATMENT PONDS, STORAGE PONDS, DISPOSAL PONDS[20] AND LAND APPLICATION BY CONTROLLED FLOOD METHODS)					
Impoundment (disinfected tertiary recycled water) [7]	100 [16]	100	100	50	200
Impoundment (disinfected secondary-2.2 or secondary-23 recycled water) [8]	100 [14]	100	100	50	200
Impoundment (undisinfected secondary recycled water [9], undisinfected secondary treated wastewater)	150 [15]	150	150	50	200

[1] All units are in feet
[2] A flowing water course must be measured from the ordinary high-water mark established by fluctuations of water elevation and indicated by characteristics such as shelving, changes in soil character, vegetation type, presence of litter or debris, or other appropriate means.
[3] Ephemeral water course denotes a surface water drainage feature that flows only after rain or snowmelt and does not have enough groundwater seepage (baseflow) to maintain a condition of flowing surface water. The drainage must be measured from a line that defines the limit of the ordinary high-water mark (described in “a” above). Irrigation canals are not considered ephemeral drainage features. The ephemeral water course must be a “losing stream” (discharging surface water to groundwater) at the proposed Wastewater System site.
[4] Setback established by California Plumbing Code, Table K-1.
[5] Lake, wetland, or reservoir boundary measured from the high-water line.
[6] Treatment system (includes all parts of the Wastewater System and piping) and collection system addresses equipment located below ground or that impedes leak detection by routine visual inspection.
[7] Disinfected tertiary recycled water is defined in California Code of Regulations, title 22, section 60301.230.

[8] Disinfected secondary-2.2 recycled water is defined in California Code of Regulations, title 22, section 60301.220. Disinfected secondary-23 recycled water is defined in California Code of Regulations, title 22, section 60301.225.
[9] Undisinfected secondary recycled water is defined in California Code of Regulations, title 22, section 60301.900.
[10] Additional restrictions for spray irrigation of recycled water are contained in California Code of Regulations, title 22, section 60310(f).
[11] Setback established by California Code of Regulations, title 22, section 60310(a). A reduced setback is allowed as described in California Code of Regulations, title 22, section 60310(a) if all the conditions in the section are met and compliance is documented in the application and notice of applicability.
[12] California Well Standards, part II, section 8. Site-specific conditions may allow reduced setback or require an increased setback. See discussion in Well Standards.
[13] Setback for drip or flood application methods. Spray irrigation is subject to additional setbacks and restrictions (see footnote [10]).
[14] Setback established by California Code of Regulations, title 22, section 60310(c).
[15] Setback established by California Code of Regulations, title 22, section 60310(d).
[16] Setback established by California Code of Regulations, title 22, section 60310(b).
[17] Setback established by the Onsite Wastewater Treatment System Policy, section 7.5.5.
[18] Setback established by California Code of Regulations, title 22, section 60310(f).
[19] No spray irrigation of any recycled water, other than disinfected tertiary recycled water, shall take place within 100 feet of a residence or a place where public exposure could be similar to that of a park, playground, or school yard.
[20] Disposal ponds include evaporation and percolation ponds.

B. Pond Systems (Treatment, Storage, and Disposal)

1. All treatment, storage, and evaporation ponds must be lined[12] to protect groundwater and associated beneficial uses. Existing wastewater treatment, storage, or evaporation ponds constructed prior to the adoption date of this General Permit where the type of existing lining systems is unknown must be evaluated by a California licensed Professional Engineer or Professional Geologist for permeability and a report submitted to the Central Coast Water Board for Executive Officer approval within **one year** of the date of enrollment in this General Permit (issuance of the notice of applicability).

   Existing wastewater treatment, storage, or evaporation ponds, that do not have permeability of less than 1×10^{-6} centimeters per second constructed prior to the adoption date of this General Permit, must be evaluated by a California licensed Professional Engineer or Professional Geologist for permeability and a report submitted to the Central Coast Water Board for Executive Officer approval within **one year** of the date of enrollment in this General Permit. The Central Coast Water Board Executive Officer may require these ponds to be lined on a case by case basis depending on the threat to water quality.

2. Two feet of freeboard must always be maintained in ponds to provide adequate storage capacity and prevent wastewater spills. Freeboard must be measured vertically from the lowest elevation of the pond berm to the pond water surface.

[12] Liner must have a permeability of less than 1×10^{-6} centimeters per second and may be constructed with synthetic materials, two feet of low permeable soils, or another engineered alternative. Discharger must provide documentation for Central Coast Water Board Executive Officer approval to confirm that a treatment, storage, or evaporation pond is sufficiently impermeable to prevent discharges of untreated or partially treated wastewater.

Wastewater ponds must contain permanent markers indicating depth and freeboard. If freeboard is less than two feet,[13] the Discharger must immediately implement the contingency plan contained in the spill prevention and emergency response plan.[14]

3. Pond systems must have capacity to accommodate wastewater, design seasonal precipitation, ancillary inflow and infiltration, and wind driven waves. Design seasonal precipitation must be based on the following precipitation criteria:

   i. If wastewater spills occur (e.g., breaches in the pond walls, flows spilling over the pond walls, etc.) at existing pond systems, the Central Coast Water Board Executive Officer may require pond upgrades consistent with the size specification defined below (section IV.B.3.ii).

   ii. For new or expanded pond systems, seasonal precipitation used in the pond sizing water balance calculations must be based on the following:

      a. The 100-year return annual total precipitation value distributed monthly in accordance with average (mean) precipitation values. The calculations must demonstrate adequate capacity to maintain two feet of freeboard in the pond(s).

      b. The Central Coast Water Board Executive Officer may allow a lower standard for the return annual total precipitation value, with approval of a technical report describing how operation of the Wastewater System will not result in wastewater spills. If the Discharger seeks relief from the 100-year return annual total precipitation value, the Discharger must certify that the spill prevention and emergency response plan is adequate to respond to forecast conditions using the 100-year return annual total precipitation value distributed monthly in accordance with average (mean) precipitation values. The calculations must demonstrate adequate capacity to maintain two feet of freeboard in the pond(s).

4. All ponds must be managed to control breeding of mosquitoes including, but not limited to, the following:

   i. An erosion control program must be implemented to ensure that small coves and irregularities are not created around the perimeter of the water surface of the pond(s).

   ii. Weeds must be minimized through control of water depth, a shoreline synthetic liner, harvesting, or other suitable measures.

   iii. Vegetation and debris must be removed from the water surface.

   iv. Coordination with the local mosquito abatement or vector control district to supplement the measures described above in cases where other methods are infeasible.

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[13] Reference – Tchobanoglous, George (1979) “Wastewater Engineering: Treatment, Disposal, Reuse,” Metcalf & Eddy, Inc.
[14] See section VI.A.2.iv.

5. A dissolved oxygen concentration of 1.0 mg/L must be maintained in the upper one foot of wastewater ponds to prevent nuisance odors.
6. Burrowing animals active in areas that may compromise the integrity of pond containment must be promptly controlled and repairs to the containment completed as soon as possible.
7. Prior to any removal, drying, treatment, or disposal of sludge for pond maintenance, the Discharger must implement and comply with the Central Coast Water Board Executive Officer approved sludge management plan.
8. Constructed ponds must be graded to prevent the accumulation of stormwater runoff into the pond.

C. Land Application by Spray or Drip Methods

1. Wastewater must not be applied to a land application area within 24 hours of forecasted precipitation with a greater than 50-percent probability of occurring, during precipitation events, or when the land application area surface soil is saturated.
2. Spray irrigation with treated wastewater is prohibited when wind speed (including gusts) exceeds 10 miles per hour. Wind speed may be measured onsite or at a nearby weather station operated by a governmental organization. If the Discharger's land application areas are isolated from receptors, the Discharger may request Executive Officer approval to spray irrigate when wind speeds exceed 10 miles per hour.
3. Land application of treated wastewater must be managed to prevent ponding, runoff, and erosion.
4. Discharge of wastewater (e.g., surface flow, spray drift, etc.) from a land application area is prohibited.
5. If undisinfected wastewater is applied to a land application area, stormwater runoff from the land application area is prohibited.
6. If stormwater can run off from a land application area (during the time of year wastewater is not applied), all applied wastewater must meet disinfection requirements at a level equivalent to disinfected secondary-23 recycled water (California Code of Regulations, title 22, section 60301.225). Land application of more highly treated water is acceptable. Alternatively, a Discharger may submit a technical report, for Central Coast Water Board Executive Officer approval, describing how the land application area will be operated to prevent pathogens from migrating off the land application area with stormwater.
7. Land application areas must be managed to control breeding of mosquitoes including, but not limited to the following:
   i. There must be no standing water 48 hours after application of wastewater.
   ii. Low-pressure and unpressurized pipelines and ditches accessible to mosquitoes must not be used to store wastewater or recycled water.

iii. The Discharger must coordinate with the local mosquito abatement or vector control district to supplement the measures described above in cases where other methods are infeasible.

D. Land Application by Controlled Flood Methods

The following requirements apply to areas where land application occurs by controlled flood methods (e.g., Spreading Basins, Rapid Infiltration Beds, etc.).

1. Two feet of freeboard must always be maintained in bermed flood areas to provide adequate storage capacity and prevent wastewater spills. Freeboard must be measured vertically from the lowest elevation of the berm to the water surface.
2. Controlled flood areas must have capacity to accommodate wastewater, design seasonal precipitation, ancillary inflow and infiltration, and wind driven waves. Design seasonal precipitation must be based on the following precipitation criteria:
   i. If wastewater spills occur (e.g., breaches in berms, flows spilling over the berms, etc.) at existing controlled flood areas, the Central Coast Water Board Executive Officer may require upgrades consistent with the size specification defined in section IV.B.3.ii.

   ii. For new or expanded controlled flood areas, seasonal precipitation used in the sizing water balance calculations must be based on the following:

      a. The 100-year return annual total precipitation value distributed monthly in accordance with average (mean) precipitation values. The calculations must demonstrate adequate capacity to maintain two feet of freeboard in the bermed flood area(s).

      b. The Central Coast Water Board Executive Officer may allow a lower standard for the return annual total precipitation value, with approval of a technical report describing how operation of the Wastewater System will not result in wastewater spills. If the Discharger seeks relief from the 100-year return annual total precipitation value, the Discharger must certify that the spill prevention and emergency response plan is adequate to respond to forecast conditions using the 100-year return annual total precipitation value distributed monthly in accordance with average (mean) precipitation values. The calculations must demonstrate adequate capacity to maintain two feet of freeboard in the bermed flood area(s).
3. Controlled flood areas must be managed to control breeding of mosquitoes including, but not limited to, the following:
   i. An erosion control program must be implemented to ensure that small coves and irregularities are not created around the perimeter of the bermed flood area (s).

   ii. Weeds must be minimized through control of water depth, harvesting, or other suitable measures.

   iii. Vegetation and debris must be removed from the water surface.

   iv. Coordination with the local mosquito abatement or vector control district to supplement the measures described above in cases where other methods are infeasible.

4. Burrowing animals active in areas that may compromise the integrity of controlled flood containment must be promptly controlled and repairs to the containment/berms completed as soon as possible.
5. Constructed flood area(s) must be graded to prevent the accumulation of stormwater runoff into the controlled flood area(s).

E. Sludge/Solids/Biosolids Disposal

1. Sludge and solid waste must be removed from screens, sumps, tanks, and ponds as needed to ensure optimal plant operation.
2. Treatment and storage of sludge/biosolids must be confined to the Wastewater System property and must be conducted in a manner that precludes runoff or infiltration of waste into soil.
3. Any storage of residual sludge, solid waste, or biosolids at the Wastewater System must be temporary, and the waste must be controlled and contained in a manner that minimizes leachate formation and precludes runoff or infiltration of waste into soils and groundwater.
4. Residual sludge and solid waste must be disposed of in a manner approved by the Central Coast Water Board Executive Officer and consistent with the Consolidated Requirements for Treatment, Storage, Processing, or Disposal of Solid Waste (California Code of Regulations, title 27 division 2). Removal for further treatment, disposal, or reuse at disposal sites operated in accordance with valid WDRs issued by the State Water Board or Central Coast Water Board will satisfy this specification.
5. Use and disposal of biosolids must comply with the USEPA Part 503 Biosolids Rule (Code of Federal Regulations, title 40, part 503).
6. Dischargers that meet the criteria for coverage under State Water Board Order No. 2004-0012-DWQ, General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities, are required to enroll in State Water Board Order No. 2004-0012-DWQ.
7. Modifications to an approved sludge management plan deemed part of an emergency action must be noticed to the Central Coast Water Board Executive Officer within **five-days** of disposal with a rationale for the emergency modification.

F. Pretreatment Specifications

1. These Pretreatment Specifications apply to:
   i. Dischargers that own or operate publicly owned treatment works[15] treating or designed to treat an average dry weather flow of 5 million gallons per day or more of community wastewater.
   ii. Wastewater Systems that the Central Coast Water Board Executive Officer has determined a pretreatment program is necessary to prevent the

[15] Publicly owned treatment works is defined in Code of Federal Regulations, title 40, part 403.3.

introduction of pollutants/wastes which will interfere with the operation of the treatment works, pass through the treatment system, reduce opportunities to recycle and reuse domestic wastewater and sludge, or expose Wastewater System employees to hazardous chemicals.

2. The Discharger must:

   i. Submit a Pretreatment Program Plan to the Central Coast Water Board for Executive Officer review and approval. This plan must provide a clear, long-term plan for addressing the pretreatment requirements contained in Code of Federal Regulations, title 40, part 403. The Pretreatment Program Plan must be maintained at the wastewater treatment facility and must be presented to the Central Coast Water Board staff upon request or as required by the notice of applicability.

   ii. Comply with the pretreatment requirements contained in Code of Federal Regulations, title 40, part 403. The Discharger must implement and enforce its pretreatment program. The Discharger's pretreatment program is hereby made an enforceable condition of this General Permit. The Central Coast Water Board may initiate enforcement action against an industrial user for noncompliance with applicable standards and requirements as provided in the Clean Water Act. [CFR]

   iii. Enforce the requirements promulgated under section 307(b), 307(c), 307(d), and 402(b) of the Clean Water Act. The Discharger must cause industrial users subject to Federal Categorical Standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of its discharge. [CFR]

   iv. Perform the pretreatment functions as required in Code of Federal Regulations, title 40, part 403.8(f), including but not limited to:

      a. Implement the necessary legal authorities as provided in Code of Federal Regulations, title 40, part 103.8(f)(1);

      b. Enforce the pretreatment requirements under Code of Federal Regulations, title 40, parts 403.5 and 403.6;

      c. Implement the programmatic functions as provided in Code of Federal Regulations, title 40, part 403.8(f)(2); and

      d. Provide the requisite funding and personnel to implement the pretreatment program as provided in Code of Federal Regulations, title 40, part 403.8(f)(3) CFR.

V. Limitations

A. Effluent Limitations

This General Permit establishes effluent limitations consistent with USEPA secondary treatment standards, the Basin Plan, and title 22 requirements (if title 22 is applicable).

For any Wastewater System regulated by this General Permit that is not able to achieve immediate compliance with the effluent limitations (as specified in Table 3 through 7 of this General Permit), that Discharger must comply with interim effluent limitations specified in their notice of applicability, which will be based on the effluent limitations specified in their preexisting individual waste discharge requirements (individual permit). These interim effluent limitations will remain in effect for a maximum of 24 months after the date of issuance of the notice of applicability.

Where a Discharger believes that additional time (more than 24 months) is needed to achieve compliance with the effluent limitations (as specified in Table 3 through 7 of this General Permit), that Discharger must request a time schedule order pursuant to Water Code section 13300 for consideration by the Central Coast Water Board no later than 12 months after the date of issuance of the notice of applicability. The request for a time schedule order must be submitted as set forth in section VI.A.5.

Central Coast Water Board staff will identify the applicable Wastewater System specific effluent limitations and corresponding monitoring requirements for a Wastewater System in the notice of applicability.

The parameters used within this General Permit to determine Wastewater System specific effluent limitations includes, but is not limited to:

1. Treatment Technology: In the application, the Discharger must identify the treatment technology used at the Wastewater System. The Discharger is required to comply with the applicable secondary treatment effluent limitations specified in Tables 3, 4, and 5.
2. Underlying Groundwater Basin/Sub-Area: In the application, the Discharger must identify the groundwater basin/sub-area that underlies the Wastewater System disposal area and is required to proceed with one of the two options presented below.
    i. <u>Option 1</u>: The Discharger complies with effluent limitations specified in Table 6 (for wastewater disposal overlying designated groundwater basins[16]) or Table 7 (for wastewater disposal overlying non-designated groundwater basins[17]). The Discharger must demonstrate within 24 months of issuance of the notice of applicability that the quality of effluent discharged from the Wastewater System meets effluent limitations specified in Table 6 or Table 7. If the Discharger is unable to comply with the effluent limitations within 24 months, the Discharger may be required to implement the groundwater monitoring program as described in Option 2. Even if the Discharger chooses Option 1, the Central Coast Water Board Executive Officer may require groundwater monitoring to ensure protection of beneficial uses.

    Designated Groundwater Basin - If the Wastewater System discharges treated wastewater or non-potable treated recycled water to a designated basin, use effluent limitations in Table 6.

    Non-Designated Groundwater Basin - If the Wastewater System discharges treated wastewater or non-potable treated recycled water into a non-designated groundwater basin use effluent limitations in Table 7.

[16] See Attachment A for definition of designated groundwater basin.
[17] See Attachment A for definition of non-designated groundwater basin.

If a Wastewater System overlies a non-designated groundwater basin, the Discharger may request Executive Officer approval to use the effluent limitations established for an adjacent designated groundwater basin (Table 6).

ii. Option 2: The Discharger does not comply with the effluent limitations specified in Table 6 or Table 7. The Discharger will be required to implement a groundwater monitoring program to demonstrate compliance with the water quality objectives specified in the Basin Plan.

3. Reclamation of Non-Potable Treated Wastewater: In the application, the Discharger must disclose whether they are a non-potable recycled water producer. If treated non-potable recycled water from the Wastewater System is discharged to land for the purposes of reuse, the Discharger must comply with the effluent limitations specified in Table 8. The requirements established in the DDW conditionally accepted title 22 Engineering Report and DDW conditional acceptance letter for the Wastewater System also apply. If the effluent limitations or requirements established in the conditionally accepted title 22 Engineering Report for the Wastewater System cannot be met, the Central Coast Water Board reserves the right to:

   i. Not permit the proposed discharge to land until effluent limitations can be achieved with proposed source control or treatment design, or

   ii. Require the Discharger to provide supplemental technical report(s) (e.g., modeling); conduct additional monitoring (i.e., groundwater monitoring, etc.); or implement best management practices (i.e., wastewater disposal management plan, etc.) to confirm compliance with conditions and requirements of this General Permit, to avoid unreasonably affecting present and anticipated beneficial uses, and to ensure that any change to water quality will be consistent with the maximum benefit of the people of the State.

Table 3: Secondary Treatment Effluent Limitations - Treatment Ponds [13]

Constituent	Units	30-Day Average	7-Day Average	Sample Maximum
Biochemical Oxygen Demand, 5-Day	mg/L[1] [2]	45 [6]	65 [6]	Not Applicable
Total Suspended Solids	mg/L	45 [6]	65 [6]	Not Applicable
Settleable Solids	mL/L [3]	0.3	Not Applicable	0.5
pH	Not Applicable	between 6.5 and 8.4 [4]	Not Applicable	Not Applicable

See notes after Table 8.

Table 4: Secondary Treatment Effluent Limitations - Trickling Filters [13]

Constituent	Units	30-Day Average	7-Day Average	Sample Maximum
Biochemical Oxygen Demand, 5-Day	mg/L	30 [6] [7]	45 [6] [7]	Not Applicable
Total Suspended Solids	mg/L	30 [6] [7]	45 [6] [7]	Not Applicable
Settleable Solids	mL/L	0.3	Not Applicable	0.5
pH	Not Applicable	between 6.5 and 8.4 [4]	Not Applicable	Not Applicable

See notes after Table 8.

Table 5: Secondary Treatment Effluent Limitations - Activated Sludge, Membrane Biological Reactor, Sequencing Batch Reactor, or Similar Systems

Constituent	Units	30-Day Average	7-Day Average	Sample Maximum
Biochemical Oxygen Demand, 5-Day	mg/L	30 [6] [7]	45 [6] [7]	Not Applicable
Total Suspended Solids	mg/L	30 [6] [7]	45 [6] [7]	Not Applicable
Settleable Solids	mL/L	0.1	0.3	0.5
pH	Not Applicable	between 6.5 and 8.4 [4]	Not Applicable	Not Applicable

See notes after Table 8.

Table 6: Effluent Limitations for Designated Groundwater Basins[4] [11], 25-Month Rolling Median in mg/L

Basin/Sub-Area	Total Dissolved Solids	Chloride	Sulfate	Boron	Sodium	Total Nitrogen[14] [15]
Big Basin						
Near Felton	100	20	10	0.2	10	10
Near Boulder Creek	250	30	50	0.2	20	10
Pajaro Valley						
Hollister	1,200	150	250	1.0	200	10
Tres Pinos	1,000	150	250	1.0	150	10
Llagas	300	20	50	0.2	20	10

Basin/Sub-Area	Total Dissolved Solids	Chloride	Sulfate	Boron	Sodium	Total Nitrogen[14] [15]
Salinas Valley						
Upper Valley	600	150	150	0.5	70	10
Upper Forebay	800	100	250	0.5	100	10
Lower Forebay	1,500	250	850	0.5	150	10
180-foot Aquifer	1,500	250	600	0.5	250	10
400-foot Aquifer	400	50	100	0.2	50	10
Paso Robles Area						
Central Basin	400	60	45	0.3	80	10
San Miguel	750	100	175	0.5	105	10
Paso Robles	1,050	270	200	2.0	225	10
Templeton	730	100	120	0.3	75	10
Atascadero	550	70	85	0.3	65	10
Estrella	925	130	240	0.75	170	10
Shandon	1,390	430	1,025	2.8	730	10
Estero Bay						
Santa Rosa	700	100	80	0.2	50	10
Chorro	1,000	250	100	0.2	50	10
San Luis Obispo	900	200	100	0.2	50	10
Arroyo Grande	800	100	200	0.2	50	10
Santa Maria River Valley						
Upper Guadalupe	1,000	165	500	0.5	230	10
Lower Guadalupe	1,000	85	500	0.2	90	10
Lower Nipomo Mesa	710	95	250	0.15	90	10
Orcutt	740	65	300	0.1	65	10
Santa Maria	1,000	90	510	0.2	105	10
Cuyama Valley	1,500	80	250	0.4	250	10
San Antonio Creek Valley	600	150	150	0.2	100	10
Santa Ynez River Valley						

Basin/Sub-Area	Total Dissolved Solids	Chloride	Sulfate	Boron	Sodium	Total Nitrogen[14] [15]
Santa Ynez	600	50	10	0.5	20	10
Santa Rita	1,500	150	700	0.5	100	10
Lompoc Plain	1,250	250	500	0.5	250	10
Lompoc Upland	600	150	100	0.5	100	10
Lompoc Terrace	750	210	100	0.3	130	10
South Coast						
Goleta	1,000	150	250	0.2	150	10
Santa Barbara	700	50	150	0.2	100	10
Carpinteria	700	100	150	0.2	100	10

See notes after Table 8.

Table 7: Effluent Limitations for Non-Designated Groundwater Basins

Constituent	Units	25-Month Rolling Median	Sample Maximum
Total Dissolved Solids	mg/L	500 [8]	1,000 [8]
Chloride	mg/L	250 [8]	500 [8]
Sulfate	mg/L	250 [8]	500 [10]
Boron	mg/L	0.5 [4] [9]	Not Applicable
Sodium	mg/L	250 [8]	Not Applicable
Total Nitrogen [14] [15]	mg/L	10 [11]	Not Applicable

See notes after Table 8.

Table 8: Effluent Limitations for Non-Potable Recycled Water Producers - All Wastewater Systems

Constituent	Unit	Regulatory Limitations
Total Coliform	MPN/100 mL [5]	title 22 [12]
Turbidity	NTU	title 22 [12]
Chlorine residual	mg/L	title 22 [12]
Other constituents or operational requirements identified in a title 22 Engineering Report	Not Applicable	title 22 [12]

[1] mg denotes milligrams.
[2] L denotes liter.
[3] mL denotes milliliters.
[4] Basin Plan. For pH, the effluent limitation values shown are a range, not an average or maximum.
[5] MPN denotes most probable number.
[6] USEPA Office of Wastewater Management, Water Permits Division, State and Regional Branch, EPA-833-K-10-001, September 2010.
[7] USEPA, Code of Federal Regulations, title 40, part 133.102, Secondary Treatment Standards, Technology-Based Effluent Limits.

[8] California Division of Drinking Water secondary MCL. California Code of Regulations, Title 22 Division 4. Environmental Health Chapter 15. Domestic Water Quality and Monitoring Regulations Article 16. Secondary Drinking Water Standards.
[9] Water Quality for Agriculture, published by the Food and Agriculture Organization of the United Nations in 1985, contains criteria protective of various agricultural uses of water, including irrigation of various types of crops and stock watering.
[10] USEPA primary MCL.
[11] California Division of Drinking Water primary MCL.
[12] As specified in State Water Board's Division of Drinking Water title 22 conditional acceptance letter. Disinfection methods will vary between plants. Some customization of this table will occur in the notice of applicability based on the title 22 conditional acceptance letter.
[13] To be eligible for discharge limitations based on equivalent to secondary standards, a Wastewater System must meet all three criteria as specified in Code of Federal Regulations, section 133.105. An applicant must provide an analysis documenting that their Wastewater System meets all three criteria.
[14] If a Discharger can demonstrate nitrogen loading associated with discharge to a land application area is reduced through agronomic uptake, the Central Coast Water Board Executive Officer may approve an adjustment to the nitrogen effluent limits.
[15] Total nitrogen is the sum of total inorganic nitrogen (nitrate + nitrite + ammonium + ammonia) and organic nitrogen.

B. Organic Loading Limitations

If a Wastewater System land applies treated wastewater or treated non-potable recycled water, organic loading limitations listed in Table 9 apply. For operational and management requirements refer to sections IV.C and IV.D.

Table 9: Organic Loading Rate Limitations

Constituent	Units	30-Day Average	Maximum
Biochemical Oxygen Demand, 5-Day	pounds/acre/day	100	300

C. Groundwater Limitations

The discharge shall not cause the underlying groundwater to exceed the water quality objectives set forth in the Basin Plan.

VI. Provisions

A. Technical Report Requirements

The Discharger must submit the following technical reports in accordance with the schedule specified in the General Monitoring and Reporting Program. The General Monitoring and Reporting Program prescribes the details on the required components of each plan. The Discharger must implement each required plan in accordance with a Central Coast Water Board Executive Officer approved schedule.

1. **Pretreatment Program Plan -** If directed by the Central Coast Water Board Executive Officer, the Discharger must submit a Pretreatment Program Plan to the Central Coast Water Board for Executive Officer review and approval. See section IV.F.2.i.

2. **Operations and Maintenance Manual** -The Discharger must submit a written Operations and Maintenance Manual for Central Coast Water Board Executive Officer review and approval. The Operations and Maintenance Manual must be maintained at the wastewater treatment facility and must be presented to Central Coast Water Board staff upon request. In addition to the required components

specified in the attached Standard Provisions and Reporting Requirements for Waste Discharge Requirements dated December 5, 2013 (Standard Provisions) A.12 and A.28, the Operations and Maintenance Manual must contain the following components:

i. **Sampling and Analysis Plan -** The sampling and analysis plan must be sufficient to ensure compliance with the terms of this General Permit and the notice of applicability. If the Central Coast Water Board issues a revised monitoring and reporting program, the Discharger must update the sampling and analysis plan as needed to comply with the revised monitoring and reporting program.

ii. **Sludge Management Plan -** The sludge management plan must be sufficient to ensure compliance with the terms of this General Permit and the notice of applicability.

iii. **Wastewater Disposal Management Plan -** The wastewater disposal management plan must be sufficient to ensure compliance with the terms of this General Permit and the notice of applicability.

iv. **Spill Prevention and Emergency Response Plan -** The spill prevention and emergency response plan must be sufficient to ensure compliance with the terms of this General Permit and the notice of applicability. The spill prevention and emergency response plan must describe operation and maintenance activities to prevent accidental releases of wastewater and to effectively respond to such releases and minimize the environmental impact.

3. **Climate Change Adaptation Plan -** The Discharger must submit a Climate Change Adaptation Plan[18] to the Central Coast Water Board Executive Officer for review and approval. The Climate Change Adaptation Plan must describe the Discharger's long-term approach for identifying and addressing climate change hazards and vulnerabilities for their Wastewater System, including all associated infrastructure (e.g., treatment facilities, conveyances to discharge points, and discharge facilities). The Climate Change Adaptation Plan must be maintained at the wastewater treatment facility.

   i. **Recycled Water Feasibility Plan –** For Dischargers with Wastewater System design flows over 1,000,000 gallons per day, the Climate Change Adaptation Plan must contain a recycled water feasibility plan for the production and reuse of non-potable recycled wastewater.

4. **Salt and Nutrient Management Plan -** If directed by the Central Coast Water Board Executive Officer, a Discharger must prepare and submit a salt and nutrient management plan, to ensure that the overall impact of treated wastewater and/or water recycling projects does not degrade groundwater resources.

   The Central Coast Water Board Executive Officer may direct the development and implementation of a salt and nutrient management plan when one of following occurs:

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[18] In place of a static document, the Discharger may develop a living document and/or set of tools that fulfills the components outlined in section VI.A.3.

i. Non-potable recycled water is produced. It is the intent of the Recycled Water Policy that every groundwater basin/sub-basin in California has a salt and nutrient management plan.

ii. If a Discharger does not treat the wastewater to the effluent limitations specified in Table 6 or Table 7.

iii. Effluent/groundwater data from a Wastewater System demonstrates negative impacts or trends towards negative impacts to groundwater from a discharge.

iv. Central Coast Water Board learns of a current or past discharge that has/had the potential to negatively impact groundwater or surface water.

5. **Time Schedule Order Request –** If the Discharger requests a time schedule order as allowed by section V.A, a Discharger must prepare and submit for Central Coast Water Board Executive Officer review and approval a time schedule compliance plan to revise its operations and upgrade the Wastewater System as necessary to achieve compliance with effluent limitations in this General Permit. The revised operation practices and/or upgrades must be designed to ensure compliance with General Permit limitations and other requirements, improve consistency of effluent quality, improve the performance of current Wastewater System operations, and provide redundancy, as appropriate, for some existing operations.

B. General Provisions for All Wastewater Systems:

1. The Discharger must comply with all items of Standard Provisions and any updates to the Standard Provisions adopted by the Central Coast Water Board, unless exempted in writing by the Central Coast Water Board Executive Officer. The Central Coast Water Board will provide the Discharger notice of proposed updates to the Standard Provisions in accordance with procedures for public participation. A copy of the 2013 Standard Provisions currently in effect is available electronically at the following link and is Attachment E of this General Permit:

   https://www.waterboards.ca.gov/centralcoast/board_decisions/docs/wdr_standard_provisions_2013.pdf

2. The Discharger must ensure that all site operating personnel are familiar with the contents of the Wastewater System notice of applicability, this General Permit, the General Monitoring and Reporting Program, the Operations and Maintenance Manual, and the conditionally accepted title 22 Engineering Report (for non-potable recycled water production and onsite use when applicable). The Discharger must at a minimum document training provided to all new site operating personnel and refresher training annually to ensure they meet this requirement. A copy of this General Permit, the notice of applicability, and technical reports required by this General Permit must be kept at the wastewater treatment facility for reference by operating personnel.

3. The Discharger must operate and maintain all Wastewater Systems in accordance with an Operations and Maintenance Manual for the Wastewater System that is subject to the approval of the Central Coast Water Board Executive Officer. The Operations and Maintenance Manual, including expected performance criteria, a process flow diagram, and a copy of as-built plans, must be kept onsite and

periodically updated whenever there is a change in operational procedures or an expansion of the system. See Standard Provisions A.12 and A.28 and the General Monitoring and Reporting Program for additional requirements of the Operations and Maintenance Manual.

4. The Discharger must maintain in good working order, and operate as efficiently as possible, any Wastewater System, control system, or monitoring device installed to achieve compliance with this General Permit and the notice of applicability.
5. The Discharger must take all reasonable steps to minimize any adverse impact to waters of the state resulting from noncompliance with this General Permit.
6. Access to the Wastewater System must be limited to authorized persons.
7. This General Permit does not relieve the Discharger from responsibility to obtain other necessary local, state, or federal permits to construct Wastewater Systems necessary for compliance with this General Permit, nor does this General Permit prevent imposition of additional standards, requirements, or conditions by any other agency.
8. The prohibitions, specifications, limitations, and provisions of this General Permit are severable. If any provision of this General Permit is held invalid, the remainder of this General Permit shall not be affected.
9. The Discharger must take all reasonable steps to prevent any discharge in violation of this General Permit.
10. The Central Coast Water Board will review this General Permit periodically and will revise requirements when necessary.
11. Before making a material change in the character, location, or volume of discharge, the Discharger must notify the Central Coast Water Board Executive Officer. A material change includes, but is not limited to, any of the following:
    i. A change in area or depth used for waste disposal beyond that specified in the notice of applicability.
    ii. A significant change in disposal method, location, or volume (e.g., change from land application by spray or drip method to percolation pond or increase in flow).
12. The Central Coast Water Board Executive Officer may require that updated permit application documents be submitted.
13. Wastewater System repairs and expansions must be made in accordance with the conditions of this General Permit, the notice of applicability, and the California Water Code.
14. At least **90 days** prior to termination or expiration of any lease, contract, or agreement involving disposal or recycling areas or offsite reuse of effluent, used to justify the capacity authorized herein and ensure compliance with this General Permit, the Discharger must notify the Central Coast Water Board Executive Officer in writing of the situation and of what measures have been taken or are being taken to ensure full compliance with this General Permit and the notice of applicability.

15. Except for material determined to be confidential in accordance with California law, all reports prepared in accordance with terms of this General Permit will be available for public inspection by the Central Coast Water Board. Data on waste discharges, water quality, geology, and hydrogeology are not confidential.
16. For any electrically operated equipment at the Wastewater System, the failure of which would cause loss of control or containment of waste materials, or violation of this General Permit, the Discharger must employ safeguards to prevent loss of control over wastes. Such safeguards may include alternate power sources, standby generators, retention capacity, operating procedures, or other means.
17. In the event of any change in control or ownership of the Wastewater System or wastewater disposal areas, the Discharger must notify the succeeding owner or operator of the existence of this General Permit by letter, a copy of which must be immediately forwarded to the Central Coast Water Board Executive Officer.
18. The Discharger must pay an annual fee to the State Water Board in accordance with the fee schedule for each fiscal year (California Code of Regulations, title 23, section 2200). Fees are based on threat to water quality and complexity ratings, which will be determined based on information in the permit application and are subject to revision by the State Water Board. Annual invoices are issued by the State Water Board for the state fiscal year (July 1 to June 30).

C. General Reporting Requirements:

1. The Discharger must report electronically via email and through the State Water Board's GeoTracker database or as otherwise specified in the General Monitoring and Reporting Program.
2. If the Discharger does not comply, or will be unable to comply, with a limit related to pond freeboard, flow rate, the conditionally accepted title 22 Engineering Report requirements, or has bypass or overflow, the Discharger must notify Central Coast Water Board staff by telephone. Current phone numbers for Central Coast Water Board offices may be found on the notice of applicability or on the Internet at:

   https://www.waterboards.ca.gov/centralcoast/

   Notification must occur as soon as the Discharger or its agents have knowledge of such noncompliance or potential for noncompliance, and the Discharger must confirm this notification in writing within five days. The written notification must state the date, time, nature, cause of noncompliance, immediate response action, and schedule for corrective actions.
3. In the event of a wastewater containment failure, the Discharger must immediately notify California Office of Emergency Services. Notification must be provided as soon as possible and when the notice can be provided without substantially impeding cleanup or other emergency measures (California Water Code, section 13271). A written report to the Central Coast Water Board Executive Officer must be submitted within 10 days of the failure describing the cause of the failure and how a recurrence will be prevented. Such a failure must be promptly corrected in accordance with the requirements of this General Permit.
4. Notification requirements for the delivery of off-specification recycled water:

i. In the event the Discharger of non-potable recycled water does not comply with the recycling specifications in section V.A.3, the Discharger must immediately notify, via telephone and email, the Central Coast Water Board and the applicable DDW District office. Within two weeks of the noncompliance, the Discharger must submit a written follow-up report to the Central Coast Water Board Executive Officer and DDW District Engineer, including pertinent information explaining reasons for the noncompliance and steps being taken to prevent the problems from recurring.

ii. In the event the Discharger delivers recycled water not meeting the Uniform Statewide Recycling Criteria specification, the Discharger must immediately notify, via telephone and email, all enrollees of the State Water Board's Water Reclamation Requirements for Recycled Water Use (Order WQ 2016-0068-DDW) with potential to have received recycled water from the Wastewater System.

5. All reports submitted in response to this General Permit, including monitoring reports, must be signed in accordance with Standard Provisions section C.14 (Attachment E) using the current transmittal document provided by Central Coast Water Board staff. In addition:

   i. For an LLC, all reports must be signed by an LLC member or manager given signing authority by the operating agreement of the LLC if the wastewater discharge will occur on property owned by an LLC.

   ii. To be considered a duly authorized representative, all the following must be completed:

      a. The authorization is made in writing by a person described above or in Standard Provisions.

      b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated Wastewater System or activity, such as the position of plant manager, operator of a waste management unit, superintendent, or position of equivalent responsibility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

      c. The written authorization is submitted to the Central Coast Water Board.

6. All reports/documents and laboratory data must be submitted electronically as specified in the General Monitoring and Reporting Program and notice of applicability.

D. Monitoring Requirements

The Discharger must comply with the monitoring and reporting program issued with the notice of applicability, and any future revisions, as specified by the Central Coast Water Board Executive Officer. A General Monitoring and Reporting Program is provided as Attachment D.

VII. Enforcement

A. Violations

Violations of these General Permit requirements may result in enforcement actions as authorized under the California Water Code.

B. Technical and Monitoring Reports

All technical and monitoring reports submitted pursuant to this General Permit are required pursuant to section 13267 of the California Water Code. Failure to submit reports in accordance with schedules established by this General Permit or attachments to this General Permit, or failure to submit a report of sufficient technical quality to be acceptable to the Central Coast Water Board Executive Officer, may subject the Discharger to enforcement action pursuant to section 13268 of the California Water Code.

VIII. Effective Date of the General Permit

This General Permit takes effect upon Central Coast Water Board adoption.

I, Matthew T. Keeling, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of the General Permit adopted by the California Regional Water Quality Control Board, Central Coast Region on September 25, 2020.

Matthew T. Keeling
Executive Officer

ECM Subject Name = General WDRs for Large Domestic WWTP, Permit No. R3-2020-0020
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ATTACHMENT A
DEFINITIONS

7-day average
Calculated as the average concentration of the results for the last seven calendar days. If only one sample is collected within a seven-day period, then that one sample becomes the seven-day average value.

25-month rolling median
The median is the value separating the higher half from the lower half of a data sample. For a data set, it may be thought of as the "middle" value. A 25-month rolling median is determined by using the most recent twenty-five months of data.[19]

30-day average
The arithmetic mean of measurements recorded during a calendar month. If only one sample is collected in a calendar month, then that sample measurement is the 30-day average concentration.

Beneficial uses
The uses of water protected against degradation, such as: domestic, municipal, agricultural and industrial supply; hydropower generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or groundwater after Nov. 28, 1975 and potential beneficial uses are uses that would develop in the future through control measures.

Biosolids
Sludge that has undergone enough treatment and testing to qualify for reuse pursuant to the USEPA Part 503 Biosolids Rule (Code of Federal Regulations, title 40, part 503).

Constituents of emerging concern
Chemicals in personal care products; pharmaceuticals including antibiotics; antimicrobials; industrial, agricultural, and household chemicals; hormones; food additives; transformation products; inorganic constituents; and nanomaterials.

Constituent
An informal term used to describe a detectable element or component or attribute of waste or effluent.

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[19] Steps for determining the 25-month rolling median:

a. Order 25-months of data from least to greatest. Put the smallest value first and arranging the values so that each following value is greater than the previous one.
b. Find the middle number.
    - If there is an odd number of values, locate the middle number. This is the median.
    - If there is an even number of values, find the two middle numbers. Average of the two middle numbers. This is the median.

Contaminant
Any physical, chemical, biological, or radiological substance or matter in air, water, or soil.

Day
The mean solar day of 24 hours beginning at mean midnight. All references to "day" in this General Permit are calendar days.

Designated groundwater basin
Designated groundwater basins are identified in Table 3-6 of the Basin Plan. Designated groundwater basins have basin-specific water quality objectives and water quality objectives associated with groundwater beneficial uses (municipal supply [MUN], industrial service supply [IND], and agricultural supply [AGR]).

Disposal ponds
Disposal ponds Include percolation and evaporation ponds.

Domestic wastewater
Wastewater from households, commercial establishments, and industries. Combined sewer/separate storm overflows are included in this category.

Flow weighted sample
A sample collected at varying time intervals (average interval one hour or less) so that each sample represents an equal portion of the cumulative flow. The duration of the sampling period will be specified in the monitoring and reporting program.

Impoundment
Impoundment refers to treatment ponds, storage ponds, disposal ponds, and land application by controlled flood methods.

Indirect potable reuse
Indirect potable reuse of treated wastewater use an environmental buffer, such as a lake, river, or a groundwater aquifer, before the water is treated at a drinking water treatment plant.

Land application area
The areas where wastewater is applied to land by spray, drip, or controlled flood methods. Ponds are not considered land application areas.

Monthly average flow rate
The total discharge to the headworks by volume during a calendar month divided by the number of days in the month that the wastewater system was discharging. This number must be reported in gallons per day or million gallons per day.

Non-Designated groundwater basin
Non-designated groundwater basins are not identified in Table 3-6 of the Basin Plan. Non-Designated groundwater basins have water quality objectives associated with groundwater beneficial uses (municipal supply [MUN], industrial service supply [IND], and agricultural supply [AGR]).

Pesticide
Any substance intended to control, destroy, repel, or otherwise mitigate a pest. The term pesticide is inclusive of all pest and disease management products, including insecticides, herbicides, fungicides, nematicides, rodenticides, algicides, etc.

Recycled water
Water that is used more than one time before it passes back into the natural hydrologic system and is suitable for a beneficial use.

Sample maximum
The highest measurement recorded for any grab or composite sample collected during a day in a calendar month.

Secondary treatment
USEPA establishes secondary treatment standards for publicly owned treatment works (POTWs), which are minimum, technology-based requirements for municipal wastewater treatment plants. These standards are reflected in terms of five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS) removal, and pH.

Sludge
The solid, semisolid, and liquid residues removed during primary, secondary, or other wastewater treatment processes. Residual sludge is sludge that will not be subject to further treatment at the Wastewater System.

Solid waste
Solid waste is the grit and screenings generated during preliminary treatment.

Spreading basin/ Rapid infiltration beds
Controlled flood methods used for wastewater disposal.

Time-weighted sample
A sample collected at equal time intervals, with a maximum interval of one hour.

Title 22 Engineering Report
Report that describes how a project will comply with the Water Recycling Criteria contained in California Code of Regulations, title 22, sections 60301 through 60355, inclusive and compliance with title 17 for cross connection control.

Wastewater system
Refers to the collection system, treatment equipment, pumping stations, treatment ponds, biological treatment systems, chemical treatment systems, clarifiers, sand/media filters, disinfection systems, recycled water systems (including distribution systems), storage ponds, land application areas, disposal ponds, and other systems associated with the collection, treatment, storage, and disposal of wastewater.

ATTACHMENT B
PERMIT APPLICATION PROCESS SUMMARY

The Discharger must complete the following steps:

Step 1: Feasibility Analysis:

- Evaluate the feasibility of connecting the discharge to a regional collection system.
- If it isn't feasible to connect to regional system, prepare a conceptual wastewater plan and go to Step 2.

Step 2: Set up a Meeting with Central Coast Water Board Staff to Discuss the Following:

- Conceptual wastewater plan including wastewater plan for characterization, treatment, and disposal.
- Water balance precipitation value.
- Threat and complexity/application fee.
- Is a title 22 Engineering Report needed?
- Is groundwater monitoring needed?
- Is the Sanitary Sewer System General Permit applicable?
- What level of operator certification may be required?
- California Environmental Quality Act status.
- Application and monitoring report procedures.

Step 3: Submit Permit Application that Includes:

- Completed application (also referred to as a report of waste discharge) and Form 200 or notice of intent.
- Application fee payment.
- Technical report (prepared consistent with the guidance in Attachment C, or as directed by Central Coast Water Board staff).
- Title 22 Engineering Report (if recycling).

Step 4: Central Coast Water Board Permit Application Review:

- If the application is complete, a notice of applicability will be prepared.
- If the application is incomplete, Central Coast Water Board staff will notify the Discharger.

Step 5: Notice of Applicability for Enrollment in the General Permit Issued:

- The notice of applicability authorizes the wastewater discharge consistent with the General Permit, additional requirements included in the notice of applicability, and conditionally accepted title 22 Engineering Report (if applicable).
- The notice of applicability will specify compliance criteria, monitoring requirements, and reporting requirements. Electronic reporting will be required.

ATTACHMENT C
PERMIT APPLICATION FORMAT

The information presented in the permit application (also referred to as a report of waste discharge) is relied upon by staff to prepare the notice of applicability for coverage by this General Permit for Discharges from Domestic Wastewater Systems with monthly average flow rates greater than 100,000 gallons per day in the central coast region. The Discharger must ensure that the information presented in the application is accurate. Misstatements, errors, or omissions that exist in the application may be included in the notice of applicability and become enforceable.

Waste discharge requirement permits are generally updated at 10 or 15-year intervals depending on the waste's potential to impact water quality. The application must state realistic growth projections. Underestimating growth may result in additional or more frequent permitting requirements. Overestimating growth will result in the need for the Discharger to prepare more treatment, storage, and disposal capacity than might otherwise be immediately required.

Dischargers must submit an application that is consistent with the application format and instructions provided on the Central Coast Water Board webpage:

https://www.waterboards.ca.gov/centralcoast/water_issues/programs/wastewater_permitting/

CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD

**GENERAL MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2020-0020
FOR
DISCHARGES FROM DOMESTIC WASTEWATER SYSTEMS
WITH FLOWS GREATER THAN 100,000 GALLONS PER DAY**

This General Monitoring and Reporting Program (MRP) applies to the monitoring and reporting requirements for wastewater treatment and disposal systems (Wastewater Systems) enrolled in General Waste Discharge Requirements Order No. R3-2020-0020 for Discharges from Domestic Wastewater Systems with Flows Greater than 100,000 Gallons per Day (General Permit).

The Discharger owns and operates a Wastewater System that is subject to the General Permit and notice of applicability. Dischargers must not implement any changes to this MRP unless and until a revised MRP is issued by the Central Coast Regional Water Quality Control Board (Central Coast Water Board) Executive Officer.

This MRP is a template covering multiple treatment and disposal scenarios and it will be specifically tailored to each individual Discharger's Wastewater System based on information provided in the Discharger's application (e.g., monitoring requirements that are not relevant will be removed). The Wastewater System specific MRP will be issued to the Discharger as part of the notice of applicability.

The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards are transitioning to the use of the publicly accessible State Water Board's GeoTracker database for the tracking of environmental and regulatory data for sites that operate under waste discharge requirements. The MRP directs Dischargers to submit reports (both technical and monitoring reports) and analytical data electronically via email and to the State Water Board's GeoTracker database (see section VII.D below).

I. SAMPLING AND ANALYSIS

Dischargers must collect representative samples in accordance with the most recently approved sampling and analysis plan contained in the Operations and Maintenance Manual and validate analytical results prior to submittal to the Central Coast Water Board. All samples (e.g., wastewater, groundwater, soil, sludge, etc.) must be representative of the volume and nature of the discharge or matrix of materials sampled.

All samples must be collected by a qualified person, trained in proper procedures for collecting the samples. The name of the sampler, sample type (grab or composite), time, date, location, bottle/container type, and any preservative used for each sample must be recorded on the sample chain of custody form. The chain of custody form must also contain all custody information including date, time, and to whom samples were relinquished. If composite samples are collected, the basis for sampling (time or flow weighted) must be included in the sampling and analysis plan contained in the Operations and Maintenance Manual for Central Coast Water Board Executive Officer review and approval.

Unless otherwise specified below, sampling must be performed as follows:

Table 1 – Sampling Schedule

Monitoring Period	Sample Collection Time
Quarterly	January, April, July, and October
Semiannual	April and October
Annual	October

Field test instruments (such as those used to test pH, dissolved oxygen, and electrical conductivity, etc.) may be used if they are used by a State Water Board Environmental Laboratory Accreditation Program accredited laboratory, or:

1. The user is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated prior to monitoring events at the frequency recommended by the manufacturer;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are maintained and available for at least three years.

II. WATER SUPPLY MONITORING

Representative samples of the Discharger’s raw water supply (sampled before use or treatment) must be collected and analyzed, at a minimum, for constituents specified in Table 2.

In lieu of the required water supply sampling, the Discharger may request Central Coast Water Board Executive Officer approval to submit a Well Identification Number and the reporting year’s consumer confidence report (annual water quality report or drinking water quality report), as required by the State Water Board Division of Drinking Water and/or county, provided, at a minimum, all of the required constituents are sampled at the frequency specified in Table 2. The Discharger must report the results of any constituent monitored more frequently than is required by the monitoring program shown in Table 2. The Discharger must also report detectable concentrations (above the reporting limit) for any other constituent that has a published maximum contaminant level (MCL).

The Discharger must evaluate and provide a tabular summary of the water supply data with the annual monitoring report.

Table 2 – Water Supply Monitoring

Constituent	Units[1]	Sample Type	Sampling Frequency[2]
Nitrate (as N)	mg/L	Grab	Annually
Total Dissolved Solids	mg/L	Grab	Annually
Chloride	mg/L	Grab	Annually
Sodium	mg/L	Grab	Annually
Sulfate	mg/L	Grab	Annually
Boron	mg/L	Grab	Annually
Carbonate	mg/L	Grab	Annually
Bicarbonate	mg/L	Grab	Annually
Calcium	mg/L	Grab	Annually
Potassium	mg/L	Grab	Annually
Magnesium	mg/L	Grab	Annually

[1] mg/L denotes milligrams per liter

[2] If the Discharger does not manage the raw water supply (sampled before use or treatment), the Discharger shall consult with their water purveyor(s) to ensure the water supply is sampled consistent with Table 2. If the water purveyor(s) sample the raw water supply for a different sampling suite or at a different frequency than what is required in Table 2, the Central Coast Water Board Executive Officer, in coordination with the Discharger at the time of enrollment, may consider the development of a site-specific sampling plan (e.g., modifications to the sampling suite, sampling frequency, and/or sampling schedule, etc.).

III. INFLUENT AND EFFLUENT MONITORING

A. **Monitoring Location Descriptions –** All samples including influent samples (IS), effluent samples (ES), water supply well samples (WSW), etc. must be collected at the locations described in the Central Coast Water Board Executive Officer approved sampling and analysis plan. The Discharger must upload the GeoTracker field point information for each sampling location in the GeoTracker database (see Table A and Table 12).

B. **Influent and Effluent Flow Monitoring –** The Discharger must monitor and report flow in gallons per day, as described in Table 3.

Table 3 – Influent and Effluent Flow Monitoring

		INFLUENT	INFLUENT	EFFLUENT	EFFLUENT
Parameter	Units	Sample Type	Reporting Frequency	Sample Type	Reporting Frequency
Daily Flow [1]	Gallons per day	Metered	Daily	Metered/Estimated [2]	Daily

		INFLUENT	INFLUENT	EFFLUENT	EFFLUENT
Parameter	**Units**	**Sample Type**	**Reporting Frequency**	**Sample Type**	**Reporting Frequency**
Maximum (Peak) Daily Flow	Gallons per day	Metered	Monthly	Metered/Estimated [2]	Monthly
Mean Daily Flow	Gallons per day	Calculated	Monthly	Calculated	Monthly

[1] The General Permit notice of applicability will specify the Wastewater System's permitted flow. In the monitoring reports, the Discharger must evaluate and provide a comparison of monitored flow to the permitted flow.

[2] If the flow is estimated, the Discharger is required to provide an explanation (e.g., no meter-estimated using pump operations including rate and time, etc.) with each monitoring report.

C. Influent and Effluent Constituent Monitoring by Wastewater System Type – Representative samples of the Discharger's influent (raw wastewater) into the Wastewater System and effluent (treated wastewater) discharged to land must be collected and analyzed in accordance with the treatment technology-based monitoring requirements (including sample type and frequency) summarized in the tables below.

The Discharger is required to identify the appropriate section related to the treatment technology implemented at their permitted Wastewater System and comply with the monitoring requirements specified in the tables specific to the treatment technology. Please contact Central Coast Water Board staff if you are not certain which monitoring requirements apply.

1. Pond System Monitoring

i. Required Pond Monitoring – All wastewater treatment and treated wastewater storage/disposal ponds (lined and unlined) must be monitored as specified below:

Table 4A – Wastewater Treatment/Storage/Disposal Pond Monitoring

Parameter/ Constituent	Units[1]	Sample Type	Sampling/Monitoring Frequency
Freeboard	0.1 feet	Measured	Weekly
Odors	Not Applicable	Observation	Weekly
Dissolved Oxygen (In pond)	mg/L	Grab	Monthly
Berm condition	Not Applicable	Observation	Monthly
Sludge Depth	0.1 feet	Measured	Annually
Precipitation	inches/day and date	Measured [2]	Each precipitation event

[1] mg/L denotes milligrams per liter

[2] The Discharger may use a rain gauge or use a National Oceanic and Atmospheric Administration or the United States Geological Survey rain station, such as http://scacis.rcc-acis.org/.

ii. **Influent and Effluent Monitoring –** At a minimum, influent and effluent constituent monitoring for pond treatment systems must consist of the following:

Table 4B – Influent and Effluent Monitoring for Pond Treatment Systems

		INFLUENT (IS)	INFLUENT (IS)	EFFLUENT (ES)	EFFLUENT (ES)
Parameter/ Constituent	**Units [1]**	**Sample Type**	**Sampling Frequency**	**Sample Type**	**Sampling Frequency**
pH	units	Grab	Weekly	Grab	Weekly
Biochemical Oxygen Demand, 5-Day	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Total Suspended Solids	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Settleable Solids	mg/L	Not Applicable	Not Applicable	Grab	Weekly
Total Nitrogen[2]	mg/L	Calculated	Quarterly	Calculated	Quarterly
Nitrate (as N)	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Nitrite (as N)	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Total Kjeldahl Nitrogen (as N)	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Ammonia (as N)	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Total Dissolved Solids	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Chloride	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Sodium	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Sulfate	mg/L	24-hour composite	Quarterly	Grab	Quarterly
Boron	mg/L	Not Applicable	Not Applicable	Grab	Quarterly
Carbonate	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Bicarbonate	mg/L	Not Applicable	Not Applicable	Grab	Semiannually

		INFLUENT (IS)	INFLUENT (IS)	EFFLUENT (ES)	EFFLUENT (ES)
Parameter/ Constituent	**Units [1]**	**Sample Type**	**Sampling Frequency**	**Sample Type**	**Sampling Frequency**
Calcium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Potassium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Magnesium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually

[1] mg/L denotes milligrams per liter
[2] Total nitrogen is the sum of total inorganic nitrogen (nitrate + nitrite + ammonium + ammonia) and organic nitrogen.

iii. **Effluent Monitoring –** Pond treatment system wastewater effluent monitoring for select constituents is required if the Wastewater System receives wastewater with significant amount of fats, oil, grease, phenol, formaldehyde, or zinc.

Types of waste streams that could contribute fats, oil, grease, phenol, formaldehyde, or zinc to a Wastewater System might include flows from oil pressing/bottling, meat processing, holding tanks (e.g., recreational vehicles, portable toilets, airplane wastewater), etc.

Table 4C – Effluent Monitoring for Select Constituents for Pond Treatment Systems

Parameter/ Constituent	Units	Sample Type	Sampling Frequency
Oil & Grease	mg/L[1]	Grab	Quarterly
Phenol	µg/L[2]	Grab	Quarterly
Formaldehyde	µg/L	Grab	Quarterly
Zinc	mg/L	Grab	Quarterly

[1] mg/L denotes milligrams per liter
[2] µg/L denotes micrograms per liter

2. Trickling Filter System Monitoring

i. **Influent and Effluent Monitoring –** At a minimum, influent and effluent constituent monitoring for trickling filter systems must consist of the following:

Table 5A – Influent and Effluent Monitoring for Trickling Filter Systems

		INFLUENT (IS)	INFLUENT (IS)	EFFLUENT (ES)	EFFLUENT (ES)

Parameter/ Constituent	Units[1]	Sample Type	Sampling Frequency	Sample Type	Sampling Frequency
pH	units	Grab	Weekly	Grab	Weekly
Biochemical Oxygen Demand, 5-Day	mg/L	24-hour composite	Quarterly	Grab	Monthly
Total Suspended Solids	mg/L	24-hour composite	Quarterly	Grab	Monthly
Settleable Solids	mg/L	Not Applicable	Not Applicable	Grab	Weekly
Total Nitrogen[2]	mg/L	Calculated	Quarterly	Calculated	Monthly
Nitrate (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Nitrite (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Total Kjeldahl Nitrogen (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Ammonia (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Total Dissolved Solids	mg/L	24-hour composite	Quarterly	Grab	Monthly
Chloride	mg/L	24-hour composite	Quarterly	Grab	Monthly
Sodium	mg/L	24-hour composite	Quarterly	Grab	Monthly
Sulfate	mg/L	24-hour composite	Quarterly	Grab	Monthly
Boron	mg/L	Not Applicable	Not Applicable	Grab	Monthly
Carbonate	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Bicarbonate	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Calcium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Potassium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Magnesium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually

[1] mg/L denotes milligrams per liter
[2] Total nitrogen is the sum of total inorganic nitrogen (nitrate + nitrite + ammonium + ammonia) and organic nitrogen.

ii. **Effluent Monitoring –** Trickling filter wastewater effluent monitoring for select constituents is required if the Wastewater System receives wastewater with significant amount of fats, oil, grease, phenol, formaldehyde, or zinc.

Types of waste streams that could contribute fats, oil, grease, phenol, formaldehyde, or zinc to a Wastewater System might include flows from oil pressing/bottling, meat processing, holding tanks (e.g., recreational vehicles, portable toilets, airplane wastewater), etc.

Table 5B – Effluent Monitoring for Select Constituents for Trickling Filter Systems

Parameter/ Constituent	Units	Sample Type	Sampling Frequency
Oil & Grease	mg/L[1]	Grab	Monthly
Phenol	µg/L[2]	Grab	Monthly
Formaldehyde	µg/L	Grab	Monthly
Zinc	mg/L	Grab	Monthly

[1] mg/L denotes milligrams per liter
[2] µg/L denotes micrograms per liter

3. **Activated Sludge, Membrane Biological Reactor, Sequencing Batch Reactor, or Similar Wastewater Systems (All Other Wastewater Systems)**

i. **Influent and Effluent Monitoring –** At a minimum, influent and effluent constituent monitoring for all activated sludge, membrane biological reactor, sequencing batch reactor or similar wastewater treatment systems must consist of the following:

Table 6A – Influent and Effluent Monitoring for All Other Wastewater Systems

		INFLUENT (IS)	INFLUENT (IS)	EFFLUENT (ES)	EFFLUENT (ES)
Constituent	**Units[1]**	**Sample Type**	**Sampling Frequency**	**Sample Type**	**Sampling Frequency**
pH	units	Grab	Weekly	Grab	Weekly
Biochemical Oxygen Demand, 5-Day	mg/L	24-hour composite	Quarterly	Grab	Monthly
Total Suspended Solids	mg/L	24-hour composite	Quarterly	Grab	Monthly
Settleable Solids	mg/L	Not Applicable	Not Applicable	Grab	Weekly
Total Nitrogen[2]	mg/L	Calculated	Quarterly	Calculated	Monthly
Nitrate (as N)	mg/L	24-hour	Quarterly	Grab	Monthly

		INFLUENT (IS)	INFLUENT (IS)	EFFLUENT (ES)	EFFLUENT (ES)
Constituent	**Units[1]**	**Sample Type**	**Sampling Frequency**	**Sample Type**	**Sampling Frequency**
		composite			
Nitrite (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Total Kjeldahl Nitrogen (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Ammonia (as N)	mg/L	24-hour composite	Quarterly	Grab	Monthly
Total Dissolved Solids	mg/L	24-hour composite	Quarterly	Grab	Monthly
Chloride	mg/L	24-hour composite	Quarterly	Grab	Monthly
Sodium	mg/L	24-hour composite	Quarterly	Grab	Monthly
Sulfate	mg/L	24-hour composite	Quarterly	Grab	Monthly
Boron	mg/L	Not Applicable	Not Applicable	Grab	Monthly
Carbonate	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Bicarbonate	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Calcium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Potassium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually
Magnesium	mg/L	Not Applicable	Not Applicable	Grab	Semiannually

[1] mg/L denotes milligrams per liter
[2] Total nitrogen is the sum of total inorganic nitrogen (nitrate + nitrite + ammonium + ammonia) and organic nitrogen.

ii. Effluent Monitoring – Activated sludge, membrane biological reactor, sequencing batch reactor or similar treatment systems wastewater effluent monitoring for select constituents is required if the Wastewater System receives wastewater with significant amount of fats, oil, grease, phenol, formaldehyde, or zinc.

Types of waste streams that could contribute fats, oil, grease, phenol, formaldehyde, or zinc to a Wastewater System might include flows from oil pressing/bottling, meat processing, holding tanks (e.g., recreational vehicles, portable toilets, airplane wastewater), etc.

Table 6B – Effluent Monitoring for Select Constituents for All Other Wastewater Systems

Parameter/ Constituent	Units	Sample Type	Sampling Frequency
Oil & Grease	mg/L[1]	Grab	Monthly
Phenol	µg/L[2]	Grab	Monthly
Formaldehyde	µg/L	Grab	Monthly
Zinc	mg/L	Grab	Monthly

[1] mg/L denotes milligrams per liter.
[2] µg/L denotes micrograms per liter

D. Effluent Monitoring for Non-Potable Recycled Water Producers – Wastewater effluent monitoring for non-potable recycled wastewater is required if a Wastewater System is recycling non-potable treated wastewater pursuant to a State Water Board Division of Drinking Water conditionally accepted title 22 Engineering Report.

A conditionally accepted title 22 Engineering Report will specify non-potable recycled wastewater monitoring requirements (e.g., disinfection, priority pollutants, etc.). The Discharger is required to comply with the non-potable recycled wastewater monitoring requirements specified in Table 7 and the title 22 Engineering Report. If there is an overlap in constituent-specific monitoring, the title 22 Engineering Report governs.

Table 7 – Effluent Monitoring for Non-Potable Recycled Wastewater

Constituent	Units	Sample Type	Sampling Frequency
Bacteria (Total Coliform) [5]	MPN/100 mL[1]	Grab	Daily
Chlorine Residual [5][6]	mg/L[2]	Continuous	Continuously
Turbidity [5]	NTU[4]	Continuous	Continuously
Total Trihalomethanes (TTHMs) [6] – *Chloroform, Bromodichloromethane, Dibromochloromethane,*	µg/L[3]	Grab	Monthly
Haloacetic Acids (HAAs) [6] *Monochloroacetic Acid, Dichloroacetic Acid, Trichloroacetic Acid, Monobromoacetic Acid,*	µg/L	Grab	Monthly
Bromate [6]	µg/L	Grab	Monthly
Chlorite [6]	µg/L	Grab	Monthly

Constituent	Units	Sample Type	Sampling Frequency
Other constituents or operational parameters identified in a title 22 Engineering Report	As required by conditionally accepted title 22 Engineering Report and/or DDW conditional acceptance letter	As required by conditionally accepted title 22 Engineering Report and/or DDW conditional acceptance letter	As required by conditionally accepted title 22 Engineering Report and/or DDW conditional acceptance letter

[1] MPN/100 mL denotes most probable number per 100 mL sample
[2] mg/L denotes milligrams per liter
[3] µg/L denotes micrograms per liter
[4] NTU denotes Nephelometric Turbidity unit
[5] Report values as required by conditionally accepted title 22 Engineering Report and/or DDW conditional acceptance letter.
[6] From the adopted disinfection methods/processes, the Discharger may be required to monitor for chlorine residual and/or specified disinfection byproducts.

IV. WASTEWATER DISPOSAL MONITORING

The Discharger must monitor all wastewater disposal areas (e.g., land application areas, percolation ponds, etc.) when wastewater and/or supplemental irrigation water is applied. If wastewater and/or supplemental irrigation water is not discharged to land during a reporting period, the monitoring report must still be submitted and indicate that there was no discharge during the reporting period. The Discharger must evaluate and summarize wastewater disposal management practices, loading rates, etc. in each monitoring report.

Wastewater disposal monitoring must include the following:

Table 8 – Wastewater Disposal Monitoring

Constituent	Units	Sample Type	Monitoring Frequency
Supplemental Irrigation	Gallons per day	Metered/Estimated [1]	Daily
Local Precipitation	Inches/day	Weather Station [2]	Each precipitation event
Acreage Applied [3]	Acres	Measured	Daily
Application Rate	Gallons per day	Metered/Estimated [1]	Daily
Biochemical Oxygen Demand, 5-Day (BOD) Applied [4] [5]	lbs/acre/day	Calculated	Monthly
Total Nitrogen Applied [4] [5]	lbs/acre/day	Calculated	Monthly

Constituent	Units	Sample Type	Monitoring Frequency
Salts Applied [4] [5] (total dissolved solids, sodium, chloride, sulfate, boron)	lbs/acre/day	Calculated	Monthly
Soil Erosion Evidence	Not Applicable	Observation	Monthly
Containment Berm Condition	Not Applicable	Observation	Monthly
Soil Saturation/Ponding	Not Applicable	Observation	Monthly
Nuisance Odors/Vectors	Not Applicable	Observation	Monthly
Discharge Offsite	Not Applicable	Observation	Monthly

[1] Requires meter reading, a pump run time meter, or other approved method. If the flow is estimated, the Discharger is required to provide an explanation (e.g., no meter- estimated using pump operations including rate and time) with each monitoring report.

[2] The Discharger must have a rain gauge or use a NOAA or USGS rain station, such as http://scacis.rcc-acis.org/.

[3] Acreage applied denotes the acreage to which wastewater is applied.

[4] The total nitrogen, salts, and BOD applied loading rates must be calculated from wastewater flow volumes, applied acreage, and concentrations reported in effluent analytical testing as follows:

Total Nitrogen/Salts/BOD Applied (pounds/acre/ day) =

$$\frac{X\ [mg/L] \times Q\ [million\ gallons\ per\ day] \times 8.34\ [pounds/gallon]}{Acreage\ Applied}$$

Where X = Total nitrogen, salts, or BOD concentration
Where Q = Application Rate

[5] Frequencies of analytical testing are defined in the influent and effluent monitoring tables (Tables 4B, 5A, and 6A).

V. SLUDGE/BIOSOLIDS DISPOSAL MONITORING

The Discharger must report the handling and disposal of all sludge/biosolids generated at the Wastewater System. Records must include the date removed from the Wastewater System, name/contact information for the hauling company, the type and volume of waste transported, the disposal facility name and address, and copies of analytical data required by the entity accepting the waste. These records must be submitted as part of the annual monitoring report.

The Discharger must also monitor sludge/biosolids consistent with a Central Coast Water Board Executive Officer approved sludge management plan and in accordance with the requirements specified by the receiving party, including a regulated landfill and/or regulated composting facility.

If sludge/biosolids are not removed during the year, the Discharger must explain the absence of this monitoring in the annual report.

VI. GROUNDWATER MONITORING

A. **Option 1: No Groundwater Monitoring Program –** If the Discharger is regulated under this option, the Discharger must demonstrate the quality of effluent discharged from the Wastewater System meets effluent limitations specified in Table 6 or Table 7 of the General Permit. The Discharger must evaluate and provide a comparison of their effluent to the effluent limitations in the monitoring reports. The Discharger must demonstrate within 24 months of issuance of the notice of applicability that the quality of effluent discharged from the Wastewater System meets effluent limitations specified in Table 6 or Table 7. If the Discharger is unable to comply with the effluent limitations within 24 months, the Discharger may be required to implement the groundwater monitoring program as described in Option 2. Even if the Discharger chooses Option 1, the Central Coast Water Board Executive Officer may require groundwater monitoring to ensure protection of beneficial uses.

B. **Option 2: Groundwater Monitoring Program –** If a Discharger is regulated under this option and discharges in excess of effluent limitations specified in Table 6 or Table 7 of the General Permit, the Discharger will be required to implement a groundwater monitoring program to demonstrate compliance with the water quality objectives specified in the Basin Plan. Groundwater monitoring reports, workplans, etc. must be prepared and stamped by a California licensed civil engineer or professional geologist.

   The Discharger must:

   1. **Within 120 days** of issuance of notice of applicability to the Discharger, submit a groundwater monitoring workplan and preliminary hydrogeologic conceptual site model for Central Coast Water Board Executive Officer approval. At a minimum, the workplan must propose the installation of three shallow groundwater monitoring wells to establish groundwater gradient, groundwater flow velocity and direction, and evaluate groundwater quality influenced by the wastewater disposal. The number and location of the proposed groundwater monitoring well network must be on a scale sufficient to determine potential impacts and be sufficiently representative of groundwater conditions upgradient and downgradient of the permitted disposal/dispersal area. The groundwater monitoring wells should not be installed prior to Central Coast Water Board Executive Officer approval of the groundwater monitoring workplan and preliminary hydrogeologic conceptual site model.

      The groundwater monitoring wells must be installed within first encountered groundwater and in accordance with California Department of Water Resources Bulletin No. 74-81 and Supplement No. 74-90, California Water Code sections 13710 through 13755, and any local permitting requirements. The locations and top-of-casing elevations for the newly installed monitoring wells must be surveyed by a licensed land surveyor. The Discharger must install[1] the Central Coast Water Board approved groundwater monitoring well network within **<u>90 days</u>** of receiving Central Coast Water Board approval.

2. Once installed, all monitoring wells designated as part of the monitoring well network must be, at a minimum, sampled and analyzed as specified in Table 9 and the Executive Officer approved sampling and analysis plan (see section VI.A.2.i of the General Permit).

   Prior to sampling, depth to groundwater must be measured and groundwater elevations must be calculated. The monitoring wells must be purged of at least three well volumes and until measurements of the following parameters have stabilized (i.e., are reproducible within 10 percent): pH, temperature, dissolved oxygen, electrical conductivity, and turbidity. No-purge, low-flow, or other sampling techniques are acceptable if they are described in the Central Coast Water Board Executive Officer approved sampling and analysis plan. Once the groundwater level in each of the wells has recovered sufficiently to ensure the collection of representative groundwater samples, a qualified individual (e.g., consultant, technician, etc.) trained in using proper sampling methods must recover samples using approved USEPA methods. Laboratories analyzing groundwater samples must be accredited by the State Water Board Environmental Laboratory Accreditation Program, in accordance with California Water Code section 13176, and must include quality assurance/quality control data with their reports. All data must be recorded and submitted in monitoring well field sheets.

3. Groundwater monitoring must include, at a minimum, the following:

Table 9 – Groundwater Monitoring

Constituent	Units	Sample Type	Sampling Frequency
Groundwater Elevation [4]	0.01 feet	Calculated	Quarterly
Depth to Groundwater	0.01 feet	Measurement	Quarterly
Gradient	feet/feet	Calculated	Quarterly
Groundwater Flow Direction	degrees	Calculated	Quarterly
Total Nitrogen[7]	mg/L[1]	Calculated	Quarterly

[1] Well installation must be supervised by a California licensed Civil Engineer or Professional Geologist.

Constituent	Units	Sample Type	Sampling Frequency
Nitrate (as N)	mg/L	Grab	Quarterly
Nitrite (as N)	mg/L	Grab	Quarterly
Total Kjeldahl Nitrogen (as N)	mg/L	Grab	Quarterly
Ammonia (as N)	mg/L	Grab	Quarterly
Total Dissolved Solids	mg/L	Grab	Quarterly
Chloride	mg/L	Grab	Quarterly
Sodium	mg/L	Grab	Quarterly
Sulfate	mg/L	Grab	Quarterly
Boron	mg/L	Grab	Quarterly
Carbonate	mg/L	Grab	Semiannually
Bicarbonate	mg/L	Grab	Semiannually
Calcium	mg/L	Grab	Semiannually
Potassium	mg/L	Grab	Semiannually
Magnesium	mg/L	Grab	Semiannually
pH	pH Units	Metered	Quarterly
Dissolved Oxygen	mg/L	Metered	Quarterly
Electrical Conductivity	µS/cm [2]	Metered	Quarterly
Oxidation Reduction Potential	mV [3]	Metered	Quarterly
Temperature	degrees Celsius	Metered	Quarterly
Phenol [5]	mg/L	Grab	Quarterly [6]
Formaldehyde [5]	mg/L	Grab	Quarterly [6]
Zinc [5]	mg/L	Grab	Quarterly [6]

[1] mg/L denotes milligrams per liter
[2] µS/cm denotes microsiemens per centimeter
[3] mV denotes millivolts
[4] Groundwater elevation must be based on depth to water using a surveyed measuring point elevation on the well and a surveyed reference elevation.

[5] Constituent monitoring is based on raw wastewater characteristics (waste streams). If the Discharger is required to monitor effluent for this constituent, the Discharger must also analyze groundwater for the potential presence of this constituent.
[6] Sampling required once every five years if not detected in initial sample.
[7] Total nitrogen is the sum of total inorganic nitrogen (nitrate + nitrite + ammonium + ammonia) and organic nitrogen.

VII. REPORTING REQUIREMENTS

A. TECHNICAL REPORTS

The technical reports are due as described in Table 10.

Table 10 – Technical Report Submittal Due Dates

Report	Report Due Date [1]
Pretreatment Program Plan[2]	24 months
Operations and Maintenance Manual	12 months
Climate Change Adaptation Plan	24 months
Salt and Nutrient Management Plan [2]	Not Applicable
Time Schedule Compliance Plan [2]	12 months

[1] Reports are due within the time specified after issuance of notice of applicability to the Discharger.
[2] If directed by the Central Coast Water Board Executive Officer.

1. **Pretreatment Program Plan –** If development of a Pretreatment Program Plan is directed by the Central Coast Water Board Executive Officer, submit a plan that meets the requirements specified in General Permit section IV.F.2.i and General Permit section VI.A.1. The plan must contain an implementation schedule and identification of adequate funding to implement the plan.

2. **Operations and Maintenance Manual –** In addition to the required components specified in Standard Provisions[2] A.12 and A.28 (and any updates to the Standard Provisions) and General Permit section VI.A.2, the Operations and Maintenance Manual must contain the following components. Each component must contain an implementation schedule and identification of adequate funding to implement the component.

   i. **Sampling and Analysis Plan –** The Discharger's Operation and Maintenance Manual must contain a sampling and analysis plan that

[2] See Attachment E, Standard Provisions, 2013: https://www.waterboards.ca.gov/centralcoast/board_decisions/docs/wdr_standard_provisions_2013.pdf

meets the requirements specified herein. Anyone performing sampling on behalf of the Discharger must be familiar with the sampling and analysis plan. At a minimum, the sampling and analysis plan must contain the following:

a. A wastewater treatment process flow schematic with the monitoring locations labeled and scaled Wastewater System maps with treatment components, discharge locations (both treated wastewater and non-potable recycled water), monitoring locations, groundwater wells, storage locations (e.g., chemical, sludge, emergency overflow ponds, etc.), buildings, etc. (see Figure A for an example process flow schematic and Figure B for an example map that contains some of the required treatment components).

b. Sample identification details in tabular format. The table must include the sample titles, GeoTracker field point information, sample description(s), and sampling frequencies (see Table A for an example of sample identification details).

c. Sample chain-of-custody procedures and documentation.

d. Sample handling/preservation procedures.

e. A description of the analytical methods.

f. A description of sample containers, preservatives, and holding times.

g. For water supply monitoring, a description of the location and method of data collection (e.g., onsite well sampling, use of consumer confidence report, etc.).

h. For groundwater monitoring, a description of the well purging and field methods.

Table A – Sample Identification Details

GeoTracker Field Point Class [1]	GeoTracker Field Point Name (Sample ID)	GeoTracker Field Point Description	Sampling Frequency
Influent Sample	IS-1	Influent sample representative of peak loading conditions (Influent Sample – 1)	Quarterly
Midway Sample	MS-1	Midway sample taken from second half of treatment pond 1 (Midway Sample – 1)	Quarterly
Effluent Sample	ES-1	Effluent sample from pond 5 (Effluent Sample – 1)	Quarterly

GeoTracker Field Point Class [1]	GeoTracker Field Point Name (Sample ID)	GeoTracker Field Point Description	Sampling Frequency
Composite Sample	CS-1	Composite sample representative of effluent from percolation ponds 3 – 7 (Composite Sample – 1)	Quarterly
Water Supply Well	WSW-1	Water Supply well sample from State well (list well number, List Latitude and Longitude) (Water Supply Well – 1)	Annually
Monitoring Well	MW-1	Monitoring well sample from monitoring well #1 (List Latitude and Longitude) (Monitoring Well – 1)	Quarterly
Recycled Water Sample	RWS-1	Recycled water sample from non-potable recycled water point of discharge, sampling location #1 (List Latitude and Longitude) (Recycled Water Sample – 1)	Monthly

[1] Example only. The graphic below shows more sampling locations than shown in the examples in this table.

Figure A – Example process flow schematic with marked sampling locations and sample titles. Schematic not to scale.

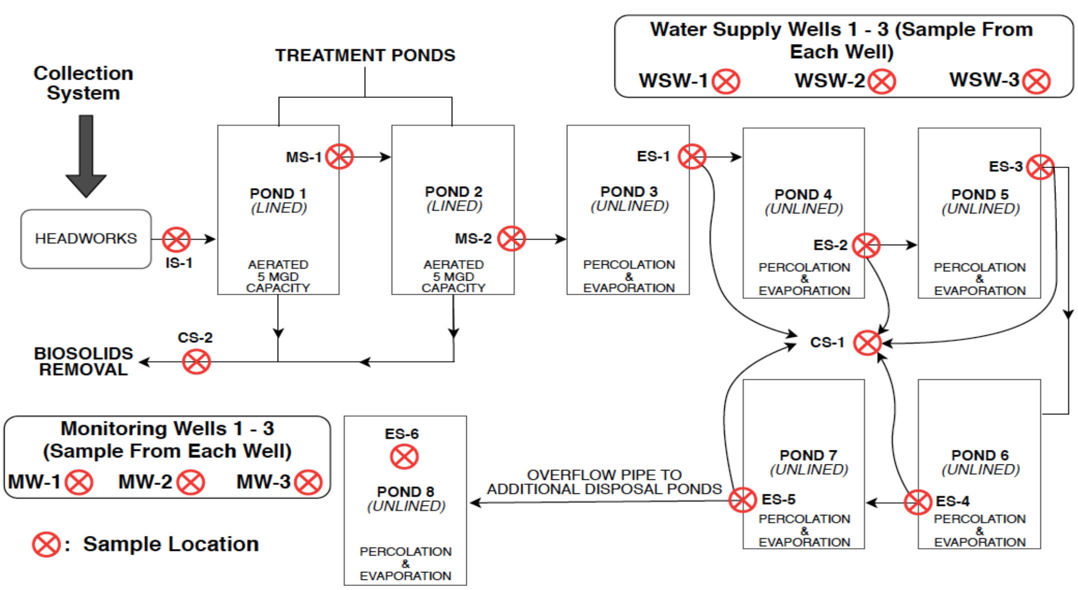

Figure B – Example aerial photograph of a Wastewater System. Location of water supply wells labeled with blue crosses. Location of monitoring well labeled with a red cross. Additional maps would be needed to show other system components.

ii. **Sludge Management Plan –** The Discharger's Operation and Maintenance Manual must contain a sludge management plan that is sufficient to ensure compliance with the terms of the General Permit and the notice of applicability. At a minimum, the plan must describe the following:

a. An estimated volume/amount and quality of sludge and scum that will be generated.

b. How sludge, scum, and supernatant will be stored and disposed of to protect groundwater quality.

c. If sludge will be subject to further treatment, describe the treatment and storage requirements.

d. Procedures for cleaning of digesters or storage vessels and the treatment and disposal of the residuals. If drying of residuals is planned, describe how that will be performed to prevent nuisance odors, prevent vectors, and protect groundwater quality.

iii. **Wastewater Disposal Management Plan –** The Discharger's Operation and Maintenance Manual must contain a wastewater disposal management plan that is sufficient to ensure compliance with the terms of the General Permit and the notice of applicability. At a minimum, the wastewater disposal management plan must include:

a. A description of the wastewater disposal area and a map denoting acreage.

b. Loading calculations based on flow volumes, applied acreage, and biochemical oxygen demand, salts (total dissolved solids, sodium, chloride, sulfate, boron), and nitrogen analytical results.

c. A description of wastewater disposal and water quality protection practices.

iv. **Spill Prevention and Emergency Response Plan –**The Discharger's Operation and Maintenance Manual must contain a spill prevention and emergency response plan that is sufficient to ensure compliance with the terms of the General Permit and the notice of applicability. The spill prevention and emergency response plan must describe operation and maintenance activities to prevent accidental releases of wastewater and to effectively respond to such releases and minimize the environmental impact. At a minimum, the spill prevention and emergency response plan must address the following:

a. Operation and Control of Wastewater System - A description of the wastewater treatment equipment, operational controls, flow measurement and calibration procedures, and treatment system schematic including valve/gate locations.

b. Sludge Handling - A description of the sludge handling equipment, operational controls, and disposal procedures.

c. Collection System Maintenance - A description of collection system cleaning and maintenance, equipment tests, and alarm functionality tests to minimize the potential for wastewater spills originating in the collection system or headworks. For collection systems subject to State Water Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (or its replacement), reports prepared to comply with State Water Board Order No. 2006-0003-DWQ satisfy this requirement.

d. Emergency Response - A description of emergency response procedures including for emergencies such as power outage, severe weather, flooding, or inadequate freeboard (for systems with wastewater treatment, storage, or disposal ponds or treated non-potable recycled water storage ponds). An equipment and telephone list for contractors/consultants, emergency personnel, and equipment vendors.

e. Finance - At a minimum, discuss current fees, projected fees, current budget for spill prevention and emergency response, projected budget for spill prevention and emergency response.

f. Notification Procedures - Coordination procedures with fire, police, Governor's Office of Emergency Services (CalOES), Central Coast Water Board, and local county health department personnel.

v. **Training Records Log –** The Discharger's Operation and Maintenance Manual must contain updated training records logs that demonstrates the Discharger is complying with General Permit section VI.B.3.

3. **Climate Change Adaptation** –The Climate Change Adaptation Plan must, at a minimum, include the following components:

   i. Hazards and Vulnerabilities – Identify climate change hazards, at a minimum accounting for the hazards listed below, applicable to the Wastewater System. Using up-to-date tools, data, and guidance from the State of California (e.g., Cal-Adapt[3], Sea-Level Rise Guidance from Ocean Protection Council, reports from the Climate-Safe Infrastructure Working Group, the Climate Adaptation Planning Guide, and California Climate Assessment Regional Reports), assess the Wastewater System's vulnerability to identified hazards that could cause reduction, loss, or failure of treatment processes and/or critical structures at the Wastewater System. Identify and justify the resources (e.g., models and tools, design parameters) used to inform identification of these hazards and vulnerabilities.

      a. Sea Level Rise – Saltwater intrusion, flooding and inundation, and increased coastal erosion.

      b. Precipitation Pattern Changes.

         I. Drought – Decreased influent quantity and quality.

         II. Peak Events – Flooding and increased influent quantity.

      c. Temperature fluctuations and extremes.

      d. Increased wildfires.

      e. Increased power outages.

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[3] Cal-Adapt is an online resource with downscaled climate project data. It provides users with projections and more detailed downloadable data supporting a range of needs and array of climate models and emissions scenarios. Cal-Adapt offers climate projections for the major stressors facing California, including the following: temperature averages and extremes, precipitation averages and extremes, sea-level rise, wildfires, and drought. The Governor's Office of Planning and Research (OPR) recommends agencies use Representative Concentration Pathway (RCP) 8.5 for analyses considering impacts through 2050, because there are minimal differences between emissions scenarios during the first half of the 21st century.

ii. Resiliency Actions – Identify actions to build Wastewater System and operational resilience to identified vulnerabilities, accounting for options that minimize resource impacts.

iii. Adaptation Strategy – For Wastewater Systems with design flows over 1,000,000 gallons per day, develop and implement a strategy to complete resiliency actions, at a minimum encompassing the following:

a. Prioritization – Prioritized resiliency actions based on risks to water quality, but also accounting for costs and benefits.

b. Schedule and Milestones – Timeframes to complete prioritized resiliency actions and/or climate change hazard triggers to inform when the Discharger must implement actions. Milestones to complete critical steps for prioritized resiliency actions, designed to demonstrate measurable progress at a steady, or accelerated, completion pace over the established timeframes.

c. Financial Planning – Projected costs necessary to implement and sustain resiliency actions and strategy to procure funds.

iv. Recycled Water Feasibility Plan – Dischargers with Wastewater System design flows over 1,000,000 gallons per day must include a recycled water feasibility plan.

The recycled water feasibility plan will assess the viability of using the Wastewater System's treated wastewater effluent for beneficial reuse including, but not limited to the following:

a. Beneficial Reuse Options – Identification of reuse opportunities for the Discharger's treated effluent that would achieve the highest beneficial impact and best uses possible of non-potable recycled water. Include assessment of the following non-potable recycled water benefits identified in the State Water Board Recycled Water Policy: providing safe alternatives to fresh water or potable water for approved uses; supporting sustainable groundwater and surface water uses with the intent of substituting use of treated effluent for use of fresh water or potable water; and diversifying community water supplies and mitigating for the impacts of climate change.[4]

b. Viable Users – Identification and viability evaluation of all potential users of the Wastewater System's treated effluent associated with identified beneficial reuse options. The Discharger must demonstrate it

[4] Water Quality Control Policy for Recycled Water, State Water Board, adopted December 11, 2018, page 1.

engaged potential water purveyors and customers about the viability of reusing the Wastewater System's treated effluent.

c. Infrastructure Upgrades – Assessment of infrastructure needs to produce non-potable recycled water for identified beneficial reuses and convey non-potable recycled water to beneficial reuse locations.

d. Fiscal Analysis – Cost estimates for identified reuse options, at a minimum including project development, construction, and long-term maintenance and lifecycle costs. This analysis shall also include identification and evaluation of the following: 1) funding options, including at a minimum, revenues from recycled water sales, grant and loan funding opportunities, and financing from other benefitting parties and 2) funding limitations.

e. Schedule and Milestones for Next Steps – Timeframes to assess the feasibility of identified beneficial reuse options and to identify proposed beneficial reuse options based on prioritized water recycling and reuse opportunities, feasibility assessments, and other factors identified by the Discharger.

v. Identification of implementation schedule and adequate funding to implement the plan.

4. **Salt and Nutrient Management Plan** – If directed by the Central Coast Water Board Executive Officer pursuant to California Water Code section 13267, the Discharger must prepare and submit a Salt and Nutrient Management Plan to ensure that the overall impact of treated wastewater and/or non-potable water recycling projects does not degrade groundwater resources. At a minimum, the salt and nutrient management plan must address the following:

i. An outline and description of an implementable salt and nutrient management program to reduce mass loading of salts and nutrients (with an emphasis on nitrogen species) in treated effluent to a level that will ensure compliance with effluent limitations and protect beneficial uses of groundwater.

a. A description of salt reduction measures that identify and focus on all potential salt contributors to the collection system (e.g., water supply, commercial, industrial, residential, etc.) and wastewater treatment process.

b. A description of nutrient reduction measures that focus on source control and optimizing wastewater treatment processes for nitrogen removal.

5. **Time Schedule Compliance Plan -** As set forth in General Permit sections V.A and VI.A.5, if the Discharger anticipates that additional time is needed to achieve compliance with the effluent limitations, the Discharger must prepare and submit for Central Coast Water Board Executive Officer review and approval, a time

schedule compliance plan. At a minimum, the time schedule compliance plan must address the following:

i. Data demonstrating the current quality wastewater discharge in terms of the effluent limitations in General Permit Tables 3-6.

ii. A detailed description and chronology of efforts, since issuance of the notice of applicability, to reduce wastes.

iii. Justification of the need for additional time to achieve the effluent limitations in General Permit Tables 3-6.

iv. A detailed time schedule of specific actions the Discharger will take to achieve the effluent limitations.

v. A demonstration that the time schedule requested is as short as possible, considering the technological, operation, and economic factors that affect the design, development, and implementation of the measures that are necessary to comply with the effluent limitation(s).

vi. If the requested time schedule exceeds one year, the proposed schedule shall include interim requirements and the date(s) for their achievement. The interim requirements shall include both of the following:

a. Effluent limitation(s) for the pollutant(s) of concern.

b. Actions, measurable milestones, and tangible products leading to compliance with the effluent limitation(s).

B. QUARTERLY AND ANNUAL MONITORING REPORTS

Quarterly and annual monitoring reports are due as described in Table 11. The reports must follow the format provided by the Central Coast Water Board.

Table 11 – Quarterly and Annual Monitoring Reporting

Report	Monitoring Period	Report Due Date
First Quarter Monitoring Report	January 1 to March 31	May 1
Second Quarter Monitoring Report	April 1 to June 30	August 1
Third Quarter Monitoring Report	July 1 to September 30	November 1
Fourth Quarter Monitoring Report	October 1 to December 31	February 1
Annual Report	January 1 to December 31	March 1

1. **Quarterly Monitoring Reporting –** At a minimum, the quarterly reports must include:

i. Results of all required monitoring in tabular format.

ii. The results of any pollutant or parameter monitored more frequently than is required by this monitoring program. Values obtained through additional monitoring must be used in calculations as appropriate.

iii. A comparison of monitoring data to the discharge specifications, applicable effluent limitations, disclosure of any violations of the notice of applicability and/or General Permit, and an explanation of any violation of those requirements. Data must be presented in tabular format.

iv. Copies of laboratory analytical report(s) and chain of custody form(s).

v. An updated hydrogeologic conceptual site model with the groundwater monitoring reporting requirements based on new information generated from the monitoring well boring logs, groundwater elevation data, water quality data, etc.

vi. Copies of groundwater monitoring well field sheets with purge methods and logs.

2. **Annual Reporting –** Submit annual reports in compliance with Standard Provisions 2013[5], (and any updates to the Standard Provisions) Section C, General Reporting Requirements, Item 16 using the most recent annual report template provided by Central Coast Water Board staff.

C. NON-COMPLIANCE REPORTING:

The Discharger must notify and report noncompliance of limits related to pond freeboard, flow rate, the conditionally accepted title 22 Engineering Report requirements, bypass or overflow, wastewater containment failure, and delivery of off-specification recycled water pursuant to General Permit section VI.C.2.

D. ELECTRONIC SUBMITTAL

All monitoring reports must be provided electronically in a searchable PDF format, with the Central Coast Water Board's current transmittal sheet found at the link below as the cover page. The transmittal sheet must be signed.

https://www.waterboards.ca.gov/centralcoast/water_issues/programs/wastewater_permitting/docs/transmittal_sheet.pdf

1. **Central Coast Water Board** – The Discharger must submit all requested information via email to centralcoast@waterboards.ca.gov.

[5] See Attachment E, Standard Provisions, 2013: https://www.waterboards.ca.gov/centralcoast/board_decisions/docs/wdr_standard_provisions_2013.pdf

2. **GeoTracker –** The Discharger must also submit all reports/documents and laboratory analytical data to the State Water Board's GeoTracker[6,7] database consistent with applicable Electronic Submittal of Information (ESI) requirements under a Wastewater System-specific global identification number over the internet at:

   http://www.waterboards.ca.gov/ust/electronic_submittal/index.shtml.

   For general questions, please contact the GeoTracker Help Desk at: Geotracker@waterboards.ca.gov.

   Table 12 summarizes all the GeoTracker electronic reporting requirements. Central Coast Water Board staff may request submittal of some documents on paper, particularly drawings or maps that require a large size to be readable, or in other electronic formats where evaluation of data is required.

Table 12 - GeoTracker Electronic Submittal Information Data Requirements

Electronic Submittal	Description of Action	Action	Frequency
Reports and Documents	Complete copy of all documents including monitoring reports (in searchable PDF format) and any other associated documents related to the Wastewater System.	Upload directly to GeoTracker all monitoring reports (in searchable PDF format) and any other associated documents.	On or before the due dates required by this General Permit and for other documents when requested by Central Coast Water Board staff.
Laboratory Data	All analytical data (including geochemical data) in electronic deliverable format (EDF). This includes all water, soil, and vapor samples collected when monitoring a discharge.	Direct your California ELAP-accredited laboratory staff to upload all laboratory data directly to GeoTracker.	On or before the due date of the required monitoring report.
Depth to Groundwater	Monitoring wells must have the depth-to-water information reported. Report data only for wells defined as	Upload depth-to-water information to the GeoTracker GEO_WELL file.	On or before the due date of the required monitoring report.

[6] Information for first-time GeoTracker users is available at: https://www.waterboards.ca.gov/ust/electronic_submittal/docs/beginnerguide2.pdf
[7] Additional information available at: https://geotracker.waterboards.ca.gov/

Electronic Submittal	Description of Action	Action	Frequency
	permanent sampling points.		
Boring Logs and Well Screen Intervals	Boring logs must be prepared by a registered professional and submitted in PDF format separately (not only as attachments to reports).	Upload boring logs (in searchable PDF format) to GeoTracker GEO_BORE file whenever a new boring is drilled.	Every time a new boring is drilled.
Field Points, Location Data (Geo XY)[1]	Name, classify, and identify the location (latitude and longitude) of all sampling points. Monitoring wells must be surveyed, influent and effluent sample locations must be identified on the GeoTracker mapping tool under "non-surveyed data." These data points are required prior to laboratory data uploads.	Upload the location data (surveyed and non-surveyed) to the GeoTracker Geo_XY file.	Every time a permanent monitoring point is established.
Elevation Data (Geo Z)[2]	Survey and mark the elevation at the top of groundwater well casings for all permanent groundwater wells. These points are required prior to depth-to-water data uploads.	Upload the survey data to the GeoTracker GEO_Z file.	One-time, for all groundwater monitoring wells.
Geo Map	Site layout, map of facilities, Wastewater System including treatment and disposal area(s).	Upload the Site layout PDF to the GeoTracker site plan file.	Year one and every five years thereafter and when the facilities are modified.

[1] Geo XY required for all wells. New wells must be surveyed. For existing wells, use original well installation survey data. The Discharger must also upload sample locations (e.g., influent and effluent samples) that are not defined as a **permanent monitoring well** and have not been surveyed by a licensed professional.

[2] Geo Z required for all wells. New wells must be surveyed. For existing wells, use original well installation survey data.

VIII. LEGAL REQUIREMENTS

All technical and monitoring reports submitted pursuant to this MRP are required pursuant to section 13267 of the California Water Code. Failure to submit reports in accordance with schedules established by this General Permit or attachments to this General Permit, or failure to submit a report of sufficient technical quality to be acceptable to the Central Coast Water Board Executive Officer, may subject the

Discharger to enforcement action pursuant to section 13268 of the California Water Code.

California Water Code section 13267 states, in part:

> "In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports and shall identify the evidence that supports requiring that person to provide the reports."

California Water Code section 13268 states, in part:

> "(a) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of section 13399.2, or falsifying any information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).
>
> (b)(1) Civil liability may be administratively imposed by a regional board in accordance with article 2.5 (commencing with section 13323) of chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars ($1,000) for each day in which the violation occurs."

The technical and monitoring reports required by this General Permit, the notice of applicability, and this MRP are necessary to ensure compliance with this General Permit. The evidence supporting the need for the reports are contained in the information provided by the dischargers subject to this General Permit and in the files of the Central Coast Water Board. The burden and cost of preparing the monitoring and technical reports is reasonable and consistent with the interest of the state in maintaining water quality. The reports are necessary to ensure that the Discharger complies with the notice of applicability and General Permit. Pursuant to California Water Code section 13267, the Discharger must implement this MRP and must submit the monitoring and technical reports described herein.

The Discharger must implement the above monitoring program as of the effective date of enrollment in this General Permit. The Central Coast Water Board Executive Officer may rescind or modify this MRP at any time.

ORDERED BY:

_______________________________ ___________________
Matthew T. Keeling Date
Executive Officer

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Appendix C
GROUNDWATER SUB-BASINS

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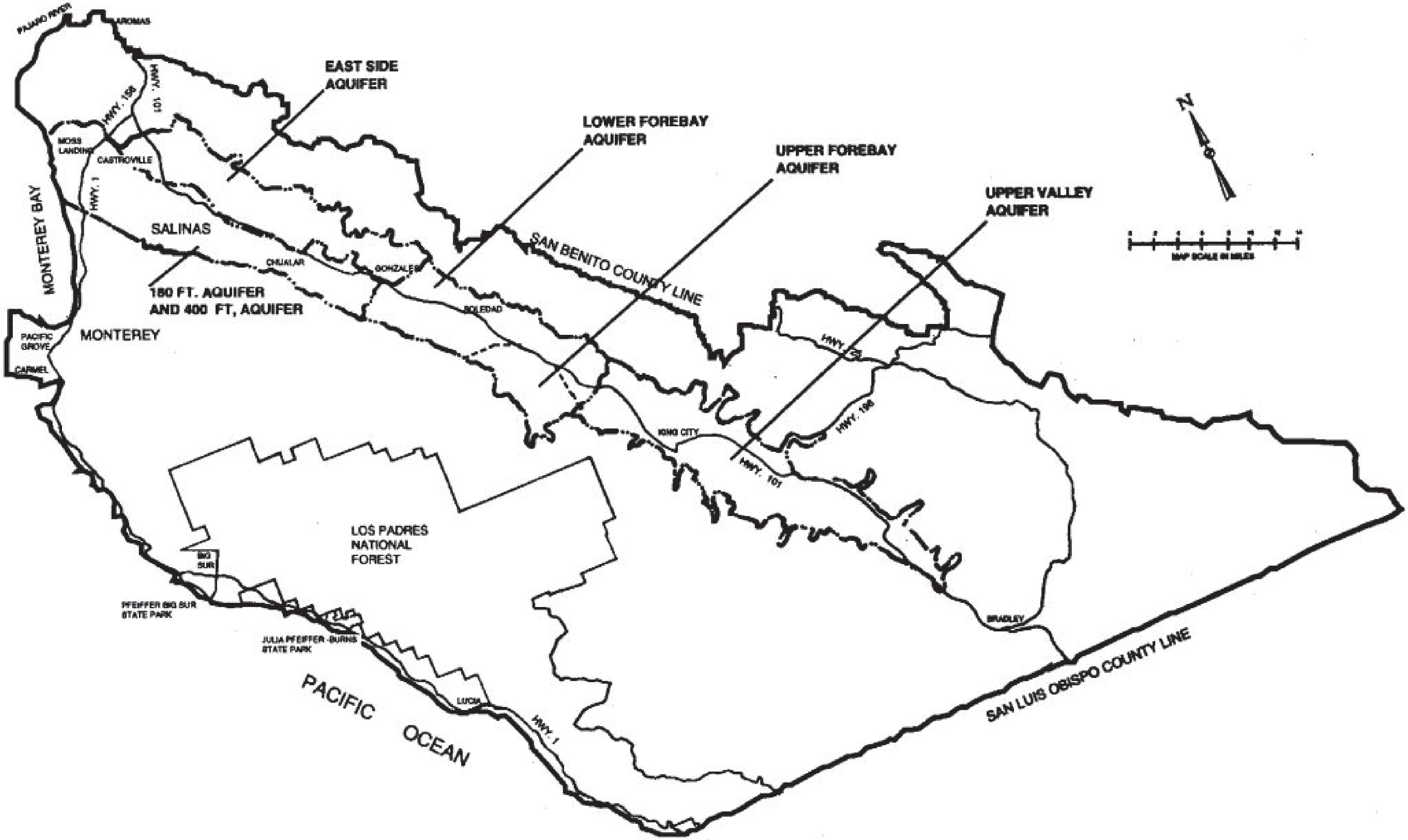
Figure 2-2. Central Coast Groundwater Basins

Table 2-4. Central Coastal Groundwater Basins

Basin/ Subbasin No.	Basin Name	County
3-1	Soquel Valley	Santa Cruz
3-2	Pajaro Valley	Monterey, Santa Cruz
3-3	Gilroy-Hollister Valley	San Benito, Santa Clara
3-3.01	Llagas Area	Santa Clara
3-3.02	Bolsa Area	San Benito
3-3.03	Hollister Area	San Benito, Santa Clara
3-3.04	San Juan Bautista Area	San Benito, Santa Clara
3-4	Salinas Valley	Monterey, San Luis Obispo
3-4.01	180/400 Foot Aquifer	Monterey
3-4.02	East Side Aquifer	Monterey
3-4.04	Forebay Aquifer	Monterey
3-4.05	Upper Valley Aquifer	Monterey
3-4.06	Paso Robles Area	Monterey, San Luis Obispo
3-4.08	Seaside Area	Monterey
3-4.09	Langley Area	Monterey
3-4.10	Corral de Tierra Area	Monterey
3-5	Cholame Valley	Monterey, San Luis Obispo
3-6	Lockwood Valley	Monterey
3-7	Carmel Valley	Monterey
3-8	Los Osos Valley	San Luis Obispo
3-9	San Luis Obispo Valley	San Luis Obispo
3-12	Santa Maria River Valley	San Luis Obispo, Santa Barbara
3-13	Cuyama Valley	Kern, San Luis Obispo, Santa Barbara, Ventura
3-14	San Antonio Creek Valley	Santa Barbara
3-15	Santa Ynez River Valley	Santa Barbara
3-16	Goleta	Santa Barbara
3-17	Santa Barbara	Santa Barbara
3-18	Carpinteria	Santa Barbara, Ventura
3-19	Carrizo Plain	San Luis Obispo
3-20	Ano Nuevo Area	San Mateo
3-21	Santa Cruz Purisima Formation	Santa Cruz
3-22	Santa Ana Valley	San Benito
3-23	Upper Santa Ana Valley	San Benito
3-24	Quien Sabe Valley	San Benito
3-25	Tres Pinos Valley	San Benito
3-26	West Santa Cruz Terrace	Santa Cruz
3-27	Scotts Valley	Santa Cruz
3-28	San Benito River Valley	San Benito
3-29	Dry Lake Valley	San Benito
3-30	Bitter Water Valley	San Benito
3-31	Hernandez Valley	San Benito
3-32	Peach Tree Valley	San Benito
3-33	San Carpoforo Valley	San Luis Obispo
3-34	Arroyo de la Cruz Valley	San Luis Obispo
3-35	San Simeon Valley	San Luis Obispo
3-36	Santa Rosa Valley	San Luis Obispo
3-37	Villa Valley	San Luis Obispo
3-38	Cayucos Valley	San Luis Obispo
3-39	Old Valley	San Luis Obispo
3-40	Toro Valley	San Luis Obispo
3-41	Morro Valley	San Luis Obispo
3-42	Chorro Valley	San Luis Obispo
3-43	Rinconada Valley	San Luis Obispo
3-44	Pozo Valley	San Luis Obispo
3-45	Huasna Valley	San Luis Obispo
3-46	Rafael Valley	San Luis Obispo
3-47	Big Spring Area	San Luis Obispo
3-49	Montecito	Santa Barbara
3-50	Felton Area	Santa Cruz
3-51	Majors Creek	Santa Cruz
3-52	Needle Rock Point	Santa Cruz
3-53	Foothill	Santa Barbara

Groundwater basin locations shown in Figure 2-2.



SALINAS
GROUND WATER
SUB-AREAS

Appendix D

GROUNDWATER MONITORING WELL NETWORK ASSESSMENT REPORT

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City of Greenfield

Groundwater Monitoring System Assessment for the City of Greenfield Wastewater Treatment Plant

March 24, 2021

Greenfield
California

Prepared by:
Timothy Nicely, PG, CHg and Lee Knudtson
GSI Water Solutions, Inc.
5855 Capistrano Avenue, Suite C, Atascadero, CA 93422

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Contents

Figures

Introduction

This memorandum presents a hydrogeologic assessment conducted by GSI Water Solutions (GSI) related to the City of Greenfield's (City's) Wastewater Treatment Plant (WWTP). Specifically, this memorandum presents our assessment of the adequacy of the existing groundwater monitoring system surrounding the WWTP's disposal area to comply with the newly-adopted provisions of the California Regional Water Quality Control Board (RWQCB) Central Coast Region's standard provisions and reporting requirements for waste discharge under General Order No. R3-2020-0020 (General Order). This hydrogeologic assessment was conducted as part of a comprehensive evaluation of the WWTP by way of a Master Plan update to determine the City's needs over the next 10 years. The location of the WWTP relative to the City is shown on Figure 1 – Overview Map.

This technical memorandum summarizes existing monitoring and reporting activities, groundwater monitoring system, the adequacy of this system that will satisfy the permitting requirements, and recommendations for enhancing the groundwater monitoring program in compliance with the General Order.

The current WWTP has the capacity of processing 2 million gallons per day (MGD) under current permit limits (City of Greenfield, 2020). The WWTP receives an average of slightly less than 1 MGD of wastewater on average (Central Coast Regional Water Quality Control Board, 2018). The basic disposal concept is to percolate all the wastewater into the ground in a manner that protects the public health, maintains, or enhances the existing groundwater quality and does not create a visual or odor nuisance. Primary treatment occurs at the headworks facility, which consists of a mechanical screen/wash removes large solids from the influent wastewater. Secondary biological treatment utilizes aeration ponds and land application (City of Greenfield, 2019). Discharges from the aeration ponds are conveyed to the adjacent effluent disposal fields, totaling over 25 acres. Wastewater discharged at the disposal location percolates to the forebay aquifer of the Salinas Valley groundwater basin. The groundwater flows beneath the wastewater disposal fields in a westerly direction.

History of Compliance

The RWQCB has regulated discharge from the City's WWTP since 1965. The City's current WWTP was constructed in 1978 to treat and dispose of 0.5 MGD of domestic wastewater. In compliance with permit requirements, the City installed two shallow monitoring wells at the facility, which have been sampled and analyzed on a regular basis since April 1982.

In 1989, the discharge from the WWTP was regulated by WDR Order No. 89-19, adopted by the RWQCB on February 10, 1989.

In 1991 in response to declining groundwater levels beneath the disposal area, the City installed eight monitoring wells upgradient and downgradient of the disposal area from which water quality samples have been collected and analyzed at least semi-annually (March and September). These monitoring wells were installed to address concerns about the adequacy of the previous two-well monitoring network. The eight monitoring wells installed as part of this project were designed to supplement the City's existing ground water monitoring network and to better define the ground water conditions at the site.

The monitoring wells were installed as four clustered wells, each with a shallow (approximately 40 feet deep) and deep (approximately 80 feet deep) construction monitoring well. The locations of these monitoring wells were adequate to monitor the upgradient and downgradient groundwater elevation and water quality of the shallow and deep materials, respectively, underlying the disposal area. The locations of these eight monitoring wells, and the original two monitoring wells, which constitute the current groundwater monitoring system, are presented on Figure 2 – Monitoring Well Locations.

In 1993, the design flow rate of the WWTP was increased to 1 MGD.

In 2002, the WWTP was regulated under the requirements of RWQCB's WDR Order No. R3-2002-0062 dated May 31, 2002. With regard to the receiving water, this Order required geologic and hydrogeologic documentation to "ascertain compliance with Waste Discharge Requirements in establishing new, or verifying existing upgradient and downgradient monitoring wells, the monitoring network shall be supported by sufficient, as determined by the Executive Officer, geologic and hydrogeologic documentation," Provision 6 of this Order required submission of an engineering report addressing whether the hydraulic gradient for groundwater below the WWTP was consistent with the configuration of the monitoring wells and whether the current groundwater monitoring wells adequately represented groundwater upgradient and downgradient of the WWTP. If the current groundwater monitoring system was deemed inadequate, the City was required to propose a revised groundwater monitoring system with an implementation schedule. Along with other components of the WWTP, groundwater samples were to be collected and analyzed on a semi-annual basis in March and September of each year, and reporting submitted quarterly.

As part of expansion of the WWTP to accommodate the increased flow, the required engineering report as the Wastewater Disposal Report was completed by Freitas + Freitas in September of 2003, which presented the planned expansion of existing spray irrigation fields from 13 to 26 acres, along with other planned improvements to the treatment system. By 2003, flow to the WWTP had increased steadily to 0.9 MGD and the City desired to increase the production capacity to 2.0 MGD. The planned disposal of the WWTP's effluent was to be a combination of spray irrigation and percolation into dedicated ponds. The report showed that, while the City had been sampling eight monitoring wells on a regular basis during the past 10 years, the depth to groundwater had not been recorded for each well. Starting on the next scheduled monitoring date following that report, the depth to groundwater was measured and recorded to better monitor the groundwater gradient. Water quality data from 2002 monitoring showed that City dilutes the total dissolved solids (TDS) by about 29 milligrams per liter (mg/l), but adds about 39 mg/l sodium and 59 mg/l chloride to the groundwater.

In 2013, the City converted their spray fields into flood irrigation areas.

In late 2017, influent flows exceeded the percolation capacity of the percolation ponds and the former spray fields. The City excavated areas in the spray fields to encourage percolation. Concurrently, the City began working with consultants to investigate the percolation problems.

On May 8, 2018, City staff reported that the berm for the disposal fields was compromised and effluent discharged to the undeveloped City-owned property east of the wastewater treatment plant, percolating into the ground before reaching the Salinas River (Central Coast Regional Water Quality Control Board, 2018). The city received a notice of violation on May 22, 2018 from the Central Coast Regional Water Quality Control Board, including notice of exceeding groundwater limitations under Order No. R3-2002-0062. Groundwater samples collected from three of the four wells downgradient of the spray fields exceeded the then-current 8 mg/L nitrate as nitrogen limit per Specification B.4 in the 2018 Order. In addition, the notice states that in compliance with Specification B.5 the “discharge shall not cause a significant increase of mineral constituent concentrations in underlying groundwater, as determined by comparison of samples collected from wells located upgradient and downgradient.”

In response to the notice of violation, the Wallace Group identified various sampling and monitoring efforts, as well as near-term and long-term infrastructure improvements the City can take to improve the operation of the WWTP and prevent additional violations (Wallace Group, 2019).

Compliance Planning

The recently adopted General Order No. R3-2020-0020 establishes effluent limitations, maximum discharge, and monitoring requirements for the WWTP as documented in the Monitoring and Reporting Program (MRP) and Waste Discharge Requirements contained in the General Order, for the protection of water quality and public health.

The City last evaluated the WWTP in 2013 and is currently contracted with Carollo Engineers to undertake a more comprehensive evaluation of the WWTP to determine the City's capital needs over the next 10 years. Based on the current regulatory landscape, Carollo is evaluating the engineering aspects of up to three (3) primary (if applicable), secondary, and tertiary treatment process configurations to increase effluent water quality in compliance with the General Order.

The General Order provides two options with regard to groundwater monitoring in Section V. Of these two options, Carollo intends to proceed with Option 1, which requires improving the treatment system to a degree that brings the quality of effluent discharged from the wastewater system within effluent limitations specified in Table 6 of the General Order, which would replace the requirement for the Discharger (the City) to conduct groundwater monitoring. To comply with Option 1 of Section V, the City must demonstrate within 24 months of issuance of the notice of applicability that the quality of the effluent discharged form the Wastewater System meets effluent limitations specified in Table 6. If the discharger is unable to comply with the effluent limitations within 24 months, the Discharger may be required to implement a groundwater monitoring program as described in Option 2 of Section V of the General Order. Even if the Discharger proceeds with Option 1, the Central Coast Water Board Executive Officer may still require groundwater monitoring to ensure protection of beneficial uses.

GSI supports the approach of choosing Option 1 and treating the effluent to a degree that brings the water quality within effluent limitations specified in Table 6 of the General Order to satisfy groundwater monitoring requirements. GSI also recommends continuing the groundwater monitoring program on a quarterly basis during the 24 months after the City receives notice that it has been enrolled in the General Order by the Central Coast Water Board. Until this notice is received, and the City is enrolled in the General Order, we recommend that the City maintains groundwater monitoring on a quarterly basis in compliance with the requirements of the monitoring plan described in Option B for groundwater monitoring

Groundwater Monitoring Network

In April of 1982, the city installed two shallow monitoring wells surrounding the percolation ponds and spray field. These wells were sampled and analyzed on a regular basis (Staal Gardner & Dunne Inc, 1992). Water levels in the monitoring wells occasionally fell below the bottom of the casing, inhibiting sampling. In addition, local regulatory agencies raised concerns regarding the volume of nitrogen loading from the wastewater disposal operations, which prompted review of the data from the existing monitoring wells. This review raised questions regarding the adequacy of the existing monitoring network and whether the existing data were representative.

In January of 1992, eight monitoring wells were installed as four clusters to enable regular monitoring to enhance the monitoring network. Each cluster consisted of a shallow (total depth of approximately 40 feet below ground surface) and a deeper well (total depth of approximately 80 feet below ground surface).

Groundwater Conditions

The reference point elevations for these eight wells and the original two monitoring wells were surveyed by MNS Engineers in August 2018 to enable accurate calculations for converting groundwater depth measurements to groundwater elevation measurements and therefore accurately determine groundwater flow direction. This was conducted for both the shallow and deep systems to determine whether the current groundwater flow directions in each system demonstrate that the monitoring wells represent upgradient and downgradient locations as originally intended. Groundwater contour maps for the March 2019 period are presented as Figure 3 for the shallow wells and Figure 4 for the deep wells. Note that water level data was not available from well MW-4D. The groundwater elevation data from both the shallow and deep wells show similar groundwater conditions consisting of relatively gentle groundwater gradient and a groundwater flow direction towards to the west, which generally parallels the Salinas River. This flow direction represents the understanding of the flow within the Salinas Valley groundwater basin. Hydrographs of water levels for all of the shallow wells are presented on Figure 5. Hydrographs of water levels for the deep monitoring wells are presented on Figure 6.

Adequacy of Groundwater Monitoring Network

The groundwater monitoring network is adequate for characterizing groundwater flow direction and gradient, as well as the relative upgradient and downgradient groundwater conditions in both the shallow and deep portions of the aquifer. The four sets of nested wells surround the disposal fields, as presented on Figures 2 through 4. Originally, two of the sets of wells were considered upgradient (clusters MW-1 and MW-3) and the other two sets considered as downgradient locations (clusters MW-2 and MW-4). The relative direction of groundwater flow from east to west supports the use of the easternmost well cluster MW-3 as an upgradient well. However, because of an expansion of the disposal fields eastward since the wells were installed in 1992 into the areas shown on Figures 2 through 4, the location of the MW-1 monitoring wells midway along the southern border of disposal fields is now potentially affected by the applied effluent. For this reason, we recommend that well cluster MW-1 remain in place as part of the monitoring network but be re-designated as a side-gradient monitoring well. With this single adjustment, monitoring well MW-3 would remain within the monitoring network to represent upgradient groundwater conditions. Monitoring well clusters MW-2 and MW-4 network would remain as downgradient wells.

If the City chooses to proceed with Option 1 with regard to effluent treatment in Section V, we recommend that the City conduct groundwater monitoring of the wells within the groundwater network on a quarterly basis in accordance with Table 9 of the Monitoring and Reporting Program of the General Order in to characterize groundwater conditions until compliance with the General Order is confirmed. Groundwater monitoring would be conducted in the following manner, in accordance with the MRP of the General Order: Prior to sampling, the depth to groundwater must be measured and groundwater elevations must be calculated. The monitoring wells must be purged of at least three well volumes and until measurements of the following parameters have stabilized (i.e., are reproducible within 10 percent): pH, temperature, dissolved oxygen, electrical conductivity, and turbidity. No-purge, low-flow, or other sampling techniques are acceptable if they are described in the Central Coast Water Board Executive Officer approved sampling and analysis plan. Once the groundwater level in each of the wells has recovered sufficiently to ensure the collection of representative groundwater samples, a qualified individual (e.g., consultant, technician, etc.) trained in using proper sampling methods must recover samples using approved USEPA methods. Laboratories analyzing groundwater samples must be accredited by the State Water Board Environmental Laboratory Accreditation Program, in accordance with California Water Code section 13176, and must include quality assurance/quality control data with their reports. All data must be recorded and submitted in monitoring well field sheets.

In addition, we recommend that the following low-cost improvements are implemented during that period to ensure the reliability of the groundwater monitoring program:

- Measurement of water level data monthly by City staff with an electronic water level sounder, capable of reading water levels relative to the surveyed monitoring point within each well to within an accuracy of 0.01 feet or, installation of low-cost, continuous groundwater level monitoring equipment in each of the monitoring wells
- Collection of water level and water quality data from monitoring well MW-4D, as possible.

Reporting Requirements

Quarterly groundwater quality sampling and reporting may be required under Option 1 of Section V of the General Order if the Executive Director determines the discharge from the City's WWTP may impact beneficial uses. All monitoring reports must be provided electronically in searchable PDF formation with the Central Coast Water Board's current transmittal sheet. The discharger must also submit all reports/documents and laboratory analytical data to the State Water Board's GeoTracker database consistent with applicable Electronic Submittal of Information requirements under a Wastewater System-specific global identification number.

References

Central Coast Regional Water Quality Control Board (2018). *Greenfield Wastewater Treatment System, Waste Discharge Requirements Order No. R3-2002-0062, WDID 3 2700105001, Monterey County – Notice of Violation & Water Code 13267 Report Requirements*. May 2018

Central Coast Regional Water Quality Control Board (2020a) *Response to Comments.* 2020

Central Coast Regional Water Quality Control Board (2020b), *General Waste Discharge Requirements Order No. R3-2020-0020*. September 2020

City of Greenfield (2019) *Request for Proposal For Wastewater Treatment Plan Master Plan Update.* August 2019

Staal Gardner & Dunne Inc (1992) *Installation of Ground Water Monitoring Wells, City of Greenfield Wastewater Disposal Area, Greenfield, California.* February 1992

Wallace Group (2019) *Effluent Disposal Study and Compliance Work Plan in Response to Notice of Violation.* June 2018

Figures

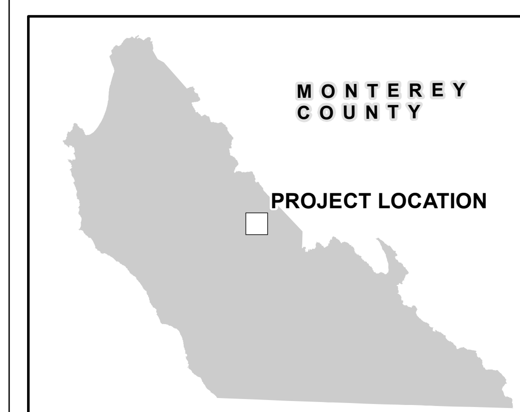
FIGURE 1

Overview Map

City of Greenfield
Wastewater Treatment Plant
Groundwater Monitoring System
Assessment

LEGEND

- Waste Water Treatment Plant
- City Boundary
- Major Road
- Watercourse



NOTE
WWTP: Waste Water Treatment Plant

N
0 1
Miles

GSI Water Solutions, Inc.

Date: March 1, 2021
Data Sources: USGS, ESRI

Document Path: Y:\0384_Carollo_Eng\Source_Figures\011_Greenfield_Master_Plan\Figure1_Overview_Map.mxd, TNicely

FIGURE 2

Monitoring Well Locations

City of Greenfield
Wastewater Treatment Plant
Groundwater Monitoring System
Assessment

LEGEND

- Monitoring Well
- Waste Water Treatment Plant
- Greenfield City Boundary
- Major Road

NOTE

WWTP: Waste Water Treatment Plant

N

0 300 600 900
Feet

Date: March 1, 2021
Data Sources: USGS, ESRI

GSI Water Solutions, Inc.

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FIGURE 3

Shallow Groundwater Elevation Contours

City of Greenfield
Wastewater Treatment Plant
Groundwater Monitoring System
Assessment

LEGEND

- Monitoring Well
  Water Level in ft
- Groundwater Elevation Contour, March 2019 (ft)
- Waste Water Treatment Plant
- Greenfield City Boundary
- Major Road

NOTE
WWTP: Waste Water Treatment Plant

N

0 200 400 600
Feet

Date: March 1, 2021
Data Sources: USGS, ESRI

GSI Water Solutions, Inc.

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FIGURE 4

Deep Groundwater Elevation Contours

City of Greenfield
Wastewater Treatment Plant
Groundwater Monitoring System
Assessment

LEGEND

- Monitoring Well
  Water Level in ft
- Groundwater Elevation Contour, March 2019 (ft)
- Waste Water Treatment Plant
- Greenfield City Boundary
- Major Road

NOTE

WWTP: Waste Water Treatment Plant

N

0 200 400 600
Feet

Date: March 1, 2021
Data Sources: USGS, ESRI

GSI Water Solutions, Inc.

Document Path: Y:\0384_Carollo_Eng\Source_Figures\011_Greenfield_Master_Plan\Figure4_WL_Elevations_deep.mxd, abarry

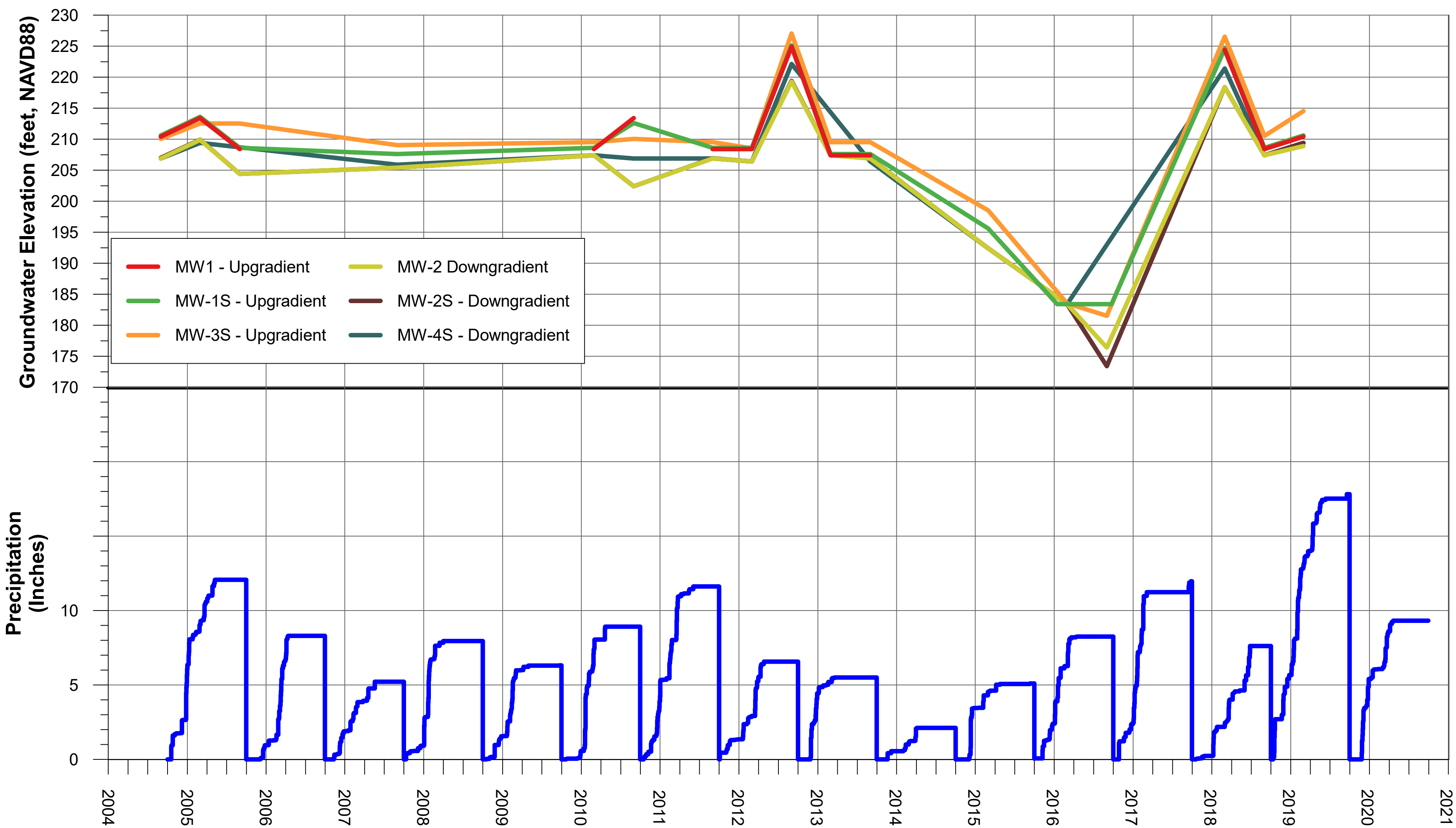

FIGURE 5

Groundwater Elevation Hydrographs - Shallow Monitoring Wells

City of Greenfield Wastewater Treatment Plant

Greenfield, California

Note:

Precipitation data from California Irrigation Management Informaton System Station 114

GSI Water Solutions, Inc.

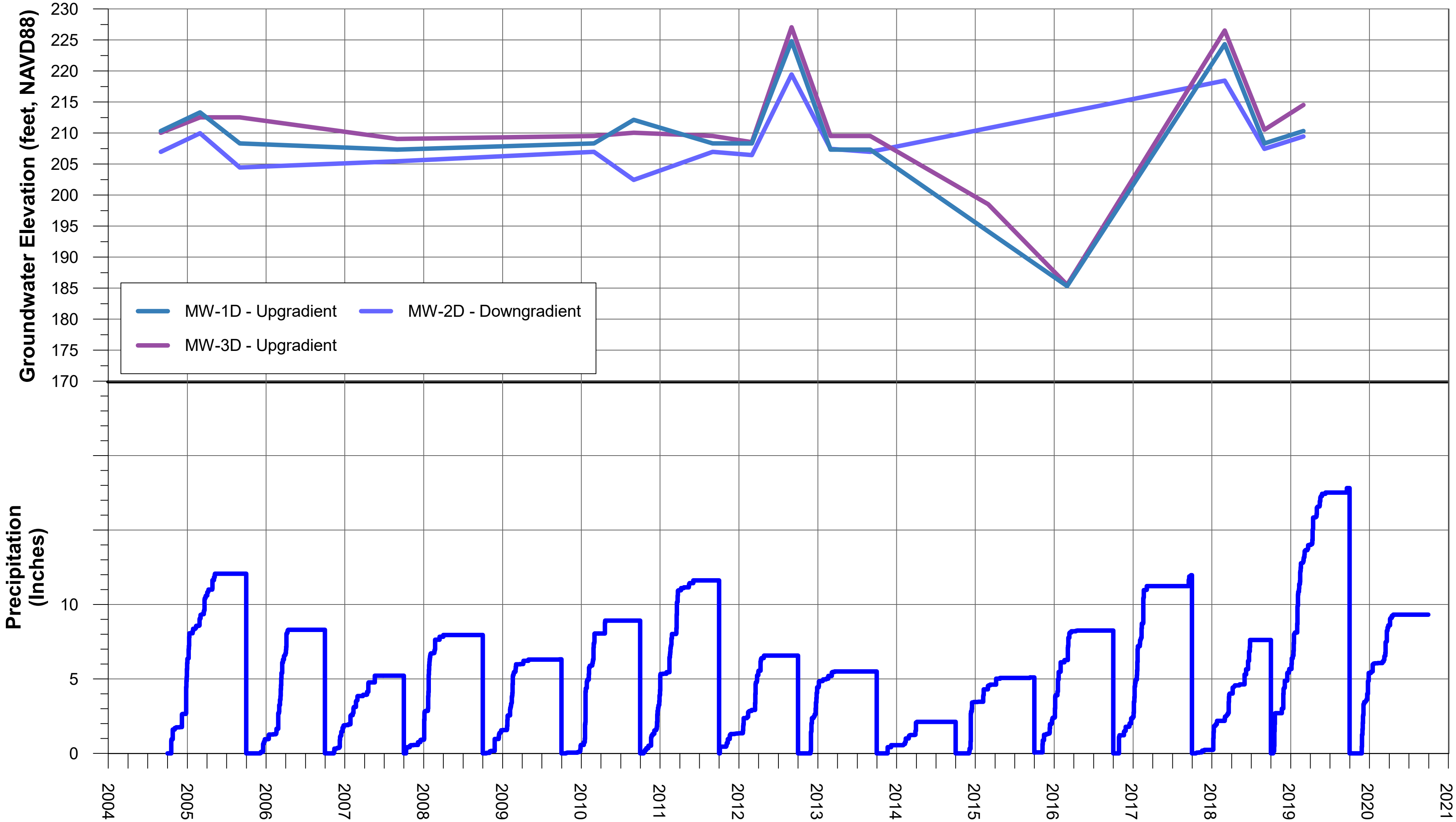

FIGURE 6

Groundwater Elevation Hydrograph - Deep Monitoring Wells

City of Greenfield Wastewater Treatment Plant

Greenfield, California

Note:
Precipitation data from California Irrigation Management Informaton System Station 114

GSI Water Solutions, Inc.

Appendix E

GROUNDWATER QUALITY FIGURES

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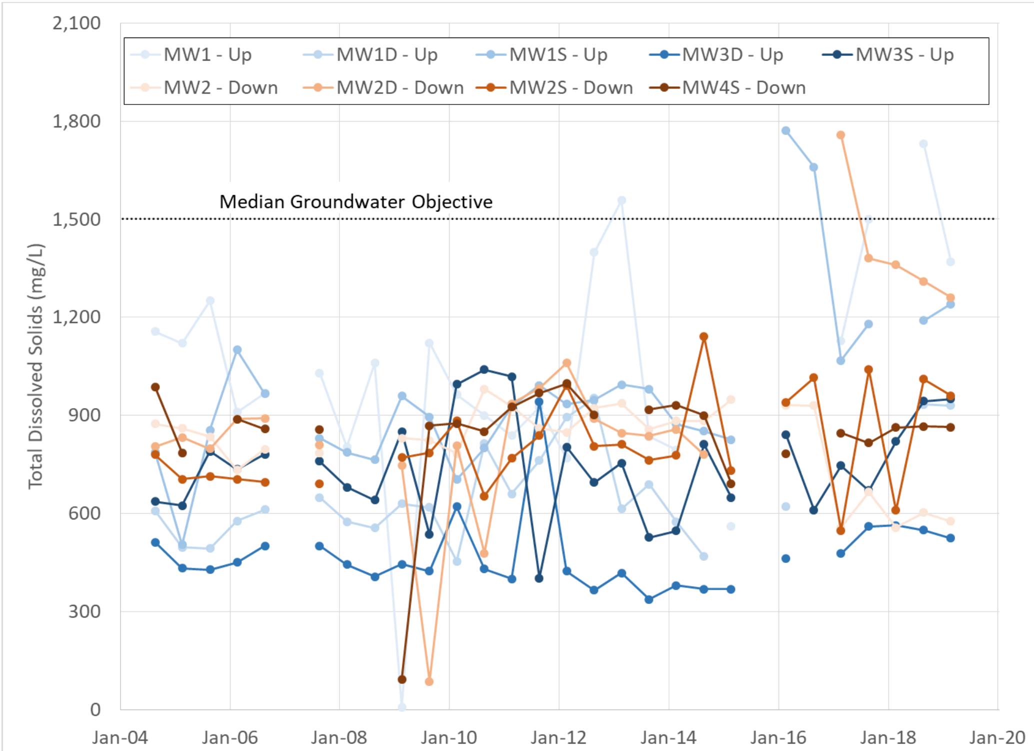

Figure 1 Total Dissolved Solids Concentration in Groundwater Monitoring Wells

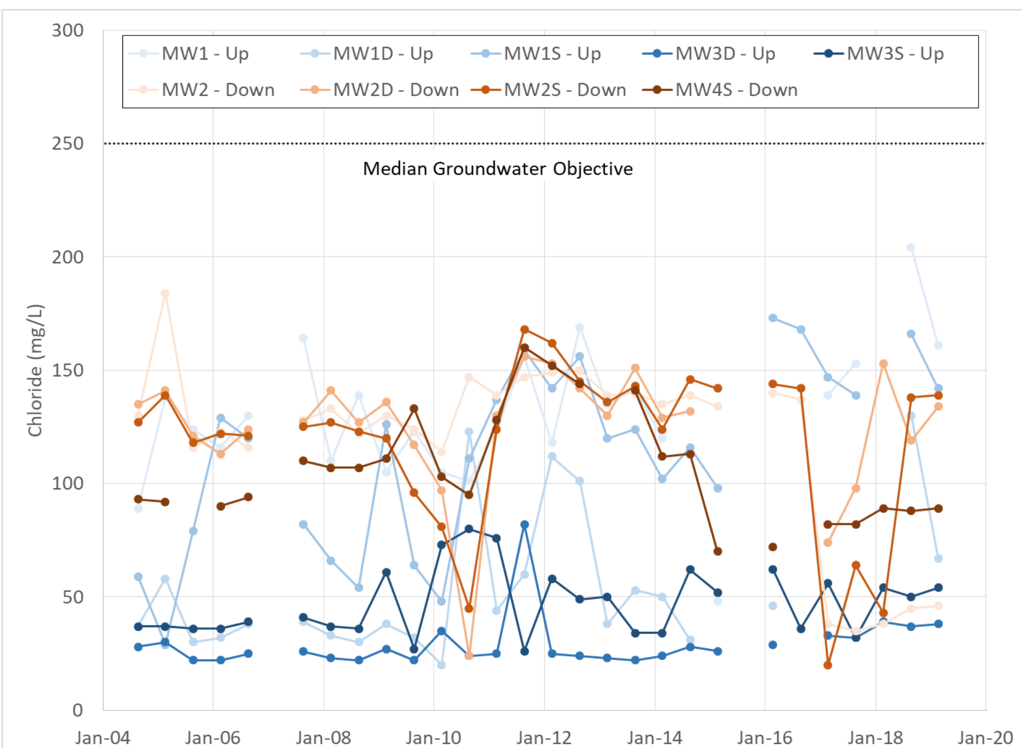

Figure 2 Chloride Concentration in Groundwater Monitoring Wells

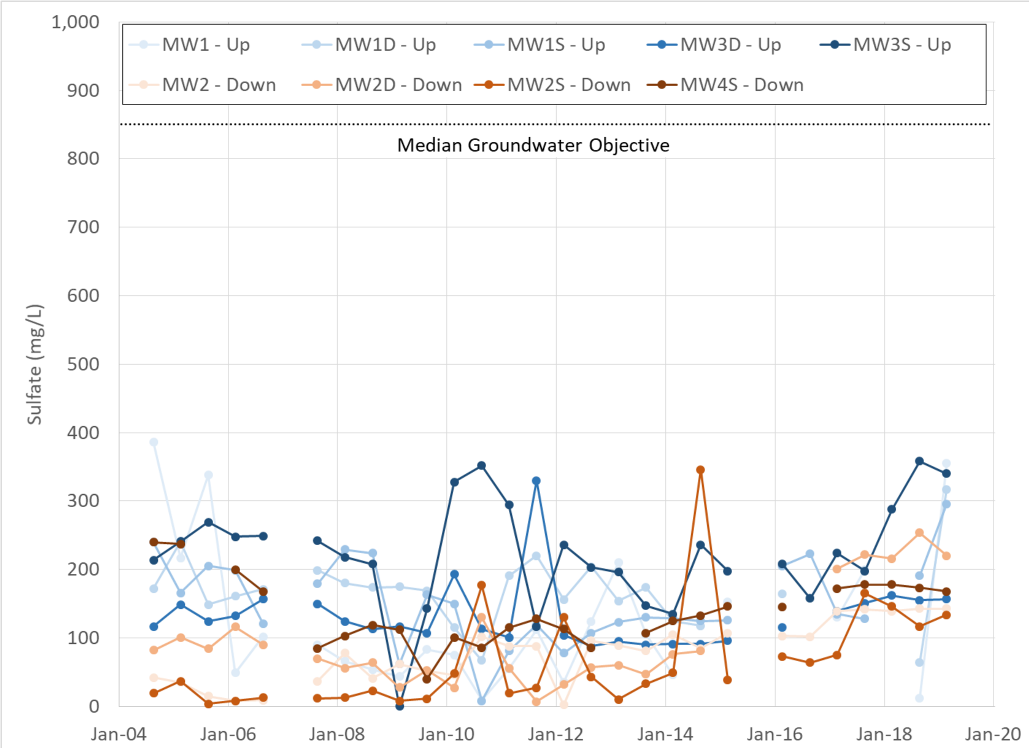

Figure 3 Sulfate Concentration in Groundwater Monitoring Wells

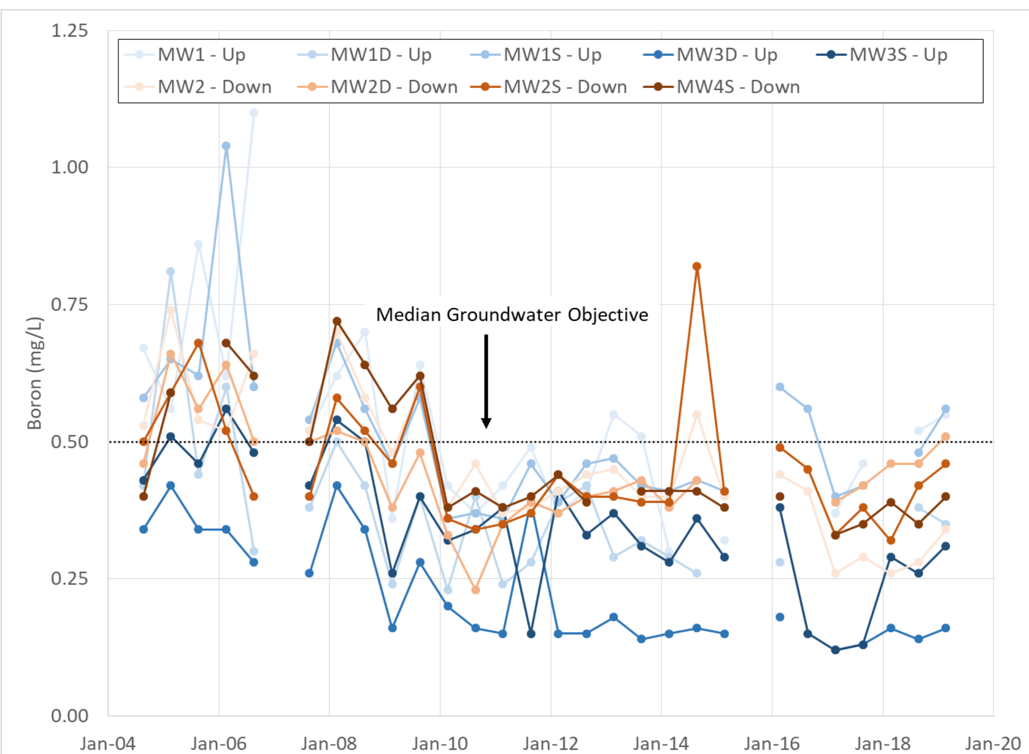

Figure 4 Boron Concentration in Groundwater Monitoring Wells

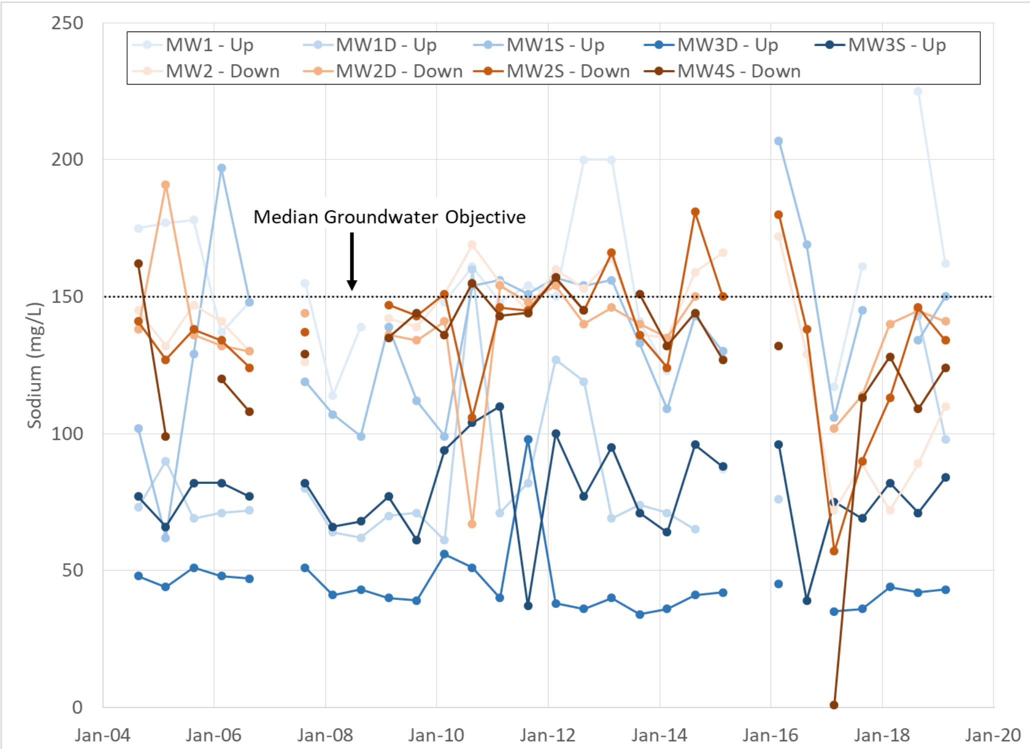

Figure 5 Sodium Concentration in Groundwater Monitoring Wells

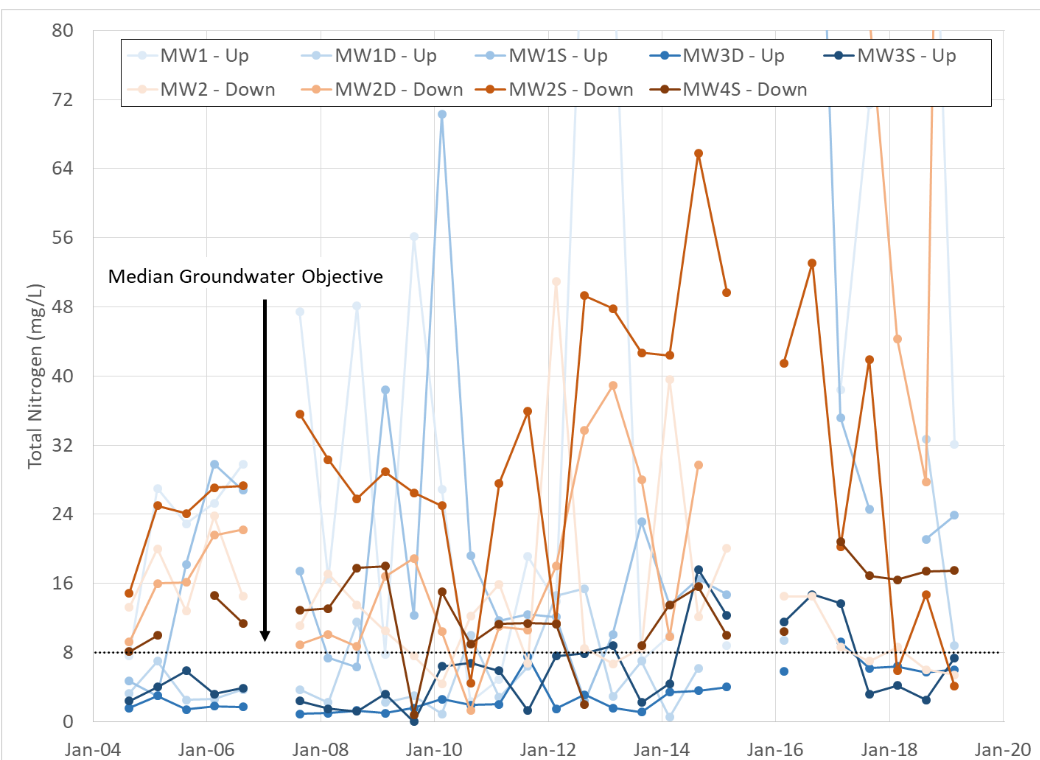

Figure 6 Total Nitrogen Concentration in Groundwater Monitoring Wells

Appendix F

WATER BALANCES

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Month	2040 Projections		Hydrologic							Recycled Water								Percolation					
	Wastewater Flow		ETo	ETc	Precipitation	Net Irrigation Requirement		Pan Evap	Evap	Use Area	RW Demand	RW demand	Excess Effluent	RW Storage (irrigating 3 d/wk)		RW Pumping (pumping 8 hr/d)		Percolation Area	Percolation Rate		Precip - Evap		Monthly Storage
	mgd	AF/mo	in/mo	in/mo	in/mo	in/mo	%	in/mo	in/mo	acres	AF/mo	mgd	AF/mo	AF	MG	AF/mo	MGD	Acres	in/d	AF/mo	in/mo	AF/mo	AF/mo
January	1.82	173	1.7	1.4	3.0	0.0	0%	1.6	1.1	113	0	0.0	173	0	0	0	0.0	19	-4.0	-196	2	93	70
February	1.83	157	2.6	2.1	2.0	0.1	0%	2.2	1.5	113	1	0.0	156	0	0	10	0.1	19	-4.0	-177	0	19	-2
March	1.89	179	3.7	2.9	2.2	1.1	2%	3.9	2.7	113	10	0.1	169	2	1	73	0.8	19	-4.0	-196	-1	-29	-56
April	1.85	171	5.5	4.4	0.6	5.5	10%	5.5	3.9	113	52	0.6	119	9	3	361	3.9	19	-4.0	-190	-3	-157	-228
May	1.90	181	6.6	5.3	0.3	7.2	14%	7.9	5.5	113	68	0.7	113	11	4	474	5.0	19	-4.0	-196	-5	-259	-342
June	1.94	179	7.5	6.0	0.0	8.6	16%	9.9	6.9	113	81	0.9	98	13	4	566	6.1	19	-4.0	-190	-7	-327	-419
July	1.94	184	8.1	6.5	0.0	9.2	18%	11.3	7.9	113	87	0.9	97	14	5	609	6.4	19	-4.0	-196	-8	-387	-486
August	1.99	189	6.9	5.5	0.0	7.9	15%	10.4	7.3	113	75	0.8	114	12	4	522	5.5	19	-4.0	-196	-7	-358	-440
September	1.99	183	5.8	4.6	0.0	6.6	13%	7.8	5.4	113	62	0.7	121	10	3	434	4.7	19	-4.0	-190	-5	-258	-327
October	2.00	190	4.5	3.6	0.4	4.5	9%	5.2	3.6	113	42	0.4	148	7	2	296	3.1	19	-4.0	-196	-3	-157	-205
November	1.90	175	2.5	2.0	1.0	1.5	3%	2.6	1.8	113	14	0.2	160	2	1	99	1.1	19	-4.0	-190	-1	-39	-69
December	1.80	172	1.9	1.5	1.5	0.0	0%	1.7	1.2	113	0	0.0	171	0	0	1	0.0	19	-4.0	-196	0	18	-7
Total:		**2133**	**57**	**46**	**11**	**52**	**100%**	**70**	**49**	**113**	**492**		**1641**	**14**	**5**	**609**	**6**	**228**	**-48**	**-2312**	**-38**	**-1841**	**-2512**

Month	2040 Projections		Hydrologic			Percolation Ponds									
	Wastewater Flow		Precipitation	Pan Evap	Evap	Percolation Area	Percolation Rate		Precip	Evap	Precip - Evap		Monthly Storage	Cumulative Storage
	mgd	AF/mo	in/mo	in/mo	in/mo	Acres	in/d	AF/mo	AF/mo	AF/mo	in/mo	AF/mo	AF/mo	AF
November	1.90	175	1.0	2.6	1.8	32	-4.0	-320	78	-144	-1	-66	-211	0
December	1.80	172	1.5	1.7	1.2	32	-4.0	-331	126	-96	0	30	-129	0
January	1.82	173	3.0	1.6	1.1	32	-4.0	-331	249	-91	2	157	0	0
February	1.83	157	2.0	2.2	1.5	32	-4.0	-299	147	-115	0	32	-110	0
March	1.89	179	2.2	3.9	2.7	32	-4.0	-331	178	-227	-1	-48	-200	0
April	1.85	171	0.6	5.5	3.9	32	-4.0	-320	45	-310	-3	-265	-414	0
May	1.90	181	0.3	7.9	5.5	32	-4.0	-331	22	-458	-5	-437	-586	0
June	1.94	179	0.0	9.9	6.9	32	-4.0	-320	1	-552	-7	-551	-692	0
July	1.94	184	0.0	11.3	7.9	32	-4.0	-331	0	-653	-8	-652	-799	0
August	1.99	189	0.0	10.4	7.3	32	-4.0	-331	0	-604	-7	-603	-745	0
September	1.99	183	0.0	7.8	5.4	32	-4.0	-320	0	-435	-5	-434	-571	0
October	2.00	190	0.4	5.2	3.6	32	-4.0	-331	35	-299	-3	-264	-404	0
Total:	**1.9**	**2133**	**11**	**70**	**49**	**26**	**-122**	**-3893**	**881**	**-3982**	**-38**	**-3101**	**-4861**	**0**

Appendix G

UV COMPARISON

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Greenfield, CA

Water Reuse Application	**Sand or Cloth-Media Filtration**	
Design Parameter:	**Option A**	[redacted]
Maximum Day Flow Rate (MGD)	2.0	
Annual Average Flow Rate (MGD)	1.8	
Design UV Transmittance (%)	55	
Average UV Transmittance (%)	60	
Total Suspended Solids (mg/L)	5	
MS2 RED (mJ/cm2), per NWRI 2012	104.0	
Redundancy	N + 1 at Max.Flow	
Upstream Process	Secondary followed by Sand Filtration	
Permit Limits:		
Total Coliform, based on a 7-day median	2.2 MPN/100 mL	
Total Coliform, maximum single grab sample	23 MPN/100 mL	

Parameters	**Trojan**	**WEDECO**	**Calgon Carbon**
Model:	**UVSigna 2-Row**	**Duron**	**$C^3$500D**
Design Factors:			
End of Lamp Life Factor	0.86	0.85	0.85
Fouling Factor	0.94	0.90	0.90
MS2 RED (mJ/cm2), per NWRI 2012	**119.1**	**104.4**	**106.0**
Configuration (Phase I):			
Number of Channels	1	1	1
Number of Duty Banks/Channel	3	6	4
Number of Standby Banks/Channel	1	1	1
Total Number of Banks/Channel	4	7	5
Number of Modules/Bank	1	1	3
Number of Lamps/Module	12	16	7
Total Number of Lamps	**48**	**112**	**105**
Number of UV Sensors	4	7	5
Number of Power Distribution Centers	2	4	5
Number of Master Control Panels	1	1	1
Total Power Consumption (kW)	**52.5**	**83.4**	**66.9**
Number of Lamps Needed at Average Flow	24	80	63
Lamp Power Consumption at Average Flow	23.5	53.6	35.6
Headloss Across UV Banks @ 2.0 MGD (inches)	0.3	0.6	2.6
Headloss across Baffle Plate (in)	2.0	2.0	2.0

Channel Dimensions			
Channel Width (inches)	40.0	39.0	18.0
Channel Depth (feet)	7.8	6.3	5.5
Total Channel Length Required (Feet)	40.0	49.0	68.0

Estimated Enclosure Footprints

Parameters	**Trojan**	**WEDECO**	**Calgon Carbon**
PDC Enclosure Sizes:			
Width (in)	46.0	47.0	53.0
Depth (in)	28.0	24.0	20.0
Height (in)	84.0	85.0	72.0
Area for All PDCs (ft^2)	17.9	31.3	36.8
SCC Enclosure Sizes:			
Width (in)	36.0	32.0	30.0
Depth (in)	12.0	24.0	13.0
Height (in)	36.0	85.0	70.0
Area for 1 SCCs (ft^2)	3.0	5.3	2.7
Number of Enclosures (PDCs):	2	4	5

Comparison of UV Alternatives Following Sand / Cloth-Media Filtration

Greenfield, CA

Description	Trojan	WEDECO	Calgon Carbon
Equipment Costs (Estimates)			
UV Disinfection System	350,000	513,000	635,000
Total Capital Costs:	**$ 350,000**	**$ 513,000**	**$ 635,000**
Operation and Maintenance Cost Information			
Power Consumption			
Power Consumption (kW) at Average Conditions (1)	23.5	53.6	35.6
Lamp and Ballast Power Consumption at Full Power, all Lamps (kW)	37.9	74.7	60.4
Ancillary Power Consumption per Power Distribution Center (PDC) (Power Supplies, Air Conditioners, Fans, etc.) (kW)	1.24	2.1	1.3
Total Number of PDC's	2	4	5
Power Consumption of System Control Center (SCC) (PLC, HMI, Power Supplies, Air Conditioner, Fans, etc.) (kW)	1.7	0.4	2.7
Maximum Power Consumption (kW)	42.1	83.5	69.6
Lamp Replacement			
Total Number of Lamps in System	48	112	105
Number of Lamps Operating at Average Conditions (1)	24	80	63
Guaranteed Lamp Life (hours)	15000	14000	16000
Lamp Replacement Cost	$850	$310	$272
Ballast Replacement			
Total Number of Ballasts in System	24	56	105
Guaranteed Ballast Life (years)	10	10	10
Ballast Replacement Cost	$1,150	$775	$585
Quartz Sleeve Replacement			
Total number of Quartz Sleeves in System	48	112	105
Guaranteed Quartz Sleeve Life (years)	10	20	10
Quartz Sleeve Replacement Cost	$230	$180	$104
UV Intensity Sensor Replacement			
Total Number of UV Intensity Sensors in System	4	7	5
Guaranteed UV Sensor Life (years)	5	10	5
UV Intensity Sensor Replacement Cost	$1,156	$750	$1,622
Annual Cost for Duty and Reference Sensors Calibration	$500	$425	$590
Cleaning System - Wiper Replacement Cost			
Total Number of Automatic Cleaning Wipers in System	48	224	105
Guaranteed Wiper Life (years)	1	1.5	5
Wiper Replacement Cost	$28	$18	$100
Annual Cost for Automatic Cleaning System Consumables (Cleaning Solution, etc.)	$100	$100	$100

Notes: (1) Average Conditions is defined as a flow rate of 1.8 MGD and a UV transmittance of 60%. Use the design End of Lamp Life and Fouling factors in your calculations.

Greenfield, CA

Water Reuse Application		MBR
Design Parameter:	[redacted]	**Option B**
Maximum Day Flow Rate (MGD)		2.0
Annual Average Flow Rate (MGD)		1.8
Design UV Transmittance (%)		65
Average UV Transmittance (%)		69
Total Suspended Solids (mg/L)		5
MS2 RED (mJ/cm2), per NWRI 2012		83.0
Redundancy		N + 1 at Max.Flow
Upstream Process		Secondary followed by MBR
Permit Limits:		
Total Coliform, based on a 7-day median	2.2 MPN/100 mL	
Total Coliform, maximum single grab sample	23 MPN/100 mL	

Parameters	Trojan	WEDECO	Calgon Carbon
Model:	**UVSigna 2-Row**	**Duron**	**$C^3$500D**
Design Factors:			
End of Lamp Life Factor	0.86	0.85	0.85
Fouling Factor	0.94	0.90	0.90
MS2 RED (mJ/cm2), per NWRI 2012	**96.2**	**91.4**	**84.9**
Configuration (Phase I):			
Number of Channels	1	1	1
Number of Duty Banks/Channel	2	5	3
Number of Standby Banks/Channel	1	1	1
Total Number of Banks/Channel	3	6	4
Number of Modules/Bank	1	1	2
Number of Lamps/Module	10	12	7
Total Number of Lamps	**30**	**72**	**56**
Number of UV Sensors	3	6	4
Number of Power Distribution Centers	2	2	4
Number of Master Control Panels	1	1	1
Total Power Consumption (kW)	**33.4**	**52.5**	**35.5**
Number of Lamps Needed at Average Flow	20	48	42
Lamp Power Consumption at Average Flow	13.0	24.0	19.2
Headloss Across UV Banks @ 2.0 MGD (inches)	0.3	0.7	1.7
Headloss across Baffle Plate (in)	2.0	2.0	2.0

Channel Dimensions			
Channel Width (inches)	35.0	29.5	12.0
Channel Depth (feet)	7.8	6.3	5.5
Total Channel Length Required (Feet)	40.0	44.0	56.0

Estimated Enclosure Footprints

Parameters	Trojan	WEDECO	Calgon Carbon
PDC Enclosure Sizes:			
Width (in)	46.0	47.0	41.0
Depth (in)	28.0	24.0	20.0
Height (in)	84.0	85.0	72.0
Area for All PDCs (ft^2)	17.9	15.7	22.8
SCC Enclosure Sizes:			
Width (in)	36.0	32.0	30.0
Depth (in)	12.0	24.0	13.0
Height (in)	36.0	85.0	70.0
Area for 1 SCCs (ft^2)	3.0	5.3	2.7
Number of Enclosures (PDCs):	2	2	4

Comparison of UV Alternatives Following MBR

Greenfield, CA

Description	Trojan	WEDECO	Calgon Carbon
Equipment Costs (Estimates)			
UV Disinfection System	275,000	406,000	481,000
Total Capital Costs:	**$ 275,000**	**$ 406,000**	**$ 481,000**
Operation and Maintenance Cost Information			
Power Consumption			
Power Consumption (kW) at Average Conditions(1)	13.0	24.0	19.2
Lamp and Ballast Power Consumption at Full Power, all Lamps (kW)	21.1	48.0	32.2
Ancillary Power Consumption per Power Distribution Center (PDC) (Power Supplies, Air Conditioners, Fans, etc.) (kW)	1.24	2.1	0.9
Total Number of PDC's	2	2	4
Power Consumption of System Control Center (SCC) (PLC, HMI, Power Supplies, Air Conditioner, Fans, etc.) (kW)	1.7	0.4	2.7
Maximum Power Consumption (kW)	25.3	52.6	38.5
Lamp Replacement			
Total Number of Lamps in System	30	72	56
Number of Lamps Operating at Average Conditions(1)	20	48	42
Guaranteed Lamp Life (hours)	15000	14000	16000
Lamp Replacement Cost	$850	$310	$272
Ballast Replacement			
Total Number of Ballasts in System	15	36	56
Guaranteed Ballast Life (years)	10	10	10
Ballast Replacement Cost	$1,150	$775	$585
Quartz Sleeve Replacement			
Total number of Quartz Sleeves in System	30	72	56
Guaranteed Quartz Sleeve Life (years)	10	20	10
Quartz Sleeve Replacement Cost	$230	$180	$104
UV Intensity Sensor Replacement			
Total Number of UV Intensity Sensors in System	3	6	4
Guaranteed UV Sensor Life (years)	5	10	5
UV Intensity Sensor Replacement Cost	$1,156	$750	$1,622
Annual Cost for Duty and Reference Sensors Calibration	$500	$425	$590
Cleaning System - Wiper Replacement Cost			
Total Number of Automatic Cleaning Wipers in System	30	144	56
Guaranteed Wiper Life (years)	1	1.5	5
Wiper Replacement Cost	$28	$18	$100
Annual Cost for Automatic Cleaning System Consumables (Cleaning Solution, etc.)	$100	$100	$100

Notes: (1) Average Conditions is defined as a flow rate of 1.8 MGD and a UV transmittance of 69%. Use the design End of Lamp Life and Fouling factors in your calculations.

Appendix H

CAPITAL COST SUMMARY

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Engineers...Working Wonders With Water®

PROJECT SUMMARY

Project:	Greenfield WWTP Master Plan	Estimate Class:	5
Client:	City of Greenfield	PIC:	PA
Location:	Greenfield, CA	PM:	ETC
Zip Code:	93927	Date:	November 2020
		By:	John Witter
Carollo Job #	11841A00	Reviewed:	ETC

NO.	DESCRIPTION		TOTAL
01	Headworks		$2,500,000
02	Grit Removal		$500,000
03	MLE (three basins; 1.8 MG total)		$6,997,975
14	Secondary Clarifiers (three 50-foot diameter)		$3,194,472
07	Continuous Backwash Sand Filter		$3,682,077
09	UV		$838,246
10	Aerobic Digester		$1,812,461
12	Centrifuge		$2,760,704
15	Effluent Pump Station		$1,000,000
16	Site Work		$2,780,800
17	Electrical, Instrumentation, and Controls		$8,688,912
	TOTAL DIRECT COST		**$34,755,647**
	Contingency	30.0%	$10,426,694
	Subtotal		**$45,182,342**
	General Conditions, Contractor Overhead, Profit, Risk	25.0%	$11,295,585
	Subtotal		**$56,477,927**
	Escalation to Mid-Point	15.0%	$8,471,689
	Subtotal		**$64,949,616**
	Sales Tax (Based on 50% of Direct Cost)	9.5%	$1,650,893
	Subtotal		**$66,600,509**
	Bid Market Allowance	0.0%	$0
	TOTAL ESTIMATED CONSTRUCTION COST		**$66,600,509**
	Construction Management, Engineering, Legal & Admin	25.0%	$16,650,127
	Owner's Reserve for Change Orders	0.0%	$0
	TOTAL ESTIMATED PROJECT COST		**$83,250,637**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Engineers...Working Wonders With Water®

PROJECT SUMMARY

Project:	**Greenfield WWTP Master Plan**	**Estimate Class:**	**5**
Client:	**City of Greenfield**	**PIC:**	**PA**
Location:	**Greenfield, CA**	**PM:**	**ETC**
Zip Code:	**93927**	**Date:**	**November 2020**
		By:	**John Witter**
Carollo Job #	**11841A00**	**Reviewed:**	**ETC**

NO.	DESCRIPTION		TOTAL
01	Headworks		$2,500,000
04	Ox Ditch (two basins; 3.6 MG total)		$7,263,827
14	Secondary Clarifiers (three 50-foot diameter)		$3,194,472
06	Cloth-Media Filters		$2,001,905
08	Chlorine Contact Basin		$782,404
11	Sludge Holding Tank		$906,005
13	Screw Press		$2,373,378
15	Effluent Pump Station		$1,000,000
16	Site Work		$2,780,800
17	Electrical, Instrumentation, and Controls		$7,600,930
	TOTAL DIRECT COST		**$30,403,721**
	Contingency	30.0%	$9,121,116
	Subtotal		**$39,524,838**
	General Conditions, Contractor Overhead, Profit, Risk	25.0%	$9,881,209
	Subtotal		**$49,406,047**
	Escalation to Mid-Point	15.0%	$7,410,907
	Subtotal		**$56,816,954**
	Sales Tax (Based on 50% of Direct Cost)	9.5%	$1,444,177
	Subtotal		**$58,261,131**
	Bid Market Allowance	0.0%	$0
	TOTAL ESTIMATED CONSTRUCTION COST		**$58,261,131**
	Construction Management, Engineering, Legal & Admin	25.0%	$14,565,283
	Owner's Reserve for Change Orders	0.0%	$0
	TOTAL ESTIMATED PROJECT COST		**$72,826,414**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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PROJECT SUMMARY

Project:	**Greenfield WWTP Master Plan**	**Estimate Class:**	**5**
Client:	**City of Greenfield**	**PIC:**	**PA**
Location:	**Greenfield, CA**	**PM:**	**ETC**
Zip Code:	**93927**	**Date:**	**November 2020**
		By:	**John Witter**
Carollo Job #	**11841A00**	**Reviewed:**	**ETC**

NO.	DESCRIPTION		TOTAL
01	Headworks (includes perforated screen)		$3,000,000
02	Grit Removal		$500,000
05	MBR (three basins; 0.85 MG total)		$11,681,412
09	UV		$670,597
10	Aerobic Digester		$1,812,461
13	Screw Press		$2,373,378
15	Effluent Pump Station		$1,000,000
16	Site Work		$2,780,800
17	Electrical, Instrumentation, and Controls		$7,939,549
	TOTAL DIRECT COST		**$31,758,197**
	Contingency	30.0%	$9,527,459
	Subtotal		**$41,285,656**
	General Conditions, Contractor Overhead, Profit, Risk	25.0%	$10,321,414
	Subtotal		**$51,607,070**
	Escalation to Mid-Point	15.0%	$7,741,061
	Subtotal		**$59,348,131**
	Sales Tax (Based on 50% of Direct Cost)	9.5%	$1,508,514
	Subtotal		**$60,856,645**
	Bid Market Allowance	0.0%	$0
	TOTAL ESTIMATED CONSTRUCTION COST		**$60,856,645**
	Construction Management, Engineering, Legal & Admin	25.0%	$15,214,161
	Owner's Reserve for Change Orders	0.0%	$0
	TOTAL ESTIMATED PROJECT COST		**$76,070,806**

Appendix J

O&M COST SUMMARY

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GREENFIELD MASTER PLAN ANNUAL OPERATION & MAINTENANCE COSTS	Process			Electricity						Chemicals			Hauling		Equipment Maintenance	Operation and Maintenance Labor		TOTAL
				$ 0.120 /kWh									$ 50.00 /WT			$ 40.00 /hr		
	Flow mgd, scfm	No. of Operating Units	Motor Power (hp)	Total Operating Motor Power (hp)	Operational % of Nameplate	Power input (kW)	Operation Time (hr/d)	Annual kWh	Annual power cost	Usage (lb/yr)	Unit Cost ($/lb)	Chemical Cost ($/year)	lb/d	$/yr	Repair/ Replacement Cost	Labor hours (hr/d)	$/yr	**O&M Cost ($/year)**
Headworks																		
Influent Pumps	1.8	2	25	50	85%	32	24	277,629	$33,315									
Climber Screen	5.0	2	1	2	85%	1	12	5,553	$666									
Screening Washer/Compactor	5.0	1	5	5	85%	3	12	13,881	$1,666									
Screenings Hauling													1,000	$9,125				
Replacement Parts															$8,000			
Labor																2.0	$29,200	
Total									**$35,648**			**$0**		**$9,125**	**$8,000**		**$29,200**	**$81,973**
MLE																		
Grit Classifier	5.0	1	1	1	85%	1	24	5,553	$666									
Grit Pump	5.0	1	7.5	8	85%	5	24	41,644	$4,997									
Anoxic Mixers		3	5	15	85%	10	24	83,289	$9,995									
RAS Pumps	1.35	3	10	30	85%	19	24	166,577	$19,989									
WAS Pumps	0.06	1	7.5	8	85%	5	8	13,881	$1,666									
MLR Pumps	10	3	5	15	85%	10	24	83,289	$9,995									
Aeration Blowers	2500	2	60	120	85%	76	24	666,309	$79,957									
Biosolids Hauling													4,514	$205,951				
Diffuser Replacement															$13,750			
Labor																16.0	$233,600	
Total									**$127,265**			**$0**		**$205,951**	**$13,750**		**$233,600**	**$580,566**
Oxidation Ditch																		
Anoxic Mixers		2	10	20	85%	13	24	111,051	$13,326									
Surface Aerator		2	60	120	85%	76	24	666,309	$79,957									
RAS Pumps	1.35	3	10	30	85%	19	24	166,577	$19,989									
WAS Pumps	0.06	1	7.5	8	85%	5	8	13,881	$1,666									
Biosolids Hauling													3,609	$219,548				
Mixer Replacement															$12,000			
Labor																12.0	$175,200	
Total									**$114,938**			**$0**		**$219,548**	**$12,000**		**$175,200**	**$521,686**
MBR																		
Grit Classifier	5.0	1	1	1	85%	1	24	5,553	$666									
Grit Pump	5.0	1	7.5	8	85%	5	24	41,644	$4,997									
Rotary Drum Fine Screen	5.0	2	2	4	85%	3	24	22,210	$2,665									
Anoxic Mixers		3	5	15	85%	10	24	83,289	$9,995									
Air Scour Blowers	3,300	2	75	150	85%	95	24	832,886	$99,946									

GREENFIELD MASTER PLAN ANNUAL OPERATION & MAINTENANCE COSTS	Process			Electricity $ 0.120 /kWh						Chemicals			Hauling $ 50.00 /WT		Equipment Maintenance	Operation and Maintenance Labor $ 40.00 /hr		TOTAL
	Flow mgd, scfm	No. of Operating Units	Motor Power (hp)	Total Operating Motor Power (hp)	Operational % of Nameplate	Power input (kW)	Operation Time (hr/d)	Annual kWh	Annual power cost	Usage (lb/yr)	Unit Cost ($/lb)	Chemical Cost ($/year)	lb/d	$/yr	Repair/ Replacement Cost	Labor hours (hr/d)	$/yr	**O&M Cost ($/year)**
Aeration Blowers	2,500	2	60	120	85%	76	24	666,309	$79,957									
RAS Pumps	1.35	3	10	30	85%	19	24	166,577	$19,989									
WAS Pumps	0.06	1	7.5	8	85%	5	24	41,644	$4,997									
Permeate Pumps	1.8	2	25	50	85%	32	24	277,629	$33,315									
Citric Acid CIP										750	$1.00	$750						
Sulfuric Acid CIP										20	$5.00	$100						
Biosolids Hauling													4,627	$281,476				
Diffuser Replacement															$6,113			
Membrane Replacement															$68,544			
Labor																24.0	$350,400	
Total									**$256,529**			**$850**		**$281,476**	**$74,657**		**$350,400**	**$963,911**
Secondary Clarifiers																		
Clarifier Drive Mechanism		3	1.0	3	85%	2	24	16,658	$1,999									
Scum Pump		2	5	10	85%	6	8	18,509	$2,221									
Drive Replacement															$48,000			
Labor																2.0	$29,200	
Total									**$4,220**			**$0**		**$0**	**$48,000**		**$29,200**	**$81,420**
CMF																		
Feed Pumps	1.8	2	25	50	85%	32	24	277,629	$33,315									
Drive Assembly		2	0.75	2	85%	1	6	2,082	$250									
Backwash Pump		2	2	4	85%	3	6	5,553	$666									
Polymer Addition	1.8									5,479	$2.00	$10,959						
Alum Addition	1.8									65,231	$0.20	$13,046						
Filter Replacement															$21,600			
Labor																4.0	$58,400	
Total									**$34,232**			**$24,005**		**$0**	**$21,600**		**$58,400**	**$138,237**
CBW																		
Feed Pumps	1.8	2	25	50	85%	32	24	277,629	$33,315									
Air Compressor		1	20	20	85%	13	24	111,051	$13,326									
Polymer Addition	1.8									5,479	$2.00	$10,959						
Alum Addition	1.8									65,231	$0.20	$13,046						
Media Replacement															$1,067			
Labor																4.0	$58,400	

GREENFIELD MASTER PLAN ANNUAL OPERATION & MAINTENANCE COSTS	Process			Electricity $ 0.120 /kWh						Chemicals			Hauling $ 50.00 /WT		Equipment Maintenance	Operation and Maintenance Labor $ 40.00 /hr		TOTAL
	Flow mgd, scfm	No. of Operating Units	Motor Power (hp)	Total Operating Motor Power (hp)	Operational % of Nameplate	Power input (kW)	Operation Time (hr/d)	Annual kWh	Annual power cost	Usage (lb/yr)	Unit Cost ($/lb)	Chemical Cost ($/year)	lb/d	$/yr	Repair/ Replacement Cost	Labor hours (hr/d)	$/yr	**O&M Cost ($/year)**
Total									**$46,642**			**$24,005**		**$0**	**$1,067**		**$58,400**	**$130,113**
CCB																		
Chemical Mixer		2	10	20	85%	13	24	111,051	$13,326									
Chlorine Addition	1.8									604,924	$0.12	$72,533						
Equipment Maintenance															$4,000			
Labor																1.0	$14,600	
Total									**$13,326**			**$72,533**		**$0**	**$4,000**		**$14,600**	**$104,459**
UV-MLE																		
Lamp power						24	24	210,240	$25,229									
Equipment Replacement															$24,000			
Labor																0.5	$7,300	
Total									**$25,229**			**$0**		**$0**	**$24,000**		**$7,300**	**$56,529**
UV-MBR																		
Lamp power						13	24	113,880	$13,666									
Equipment Replacement															$18,670			
Labor																0.4	$5,840	
Total									**$13,666**			**$0**		**$0**	**$18,670**		**$5,840**	**$38,176**
Aerobic Digestion																		
Mixer		6	5	30	85%	19	8	55,526	$6,663									
Blower		1	15	15	85%	10	16	55,526	$6,663									
Equipment Maintenance															$7,500			
Labor																2.0	$29,200	
Total									**$13,326**			**$0**		**$0**	**$7,500**		**$29,200**	**$50,026**
Sludge Holding																		
Mixer		2	5	10	85%	6	8	18,509	$2,221									
Blower		1	5	5	85%	3	16	18,509	$2,221									
Equipment Maintenance															$5,000			

GREENFIELD MASTER PLAN ANNUAL OPERATION & MAINTENANCE COSTS	**Process**			**Electricity**						**Chemicals**			**Hauling**		**Equipment Maintenance**	**Operation and Maintenance Labor**		**TOTAL**
				$ 0.120 /kWh									**$ 50.00 /WT**			**$ 40.00 /hr**		
	Flow mgd, scfm	No. of Operating Units	Motor Power (hp)	Total Operating Motor Power (hp)	Operational % of Nameplate	Power input (kW)	Operation Time (hr/d)	Annual kWh	Annual power cost	Usage (lb/yr)	Unit Cost ($/lb)	Chemical Cost ($/year)	lb/d	$/yr	Repair/ Replacement Cost	Labor hours (hr/d)	$/yr	**O&M Cost ($/year)**
Labor																1.0	$14,600	
Total									**$4,442**			**$0**		**$0**	**$5,000**		**$14,600**	**$24,042**
Screw Press																		
Feed Pumps	0.06	2	15	30	85%	19	4	27,763	$3,332									
Drive		1	5	5	85%	3	4	4,627	$555									
Conveyor		1	10	10	85%	6	4	9,254	$1,111									
Polymer Addition										10,950	$3.00	$32,850						
Equipment Maintenance															$24,000			
Labor																2.0	$29,200	
Total									**$4,997**			**$32,850**		**$0**	**$24,000**		**$29,200**	**$91,047**
Centrifuge																		
Feed Pumps	0.06	2	15	30	85%	19	4	27,763	$3,332									
Drive		1	60	60	85%	38	4	55,526	$6,663									
Conveyor		1	10	10	85%	6	4	9,254	$1,111									
Polymer Addition										21,900	$3.00	$65,700						
Equipment Maintenance															$24,000			
Labor																3.0	$43,800	
Total									**$11,105**			**$65,700**		**$0**	**$24,000**		**$43,800**	**$144,605**

Appendix K

COMPARISON OF DEWATERING, FILTRATION, AND DISINFECTION ALTERNATIVES

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Table A Comparison of Dewatering Processes

Process	Capital	Annual O&M[1]	20-year Life Cycle
Screw Press	$7.6M	$311k	$12.2M
Centrifuge	$8.9M	$310k	$13.5M

Notes:

(1) O&M costs were calculated based on the modeled solids production from the oxidation ditch alternative (3,610 lb/d). It was assumed that the screw press cake is 15%TS and the centrifuge cake is 20%TS and the biosolids hauling cost is $50/WT. Refer to Appendix J for a breakdown of O&M costs.

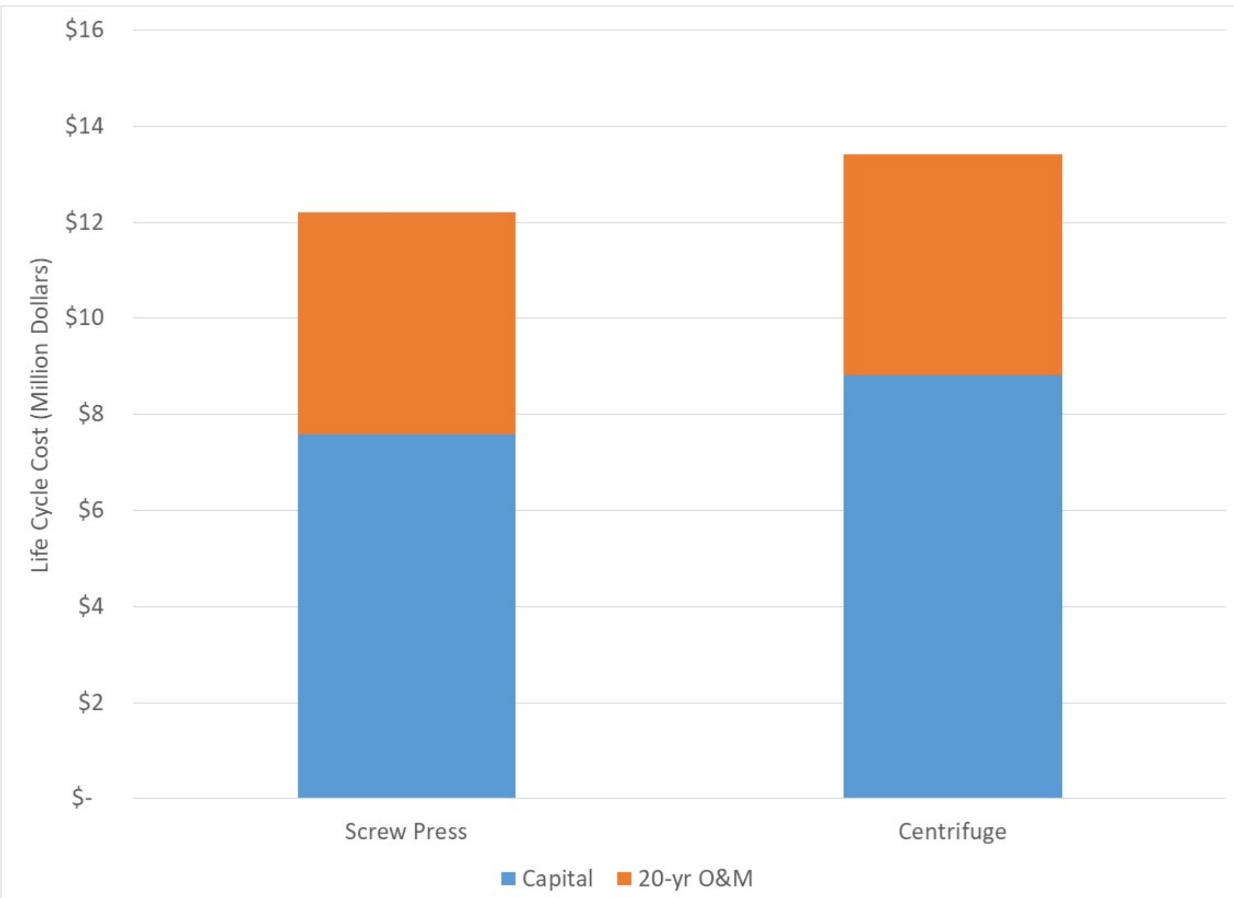

Figure A Comparison of Dewatering Processes

Table B Comparison of Filtration Processes

Process	Capital	Annual O&M[(1)]	20-year Life Cycle
Cloth-Media Filter	$6.4M	$139k	$8.5M
Continuous Backwash Sand Filter	$11.8M	$131k	$13.7M

Notes:
(1) Refer to Appendix J for a breakdown of O&M costs.

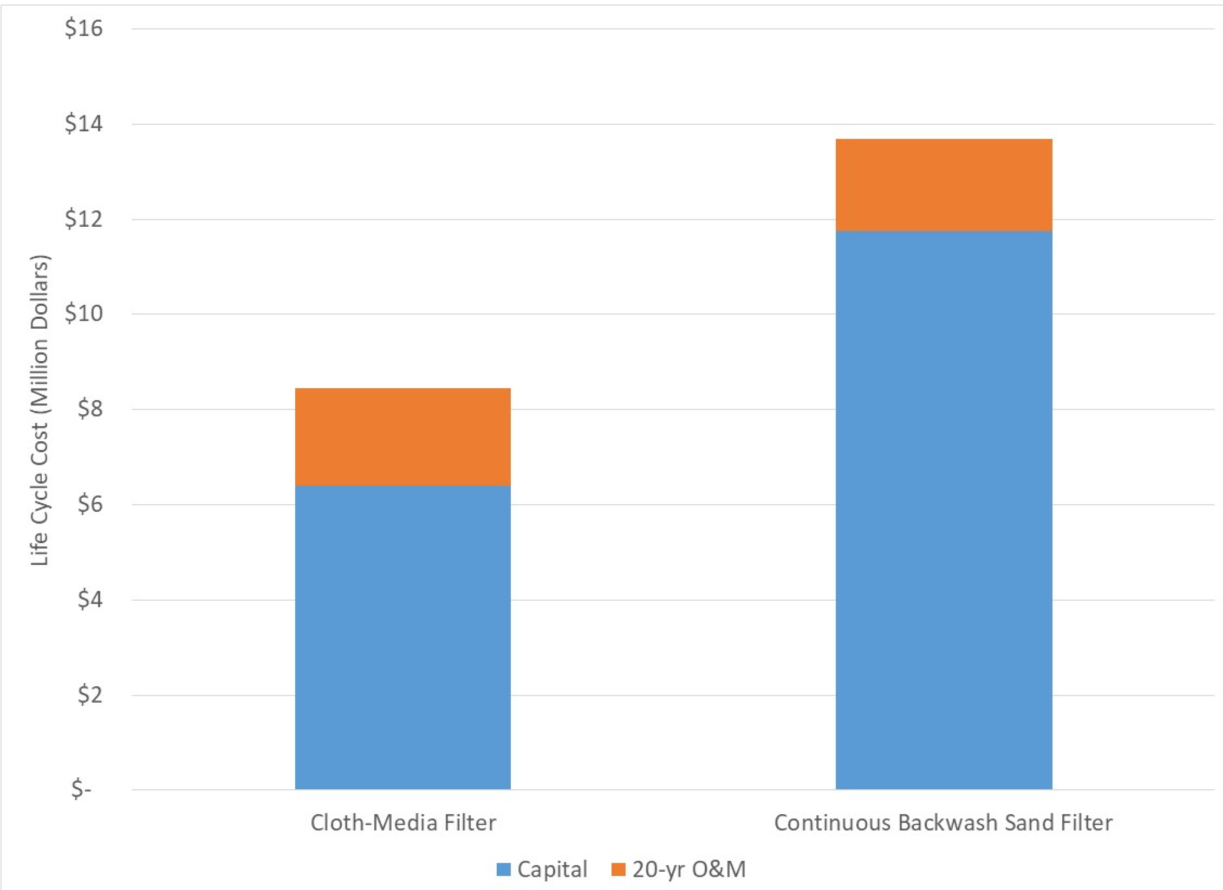

Figure B Comparison of Filtration Processes

Table C Comparison of Disinfection Processes

Process	Capital	Annual O&M(1)	20-year Life Cycle
Chlorine	$2.5M	$105k	$4.1M
UV (following sand or cloth filtration)(2)	$2.7M	$57k	$3.6M
UV (following MBR)(3)	$2.2M	$38k	$2.8M

Notes:
(1) Refer to Appendix J for a breakdown of O&M costs.
(2) Assumes a UVT of 60% and a UV dose of 104 mJ/cm^2.
(3) Assumes a UVT of 69% and a UV dose of 83 mJ/cm^2.

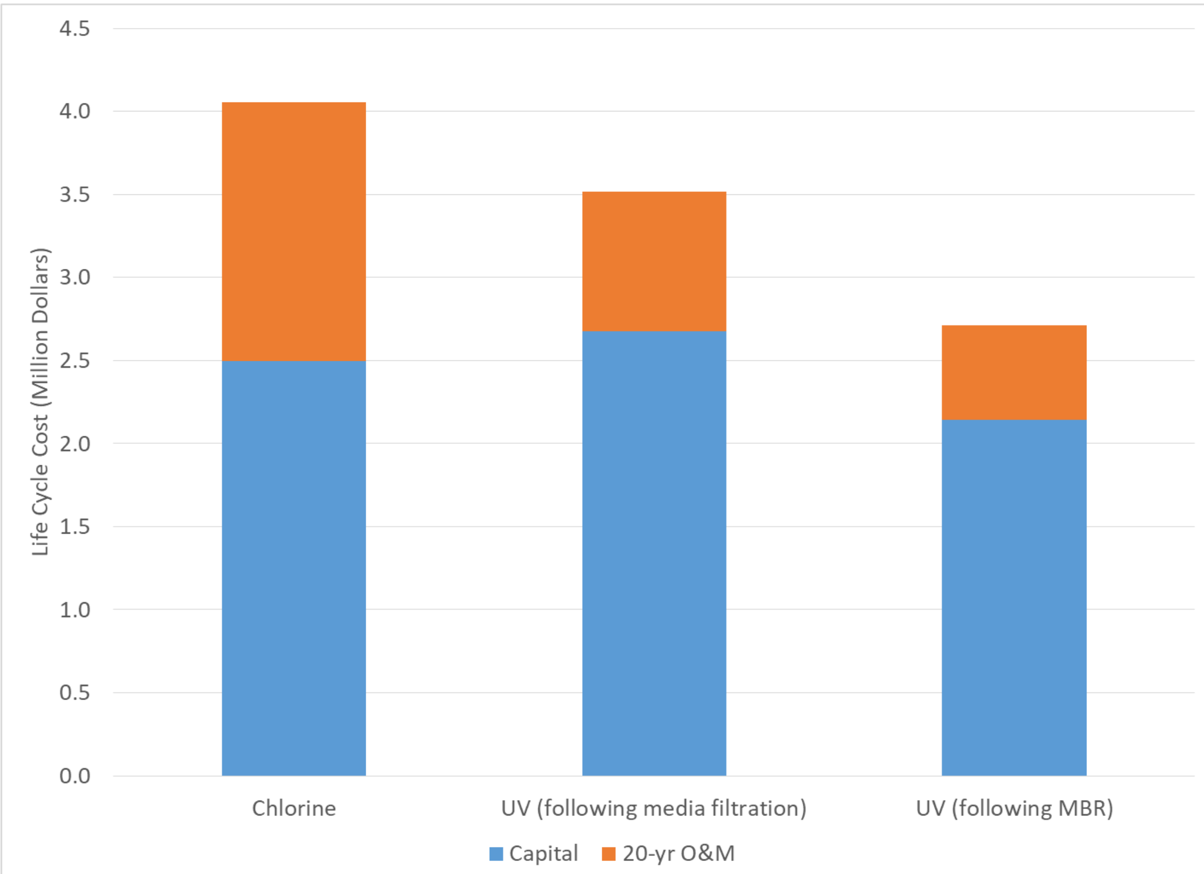

Figure C Comparison of Disinfection Processes

Appendix L

SUMMARY OF FUNDING SOURCES

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Table L.1 Funding Source Summary

Program	Agency	Type	Description	Relevance
Federal Funding Programs				
Water Infrastructure Finance and Innovation Act (WIFIA)	EPA	Loan	Financing mechanism providing low interest rate financing for large dollar-value water, wastewater and infrastructure projects. • Projects must cost no less than $20 million (communities > 25,000 people) or $5 million for small community projects (25,000 of fewer). There is no maximum loan amount. • Projects can be bundled if: 1) projects serve a common purpose/objective; 2) will be completed within a similar time periods (typ. 5 years); and 3) loan is repaid via the same funding source. • Program provides a maximum 49 percent of the total project costs. Funds can be used to cover planning/design (retroactive), construction and financing costs. • Match can be provided by SRF, Bonds, Cash, Reserves, or other grants (federal grant cap limit of 80%). • Maximum loan term is 35 years (allows agencies to defer repayment 5 year from construction completion). • Interest rate is equal to the US Treasury rate of a similar maturity. • Application fees apply (ranges from $100,000-$300,000) plus annual construction fee (ranges between $10-20K based on project cost) and an annual serving fee of $8,000. • Federal compliance requirements apply including NEPA, A&E Procurement, AIS, Davis Bacon, anti-lobbying, and other requirements apply. FY 2020 lending capacity was $5.5 billion and 55 projects were invited to the application phase.	Funding program is a viable source of funding for the WWTP upgrades. Due to the community size, the City would be eligible based on the $5 million Total Project Cost (small community project loan).
Energy Efficiency & Renewable Energy (EERE)	Department of Energy (DOE)	Misc.	EERE's goal for its investments is to make clean energy technologies and services more available and reliable while lowering their direct and indirect costs, both to energy users and the community. The EERE investment approach is designed to address specific gaps in the technology development pathway–areas where the private sector or other non-government stakeholders are unable to make the required investments to the scale or in the timeframe required for clean energy technologies to be commercialized. As funding for the program is from Federal sources – federal requirements apply including NEPA, A&E Procurement, AIS, Davis Bacon, anti-lobbying, and other requirements. Link: https://eere-exchange.energy.gov/	Not currently applicable to project. May be considered if future energy conservation measures are added at the WWTP. Note that program opportunities vary year to year and will have different requirements for project readiness.
Water & Waste Disposal Loan & Grant Program	U.S. Department of Agriculture (USDA)	Grant/ Loan	This program provides funding to eligible rural areas (population 10,000 or less) for reliable drinking water, sewage and solid waste disposal, and stormwater drainage to households and businesses. Financing is available in long-term (up to 40 years), low-interest loans (currently 1.25% for communities in poverty [MHI < $50k], 1.75% for communities with MHI between $50k and $62k, and 2.125% for communities with MHI > $62k) and may be combined with a grant if funding is available. Final design documents and environmental clearance are required prior to funding award. Design build projects are not eligible for USDA funding. The USDA will work closely with the applicant to prepare the financial portion of the application. As funding for the program is from Federal sources – federal requirements apply including NEPA, A&E Procurement, AIS, Davis Bacon, anti-lobbying, and other requirements. SWRCB and USDA can work together to jointly fund a project. Link: https://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program	Greenfield population (18,000) makes them ineligible to pursue this program or other USDA funding programs.
WaterSMART Water and Energy Efficiency Grants	U.S. Bureau of Reclamation (USBR)	Grant	Eligible projects include projects that result in quantifiable and sustained water savings, increase renewable energy use and improve energy savings, and support broader water quality sustainability benefits. Projects that benefit endangered and threatened species, support water sustainability benefits, or implement activities to address climate related impacts on water may apply. Requires a 50 percent cost share. Two funding limits: $300,000 (typically for projects completed within a year); and up to $1,000,000 (for projects to be completed in 3 years). Engineering documents should be 90 to 100 percent complete at the time of application to demonstrate construction readiness at the time of grant award. As funding for the program is from Federal sources – federal requirements apply including NEPA, A&E Procurement, AIS, Davis Bacon, anti-lobbying, and other requirements. Applications must also undergo the findings of no significant impact (FONSI) process, which will be aided by USBR. Link: https://www.usbr.gov/watersmart/	Not currently applicable. May be considered if water savings, recycled water, or renewable energy use projects are incorporated into the CIP.

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Program	Agency	Type	Description	Relevance
WaterSMART Water Marketing Strategy Grants	U.S. Bureau of Reclamation (USBR)	Grant	Through the WaterSMART Water Marketing Strategy Grants, Reclamation provides assistance to states, tribes, and local governments to conduct planning activities to develop water marketing strategies that establish or expand water markets or water marketing activities between willing participants, to help prevent water-related conflicts and contribute to water supply sustainability. Applicants under this FOA may request funding to conduct planning activities to develop a water marketing strategy to establish or expand water markets or water marketing. Funding awarded under this FOA is for planning purposes only; funding will not be provided to implement water marketing activities. Funding award is up to $200,000 for projects completed within 2 years; $400,000 for projects completed within 3 years. As funding for the program is from Federal sources – federal requirements apply and projects must go through Reclamation's NEPA review process.	Not currently applicable. Could be used to help justify recycled water projects in the CIP.
Title XVI/WIIN Water Reclamation and Reuse	U.S. Bureau of Reclamation (USBR)	Grant	Eligible projects include recycled water feasibility, demonstration, and construction projects. The program provides as much as 25 percent of construction costs with a maximum grant limit of $20 million. To meet eligibility requirements a project must have Congressional Authorization, a U.S. Bureau of Reclamation (USBR) approved feasibility study, comply with environmental regulations, and demonstrate the ability to pay the remainder of the construction costs. Engineering documents should be at least 30 to 60 percent complete at the time of application to demonstrate project readiness at the time of grant award. Projects closer to implementation will score higher. As funding for the program is from Federal sources – federal requirements apply and projects must go through Reclamation's NEPA review process. Link: https://www.usbr.gov/watersmart/title/	Not currently applicable. May be considered if recycled water projects are incorporated into the CIP.
Drought Response Program	U.S. Bureau of Reclamation (USBR)	Grant	USBR aids communities in developing and implementing projects that will build long-term resiliency to drought in the following program areas: Drought contingency planning: Provides grant funding up to $200,000 to support agencies with the development of a Drought Management Plan or to update an existing Drought Management Plan. Grant funding requires a 50/50 cost share. Drought resiliency projects: Funding is for implementation projects building long-term resiliency to drought and reduce the need for emergency response actions that are identified in a Drought Contingency Plan. Projects eligible for funding should address at least one the following: serve to increase the reliability of water supply; improve water management; implement systems to facilitate voluntary water sales, transfers, or exchanges; and provide benefits for the environment are eligible. Types of projects include moving pipelines, small recycling, storage reservoir construction, and projects that increase flexibility in drought. Two Funding: Group 1 $300,000 (complete in 2 years); Group 2 $750,000 (complete in 3 years). As funding for the program is from Federal sources – federal requirements apply and projects must go through Reclamation's NEPA review process. Link: https://www.usbr.gov/drought/	Not currently applicable. May be considered if recycled water or water resiliency projects are incorporated into the CIP.
Public Works and Economic Adjustment Assistance Programs	Department of Commerce Economic Development Administration (EDA)	Grant	The EDA provides grants for public works projects provide grant funding for public works projects, including wastewater and stormwater projects that promote economic development. The EDA through its Public Works and Economic Adjustment Assistance Program will provide support assistance with up to 50 percent in matching funds (up to $3 million) based on the number of permanent jobs created by the implementation of the proposed project. For every full-time job created, the EDA will provide $10,000 in EDA assistance. In order to apply a community, county or region must have a current Comprehensive Economic Development Strategies plan. In 2018, public works project awards ranged from $600,000 to $3,000,000, with an average award of $1.4 million. All construction projects are expected to be completed within 5 years from the date of award. Applications are accepted on a rolling basis.	Potentially applicable if the City can provide an economic impact statement demonstrating the anticipated growth associated with the project implementation as part of the application process. Will not cover full cost of the project.

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Program	Agency	Type	Description	Relevance
Building Resilient Infrastructure and Communities (BRIC)	FEMA	Grant	New FEMA pre-disaster hazard mitigation program to incentivize new, innovative, large infrastructure projects that build resilient communities and reduce risks from hazards. Total program funding is $500 Million for FY 2020. Project need to be included in a FEMA-approved Hazard Mitigation Plan and project to comply with 2015 and 2018.International Building Codes. Program requires a cost share of 75%:25% of Federal to Non-Federal. FEMA funding process varies from state to state – typically a two-step process. https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities	Not applicable - Project does not fit FEMA Program priorities of hazard mitigation projects, reducing the risks communities face from disasters and natural hazards.
America's Water Infrastructure Act (AWIA) (Potential Federal Program - pending appropriations)	EPA	Grants and Low Interest Loan Program	Potential funding opportunities for the City of Greenfield's CIP include: Clean Water Infrastructure Resiliency and Sustainability Program for the planning, design and construction of resiliency projects (e.g. conservation, water use efficiency, wastewater/stormwater management through watershed protection, green infrastructure, reclamation/reuse of wastewater and stormwater, modification/relocation of POTWs at risk, and renewable/ recovered energy. Grants not to exceed 75% of total cost. - $5 million (FY 2021 through 2024). Wastewater Infrastructure Discretionary Grant Program (to be established within 1 year) – grant for investments in wastewater infrastructure projects; can bundle projects; - $50 million/year (FY 2022 through 2024). Sewer Overflow and Stormwater Reuse Municipal Grants –Reauthorization of EPA's grant program which serves to provide funding for critical stormwater infrastructure projects in communities including combined sewer overflows (CSO) and sanitary sewer overflows. Grants will be awarded to states, which will then provide sub-awards to eligible entities for projects that address infrastructure needs for CSOs, SSOs, and stormwater management. States are required to prioritize funding projects for communities that are financially distressed, have a long-term municipal CSO or SSO control plan, or for projects that have requested a grant on their CWSRF Intended Use Plan. Program budget to provide $225 million/year in upcoming years (pending appropriations). FY 2020/2021 appropriation: $40M Link: https://www.epa.gov/ground-water-and-drinking-water/americas-water-infrastructure-act-2018-awia	Potential programs to Track
State Funding Programs				
Clean Water State Revolving Fund (CWSRF)	State Water Resources Control Board (SWRCB)	CWSRF Construction Loan	The State's CWSRF program provides low interest (50% of the G.O. bond rate – the 2021 rate is 0/9%) loans for up to 30 years for the funding of wastewater treatment works, transmission lines, distribution systems, recycled water, and other projects. To be considered for funding, a complete (or as complete as possible) CWSRF Application package (including required technical, environmental and financial documentation) is due by December 31st for evaluation by the SWRCB based on established scoring criteria. Projects meeting an established priority score (FY 2020 and FY 2021 Priority Score was 13 out of 16 points) will be placed on a fundable list for funding in the upcoming fiscal year. Program provides for both planning/design and construction loans. For construction projects, it is recommended that engineering documents are at least 50 percent complete, projects with score higher the more completeness they can demonstrate. As funding for the program is from both Federal and State sources – federal requirements apply including CEQA plus, A&E Procurement, AIS, Davis Bacon, anti-lobbying, and other requirements. For Small (serving up to 6,600 people with a median household income level [MHI] less than 80 percent of the statewide MHI) or Expanded Small Disadvantaged Communities (serving less than 20,000 people) principal forgiveness maybe provided with up to $500,000 for planning efforts and up to $5 million for construction. The Green Project Reserve (GPR) program provides in principal forgiveness for projects that address water or energy efficiency or encourage sustainable project development. The maximum GPR project's loan forgiveness limit for recycled water projects is 50% for construction costs with a maximum $2.5 million cap and for WWTP project is $4M or 50% of eligible costs. GPR funding is available based on allocations. Link: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/	Funding program is a viable source of funding for the WWTP upgrades. Project purpose (including permit compliance) targets the program priorities. The City of Greenfield would likely be eligible for principal forgiveness as an Expanded Small Disadvantaged Community.

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Program	Agency	Type	Description	Relevance
Small Community Clean Water/Waste-water (SCWW) Funding	State Water Resources Control Board (SWRCB)	Grant/ Loan	For Small (serving up to 6,600 people with a median household income level [MHI] less than 80 percent of the statewide MHI) or Expanded Small Disadvantaged Communities (serving less than 20,000 people) principal forgiveness maybe provided with up to $500,000 for planning efforts and up to $6 million for construction. Grants maybe up to $10 million if the project is broken up appropriately (i.e. different phases, wastewater vs. collection system, wastewater vs reclaimed water). Provides low interest loans and principal forgiveness to small disadvantaged communities (DACs) (population less than 20,000) for planning and construction of projects that restore and maintain water quality. DACs are defined as communities with an MHI less than 80 percent of the average statewide MHI. Applications are accepted and awarded continuously.	The City will be eligible based on the definition as an Expanded Small Disadvantaged Community. Would require further discussion with the Program staff to confirm eligibility.
Proposition 1, Groundwater Grant Program	State Water Resources Control Board (SWRCB)	Grant	The third and final solicitation for this program is slated to open in mid-2021. Eligible projects include projects that prevent groundwater contamination, accelerate contamination cleanup, protect a drinking water aquifer, provide drinking water to disadvantaged communities. Special funding allocations have been set aside for eligible DACs. Applicant must demonstrate project feasibility and ability to complete project within a reasonable timeframe Funding for the program is from State sources. Applicant must demonstrate CEQA compliance. Link: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/proposition1/groundwater_sustainability.html	As a WWTP Upgrade project, this funding program may not be eligible unless a direct connection to prevention of groundwater contamination of a drinking water source is established.
Proposition 68, Sustainable Groundwater Management (SGM) Grant Program	California Department of Water Resources (DWR)	Grant	DWR's SGM Grant Program provides funding for groundwater planning and implementation projects. Round 1 of the grant solicitations closed in January 2021 and there will be one additional round of solicitation likely in Spring 2022. Round 1 will provide $26 million for critically over drafted (COD) groundwater basins only. Round 2 will provide approximately $77 million for medium, high, and COD priority basins. Applicant must demonstrate project feasibility and ability to complete project within a reasonable timeframe. Eligible projects include those that improve groundwater sustainability, address groundwater contamination, support water supply reliability, conservation, or efficiency, and support water banking, exchange and reclamation. Funding for the program is from State sources. Applicant must complete State crosscutters including CEQA. Link: https://water.ca.gov/sgmgrants	The City is a part of the Arroyo Seco GSP. As the Arroyo Secco is identified as a high priority groundwater basin, the agency could be eligible for Round 2 funding if there is an applicable project.
Community Development Block Grant Programs (CDBG)	California Department of Housing and Community Development (HUD)	Loans and Grants	The CDBG program provides annual grants to states, cities, and counties to improve community living through housing improvements and economic expansion. All CDBG activities must meet one of the following National Objectives: benefit low- and moderate-income persons; aid in the prevention or elimination of slums and blight; or meet certain urgent community needs. FY 2021 Notice of Funding Availability announced $30M in funding will be provided.	Not a viable funding program.
Infrastructure State Revolving Fund (ISRF)	California Infrastructure and Economic Development Bank (IBank)	Loan	The California Infrastructure and Economic Development Bank (IBank) Infrastructure SRF (ISRF) Program provides financing to public agencies and nonprofit corporations sponsored by public agencies for a wide variety of infrastructure and economic development projects. ISRF Program funding is available in amounts ranging from $50,000 to $25 million, with terms for the useful life of the project up to a maximum of 30 years. Fund matching is not required. Eligible projects include parks and recreational facilities, public safety facilities, sewage/solid waste collection, treatment and disposal and water projects (drainage, supply, flood control, treatment and distribution). The program offers below-market interest rates, on-going application acceptance, non-competitive application process, technical assistance, no match funding requirement, and no federal overlays. Funding for the program is from State sources. Link: https://ibank.ca.gov/loans/infrastructure-loans/	Potential funding program for funding the WWTP improvements project.

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Program	Agency	Type	Description	Relevance
California Lending for Energy and Environmental Needs Program (CLEEN)	California Infrastructure and Economic Development Bank (IBank)	Loan	The CLEEN Center provides direct public financing to municipalities, universities, schools and hospitals to help meet the State goals for greenhouse gas reduction, water conservation, and environmental preservation. Financing is provided through a direct loan from IBank ranging from $500k to $30 million. Specifically, the Statewide Energy Efficiency Program (SWEEP) provides funding for small, medium and large-scale energy efficiency upgrades for public borrowers. Eligible projects include water and wastewater facilities and infrastructure. The SWEEP program accepts applications on a monthly basis. Funds are currently available and are allocated on a first come, first serve basis. The interest rate is subject to the type of project and the credit qualifications of the applicant. Recent wastewater projects have seen interest rates as low as 2.5 percent for a 30-year fixed rate. Applicants must demonstrate project-readiness and feasibility to complete construction within two years after financing approval. Funding for the program is from State sources. Link: https://ibank.ca.gov/loans/cleen-programs/	Not currently applicable. May be applicable if alternative energy measures are added at the WWTP.
Energy Conservation Assistance Act (ECCA)	California Energy Commission	Loan	The CEC offers a low interest loan program (1 percent interest rate for cities, counties, special districts, and public schools) for cities and schools to implement energy efficiency and renewable energy projects. The maximum loan amount available is $3 million per application. Applications are accepted on a rolling basis until funds are fully allocated for the fiscal year. Appropriations, and therefore program availability, vary year to year. Funding for the program is from State sources. Applicants must demonstrate CEQA compliance. Link: https://www.energy.ca.gov/programs-and-topics/programs/energy-conservation-assistance-act/low-interest-loans	Not currently applicable. May be applicable if future energy conservation measures are added at the WWTP.
Self-Generation Incentive Program (SGIP)	California Public Utilities Commission	Rebate	Provides incentives to support existing, new, and emerging distributed energy resources. Provides rebates for qualifying distributed energy systems installed on the customer's side of the utility meter. Qualifying technologies include wind turbines, waste heat to power technologies, pressure reduction turbines, internal combustion engines, microturbines, gas turbines, fuel cells, and advanced energy storage systems. The current rate for power generation is $850 per kilowatt-hour under the "Equity" category. The SGIP program limits the amount of electricity that can be exported to no more than 25% of on-site consumption on an annual basis. Link: https://www.cpuc.ca.gov/sgip/	Not currently applicable. May be applicable if alternative energy measures are added at the WWTP. The program prioritizes DACs.

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Appendix M

NOTICE OF ENROLLMENT IN THE GENERAL ORDER

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CALIFORNIA
Water Boards

RECEIVED

MAR 02 2021

CITY OF GREENFIELD

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Coast Regional Water Quality Control Board

NOTICE OF PUBLIC HEARING AND OPPORTUNITY TO COMMENT AND ASK QUESTIONS

concerning

ORDER NO. R3-2021-0008, TERMINATION OF CERTAIN INDIVIDUAL ORDERS UPON THE REGULATED FACILITY'S ENROLLMENT IN AN APPROPRIATE GENERAL ORDER

You are receiving this notice because you have a permit with the Central Coast Regional Water Quality Control Board (Central Coast Water Board) for the disposal of your wastewater. The Central Coast Water Board's goal is to update all of our wastewater permits every 5 to 10 years. As part of this update process, the Central Coast Water Board is transitioning many of our wastewater permits from individual permits into enrollments in our general wastewater permits (general orders). At the June 17-18, 2021 Central Coast Water Board meeting, staff will recommend the board adopt an order that would terminate your existing wastewater permit upon your enrollment in a general permit.

Adoption of the order in June will not immediately change anything about your current permit. The process to update many of our wastewater permits and transition them into general permit enrollments will occur over time (likely 1-2 years). Central Coast Water Board staff will contact you when we are ready to work on updating your current permit and transitioning you into a general permit.

QUESTIONS AND COMMENTS. If you have questions or comments on this plan, please call or email Central Coast Water Board staff by **5:00 p.m. on April 1, 2021**.

Email: RB3-WDR@Waterboards.ca.gov
(805) 542-4787

PUBLIC HEARING
A public hearing to consider adoption of the order that will terminate qualified individual permits upon enrollment in an appropriate general permit will be held during the Central Coast Water Board meeting scheduled for:

June 17-18, 2021
Remote Video Conference

The final meeting agenda and Staff Report will also be available at least 10 days before the Board meeting, at:
https://www.waterboards.ca.gov/centralcoast/board_info/agendas/2021/2021_agendas.html

The agenda will provide the specific date this item will be considered during the Board meeting, indicate the anticipated order of all agenda items, and may include staff revisions to the proposed order(s).

FUTURE NOTICES

The Central Coast Water Board will hold the public meeting at the time and place noted above. Any change in the date, time, and place of the Board Meeting will be noticed through the e-mail distribution list and posted on the Water Board's website. Any person desiring to receive future notices concerning changes to the notice of public meeting and consideration of adoption, must sign up for the e-mail distribution list. To sign up for the e-mail distribution email list, access the Region 3 E-mail Subscription form, select the box for 'Board Meeting Agenda', and provide the required information. The subscription form is located at:

https://www.waterboards.ca.gov/resources/email_subscriptions/reg3_subscribe.html

Please bring the above information to the attention of anyone you know who would be interested in this matter.