Minden-Gardnerville Sanitation District

Wastewater Master Plan

June 14, 2022

Wastewater Master Plan

Final Draft

MGSD
Minden Gardnerville
Sanitation District

June 14, 2022

Prepared under the responsible charge of

Craig Olson

HDR

2365 Iron Point Road, Suite 300
Folsom, CA 95630

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Abbreviations

To conserve space and improve text, the following abbreviations have been used in this document:

AA	Average annual
ac-ft	Acre-feet
BAF	Biological active filter
Bently	Bently Agrowdynamics
BOD	5-Day biochemical oxygen Demand
cf	Cubic feet
CIP	Capital improvement program
CWA	Clean Water Act
District	Minden Gardnerville Sanitation District
ft	Feet
Gallepi	Gallepi Land and Livestock Company
GBT	Gravity belt thickener
gpd	Gallons per day
gpm	Gallons per minute
HP	Horsepower
HRT	Hydraulic retention time
lb	Pound
lb/day	Pounds per day
MBBR	Moving bed biofilter reactor
MCRT	Mean cell resistance time
MD	Maximum day
MG	Million gallons
mgd	Million gallons per day
mg/L	Milligrams per liter
MLSS	Mixed liquor suspended solids
MM	Maximum month
MOP8	Manual of Practice Number 8
NDEP	Nevada Department of Environmental Protection
NOI	Notice of Intent
OSHA	Occupational Safety and Health Administration
OUR	Oxygen uptake rate
PEIR	Programmatic Environmental Impact Report
PWWF	Peak wet weather flow
RAS	Return activated sludge
scfm	Standard cubic feet per minute
sq ft	Square feet
SWPPP	Storm water pollution prevention plan
WAS	Waste activated sludge
WEF	Water Environment Federation
TSS	Total suspended solids
USACE	US Army Corps of Engineers
WWTP	Wastewater treatment plant

1.0 Introduction

The Minden-Gardnerville Sanitation District (District) retained HDR to prepare the Master Plan in 1994 and subsequent updates in 1997, 2004, and 2012. Performing regular updates to the Master Plan allows the District to develop a plan and funding mechanism for upgrades and improvements that are needed to maintain existing infrastructure, provide reliable treatment, meet future regulatory requirements, and accommodate growth in the District's service area. This Master Plan Update provides an update to influent flow and load projections, future regulatory requirements, existing treatment capacity, and an evaluation of the condition of existing infrastructure at the WWTP.

1.1 Purpose

The purpose of this Master Plan is to identify capital improvement projects over a 20-year planning horizon that address aging infrastructure, capacity limitations, future regulatory requirements, and opportunities for process optimization. The Master Plan will establish a phased plan for the facility improvements from which the District can develop funding mechanisms for the projects. The Master Plan also considers the long-term buildout conditions that are based on the Douglas County lang-use designation. Buildout conditions are not expected to occur within the planning horizon of this master plan but were considered to establish long-term land needs and/or potential long-term capital improvement projects.

1.2 Background Information

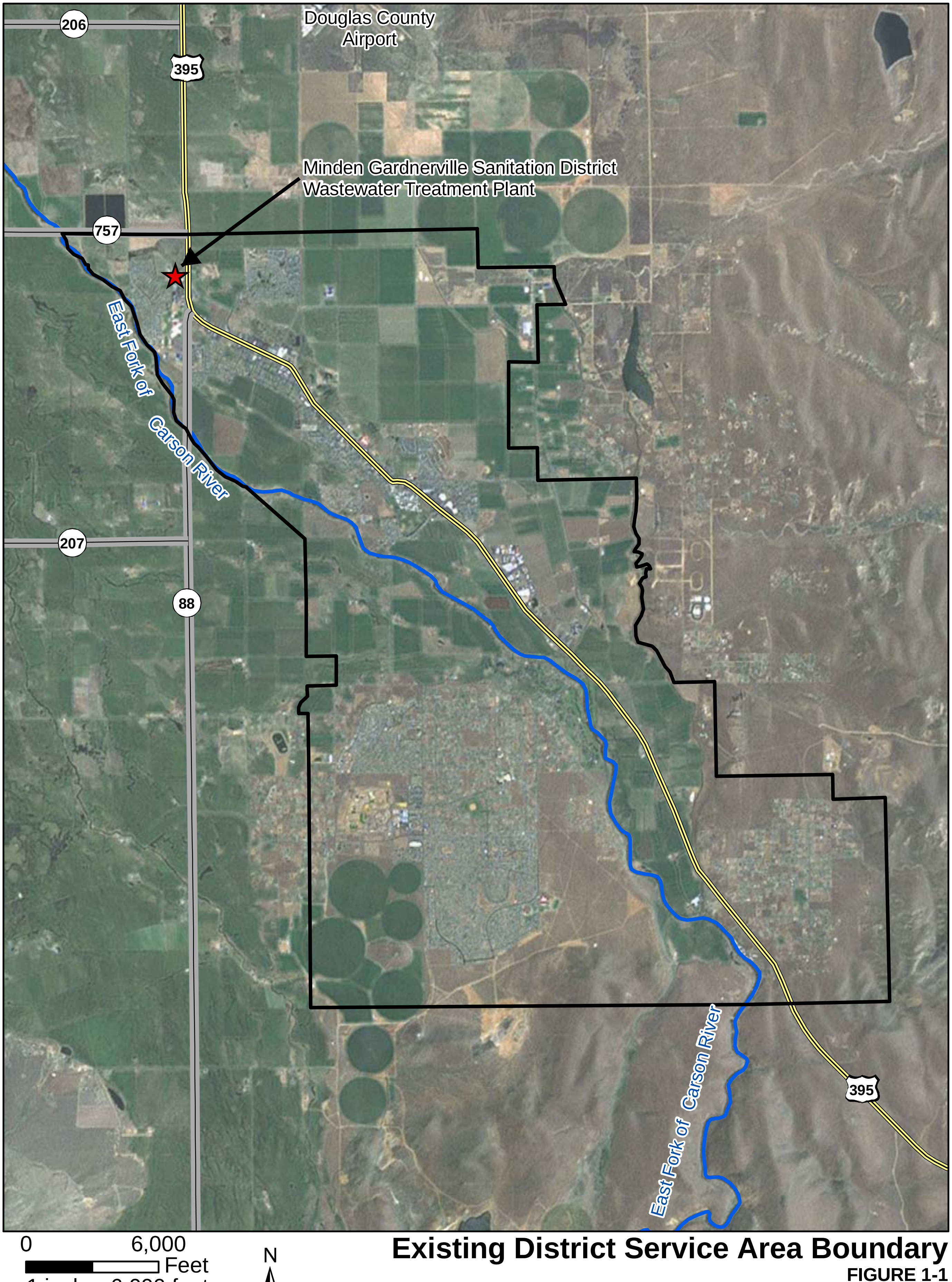
The District's wastewater treatment plant (WWTP) serves the Towns of Minden and Gardnerville, the Gardnerville Ranchos General Improvement District and parts of the communities of Ruhenstroth and the Bentley Science Park. The current service area boundary is shown in Figure 1-1. The service area does not include all of Douglas County.

The WWTP was constructed in 1966 and has undergone several modifications over the years, as described in Table 1-1, to increase the average daily treatment capacity to 2.8 mgd. Wastewater enters the WWTP headworks where it is screened with parallel travelling bar screens and then pumped to grit basins where grit is removed and dewatered. The screened and de-gritted wastewater is conveyed to three primary clarifiers that operate in parallel. Primary effluent is then routed to trickling filters (packed with cross-flow plastic media) followed by an aerated solids contact tank for secondary treatment. Mixed liquor is conveyed to three secondary clarifiers and secondary effluent is conveyed to two chlorine contact basins for disinfection. Sodium hypochlorite is used for disinfection.

Following disinfection, treated effluent is either stored in two clay-lined reservoirs or used for irrigation of about 28 acres owned and managed by the District. The storage reservoirs have a total capacity of approximately 650 acre-ft and an operating capacity of 550 acre-ft and are located northwest of the WWTP along Muller Lane. Treated effluent is released from the reservoirs on an as-needed basis for irrigation of pasture lands that produce crops for cattle feed.

Primary sludge and waste activated sludge are anaerobically digested in three digesters. Digester No. 2 and No. 3 are operated in parallel. Digestate is routed to Digester No. 1 which also serves as equalization for the dewatering operation. The District receives fats, oils and grease (FOG) trucked waste deliveries (approximately 3 trucks per week or 12,000 gallons per week). The FOG deliveries are offloaded to a 15,000-gallon storage tank, of which the usable storage volume is limited to

10,000 gallons, and then metered directly into Digester No. 3. Digested sludge is dewatered using a belt filter press that is operated typically 1 shift per day, 5 days per week. The District produces Class B biosolids that are currently land applied by Bently Agrodynamics. Biogas is typically directed to the 200-kW co-generation engine for onsite power production. Biogas can also be used in the District's boiler. When biogas production exceeds the co-generation system capacity, it is flared.



Existing District Service Area Boundary

FIGURE 1-1

Table 1-1. WWTP Construction Phases

Year	Improvement Project
1966	WWTP placed into operation. WWTP consisted of a contact stabilization activated sludge process and a secondary clarifier. Sludge was trucked to a landfill as liquid.
1974	This expansion included constructing a new headworks, primary clarifier, trickling filter, recycle pumping station, secondary clarifier, and chlorination facilities. Solids processing included anaerobic digestion followed by dewatering via sand drying beds and land disposal.
1986	Vacuum assisted drying beds were installed to expand the capacity of the dewatering facilities.
1987	A second primary clarifier and a new raw sludge pumping station were constructed. The original (1966) secondary clarifier was converted into a dilute waste sludge storage basin as part of this expansion and included aeration to minimize odors.
1988	Solids contact aeration, using the original aeration basins, was constructed. The intent of this modification was to add additional biological treatment capacity during the cold winter months.
1990	The headworks facilities were modified to include a 12-inch Parshall flume and a mechanical bar screen with a manual bypass screen. A second anaerobic digester was constructed, and pump mixing was provided for both the existing and new digesters. A second secondary clarifier was also constructed.
1993	Solids handling improvements, which included gravity belt thickening and belt filter press dewatering, were completed.
1996	Expansion included upgrading the trickling filter pumping station and plant drain system, installing a new trickling filter, a secondary clarifier mechanism in the original clarifier, non-potable water pumping station, hypochlorite disinfection system, backup waste activated sludge (WAS) and gravity belt thickening feed pumps, providing additional WAS storage in the south half of the original aeration basins, and converting two of the sludge drying beds into dewatered sludge holding bins.
1999	The new Influent Pumping Station was installed and placed into service. Modifications within this project included mechanical bar screens, an electrical room, a generator set, and some hydraulic modifications.
2001	Construction completed consisted of a third secondary clarifier, a flow split structure, a new return activated sludge/waste activated sludge (RAS/WAS) Pumping Station, and an odor control biofilter.
2003	The third primary clarifier, primary sludge pumping station, grit removal facility, and boiler system modifications were completed.
2004	Effluent Pump Station No. 4 constructed to convey effluent from the MGSD storage ponds to the Bently storage ponds.
2006	The solids contact aeration basins, new blower building, and a chlorine contact basin expansion was completed.
2008	A third anaerobic digester and an additional digester control building were constructed. Effluent Pump Station No. 2A constructed.
2010	A grease receiving facility and a 200 kW co-generation system were constructed.
2017	The Digester No. 3 roof was replaced.
2020	The Digester No. 2 cover was replaced.
2021	A redundant belt filter press was installed and the old polymer feeder and BFP feed pump were replaced.

Because commercial and residential developments have encroached into the area surrounding the WWTP, the District has installed a number of measures to control odors. A chemical scrubber is used to treat odorous gases from the headworks. Primary Clarifiers No. 1 and 2 are partially covered and Primary Clarifier No. 3 is completely covered for odor capture. The air is discharged through a biofilter for biological treatment of the odor causing compounds. Air is also down-drafted through the trickling filter no. 2 to supply oxygen to meet microbial demand and odor capture, and the pulled air vented through the odor neutralization beds.

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2.0 Wastewater Characteristics

This section provides a description of wastewater characteristics including the projection of future flows and loads and the development of design criteria for sizing the WWTP to meet the expected growth.

2.1 Historical Data Analysis

Influent data from the last six years (2015 through 2021) was reviewed and historical trends of influent flows and loads was developed. The following averaging periods were reviewed for each calendar year:

- **Average Annual:** Equal to the average in a calendar year. The average annual was calculated by a log-normal statistical analysis with daily average flows and loads arranged in order of increasing magnitude on a log-normal plot. The average annual value was based on its probability of occurrence (50^{th} percentile value).
- **Maximum Month Flow:** Equal to the maximum month (30-day average) in a calendar year. Using a log-normal statistical analysis, the maximum month value is defined as the 91.7 percentile value (represents values less than or equal to the maximum month value eleven out of twelve months).
- **Maximum Day Flow:** Equal to the maximum day flow in a calendar year. The maximum day flow is calculated as the 99.7^{th} percentile value on a log-normal statistical analysis of average. The 99.7^{th} percentile value represents the percentage of values less than or equal to the maximum day flow or 364 out of 365 days (364÷365).
- **Peak Wet Weather Flow:** Equal to the peak instantaneous flow during a wet weather event.

2.1.1 Historical Wastewater Flows

A summary of the historical average daily influent flows (2015 through 2021) is presented as Figure 2-1 and the probability plot of average daily influent flows is shown as Figure 2-2. Table 2-2 summarizes the historical flows for the different averaging periods together with flow peaking factors (expressed in terms of the ratio to average annual flow).

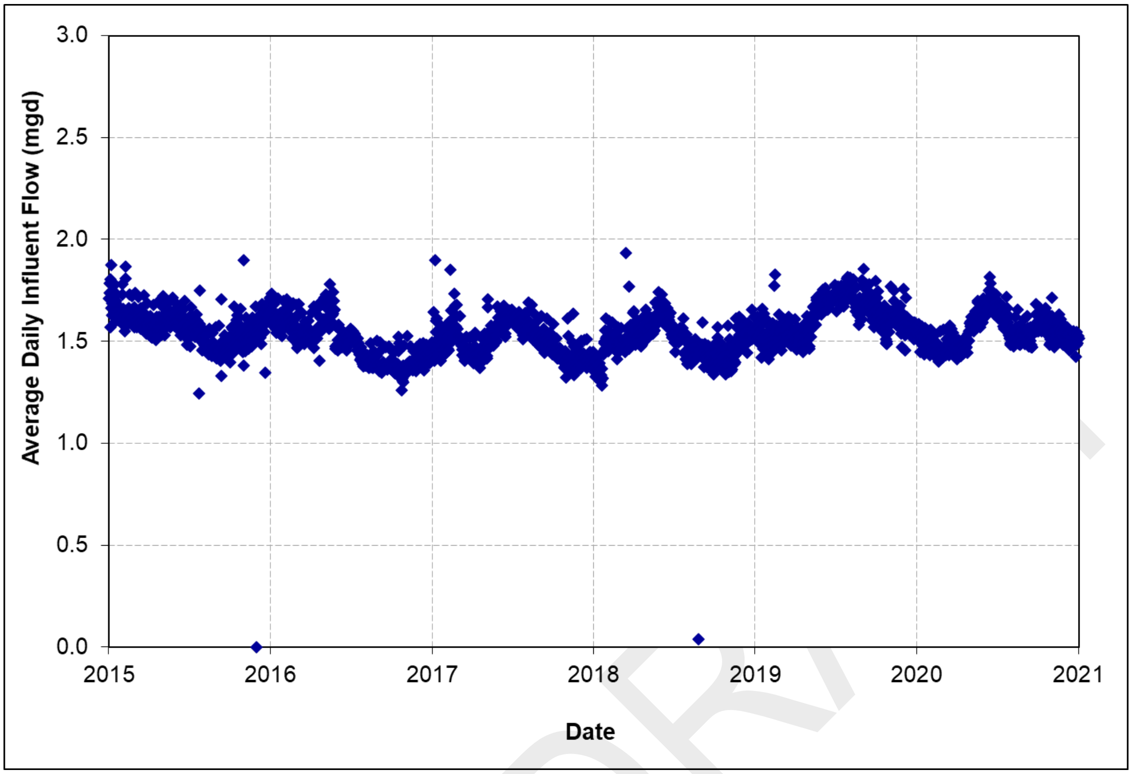


Figure 2-1. Historical Average Daily Influent Flow (2015-2021)

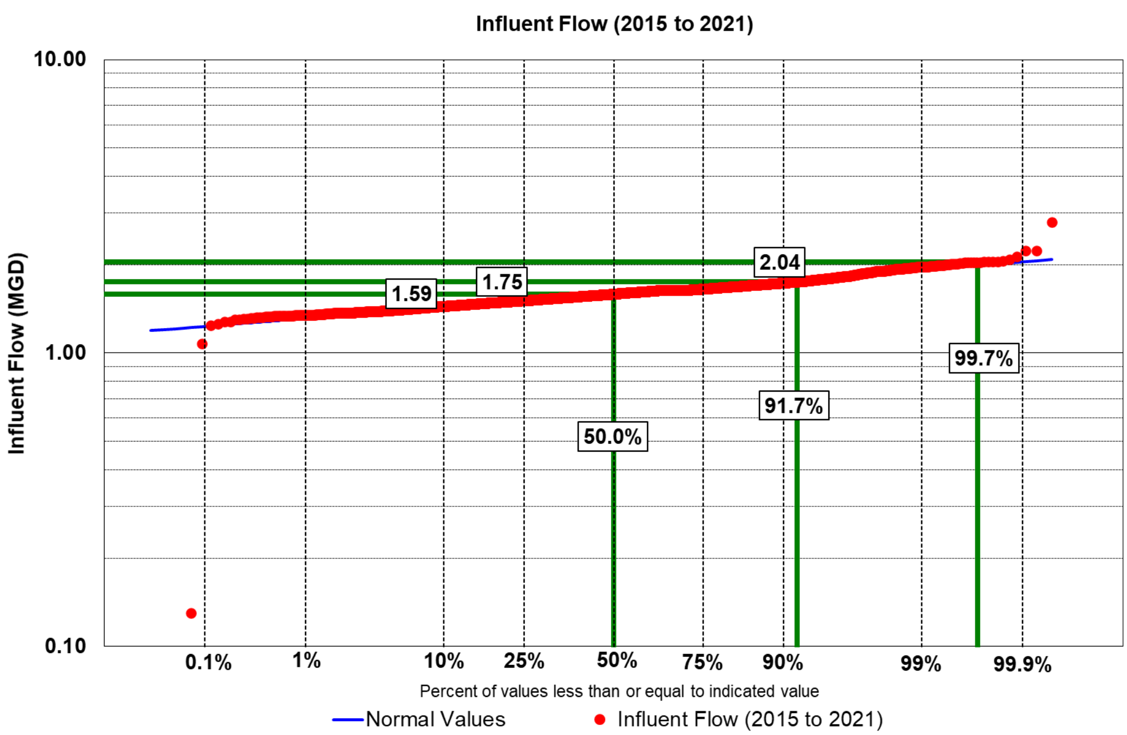


Figure 2-2. Probability Plot of Historic Influent Flows

Table 2-1. Historic Influent Flows and Peaking Factors

Flow Condition	Flow (mgd)	Peaking Factor (Ratio to Average Annual Flow)
Average Annual	1.59	1.0
Maximum Month	1.75	1.1
Maximum Day	2.07	1.3
Peak Wet Weather	4.70	3.0

Note: Peak Wet Weather is equal to the peak instantaneous flow measured during a wet weather event.

Figure 2-1 presents the historical average daily flows from 2015 through 2021. As shown in Figure 2-1, there is a seasonal pattern to the flows with higher flows occurring in the spring and fall months.

The peak wet weather flow was estimated based on the December 31, 2005 storm. This was the highest flow historically experienced at the WWTP. A plot of the flow during this event is shown in Figure 2-3.. The SCADA system is capable of only recording flows up to 4.0 mgd. On December 31, the influent flow exceeded 4.0 mgd. Therefore, the peak instantaneous wet weather flow was estimated by interpolation.

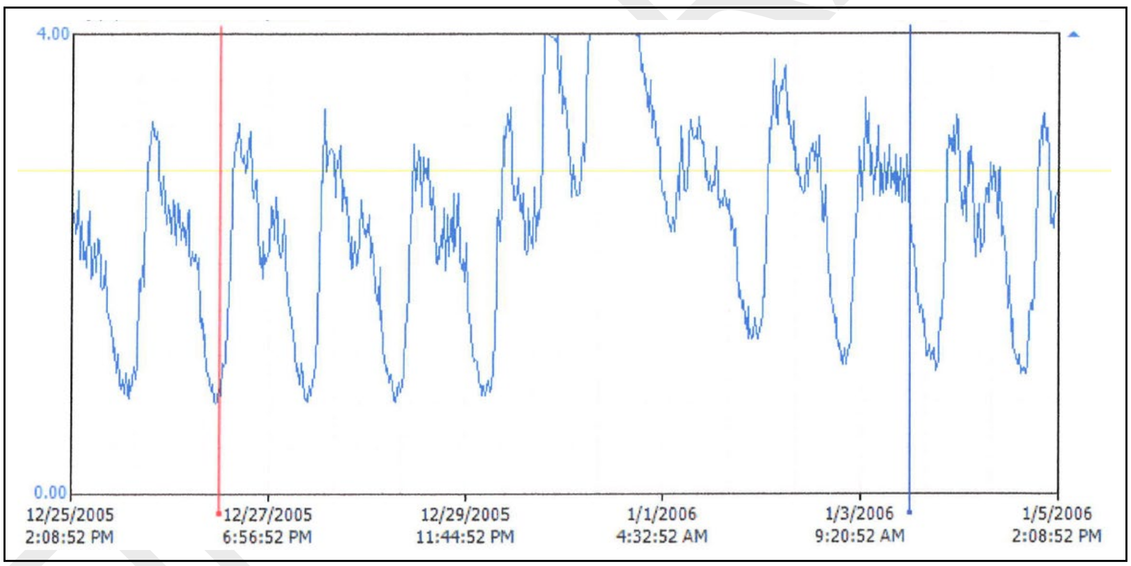


Figure 2-3. Historical Peak Wet Weather Flow

2.1.2 Historical Wastewater Loads

A historical trend of influent biological oxygen demand (BOD) and total suspended solids (TSS) loads is shown in Figure 2-4.. A 30-day moving average line was included for both plots.

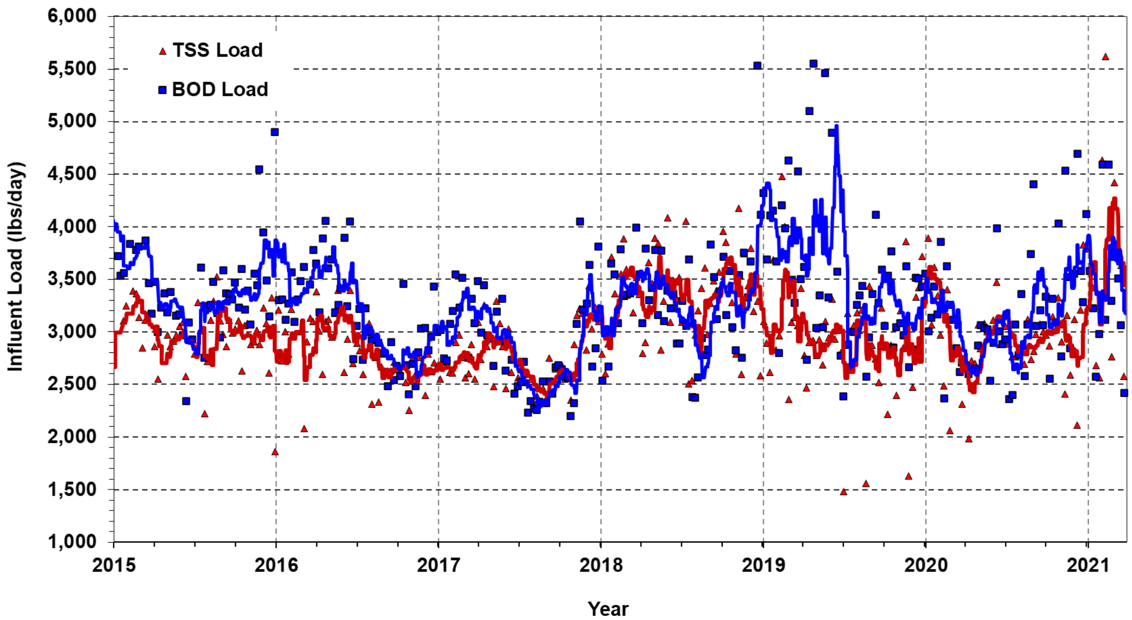


Figure 2-4. Historic Influent BOD and TSS Loads

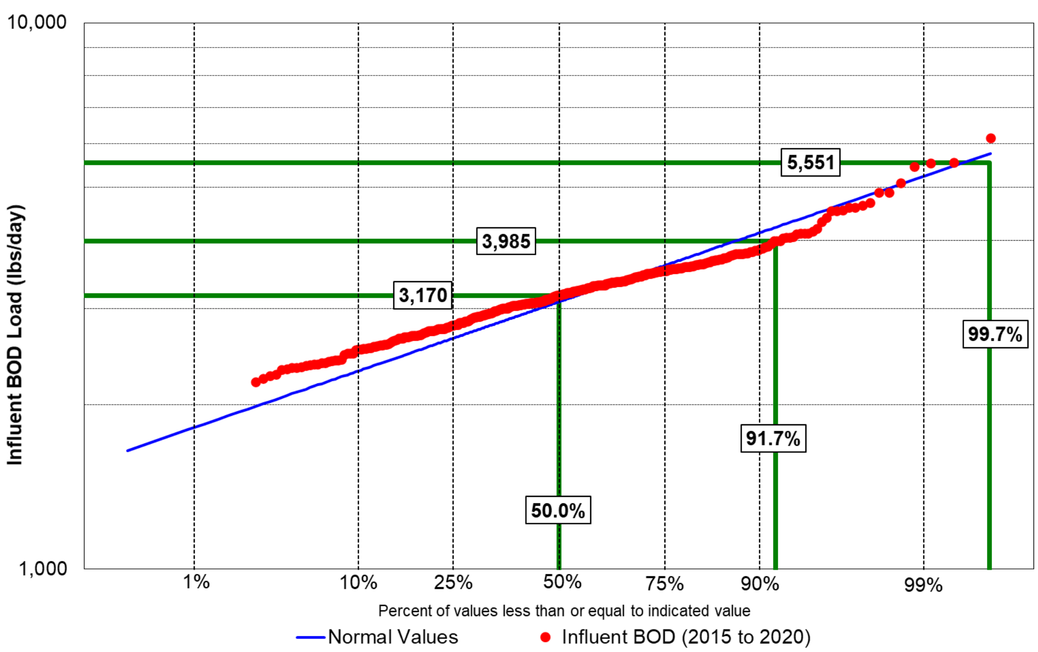


Figure 2-5. Probability Plot of Historical BOD Loads

Current loads were estimated using the same methodology described for the influent flows. Probability plots of influent BOD and TSS loads used to estimate average annual, maximum month, and maximum day loads are shown in Figure 2-5 and Figure 2-6.

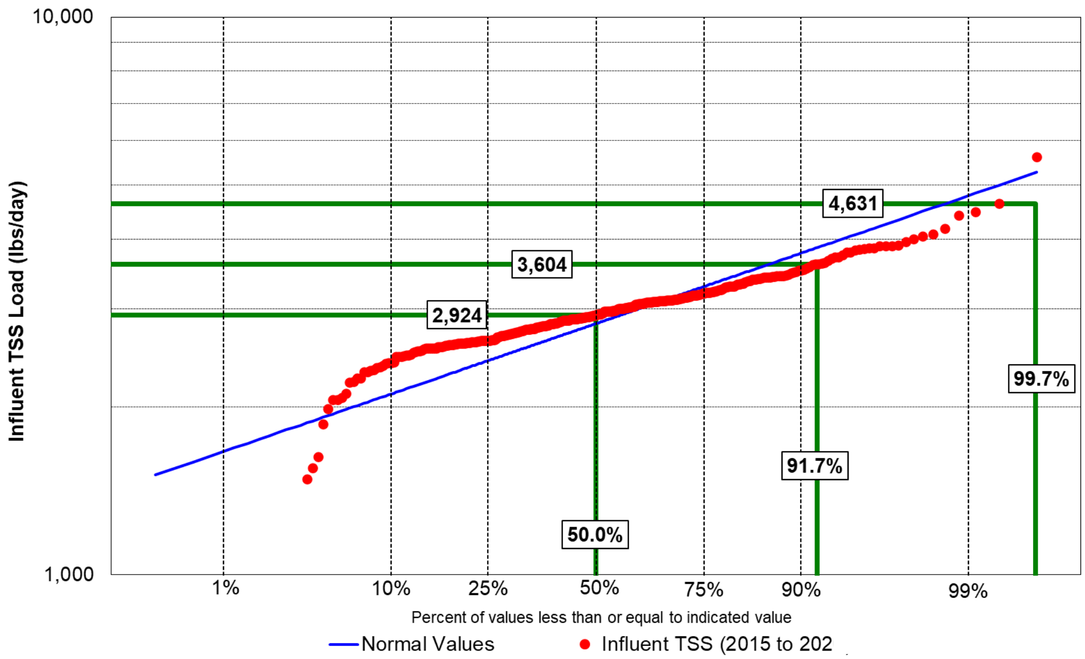


Figure 2-6. Probability Plot of Historical TSS Loads

A summary of the average annual, maximum month, and maximum day influent BOD and TSS loads are shown in Table 2-2. Concentrations were calculated based on the probability plots above and the flows presented in Table 2-2. Peaking factors (expressed in terms of the ratio to average annual load) are also presented in Table 2-2.

Table 2-2. Historic Influent BOD and TSS Loads and Peaking Factors

	BOD			TSS		
Condition	Load (lb/day)	Concentration (mg/L)	Peaking Factor	Load (lb/day)	Concentration (mg/L)	Peaking Factor
Average Annual	3,170	239	1.0	2,924	221	1.0
Maximum Month	3,985	273	1.3	3,604	247	1.2
Maximum Day	5,619	326	1.8	4,631	272	1.6

Data from the last five years were used to characterize current BOD and TSS loads. Because of the future uncertainty in economic development the BOD and TSS loadings and projections should be updated annually as new information becomes available. However, it should be noted that the BOD and TSS loads (in lb/day) are generally independent of flows. The historical BOD concentration data show that it has remained consistent with some higher concentrations observed intermittently in 2019 and 2020. These higher concentrations are believed to be due to new industrial dischargers (i.e., distilleries) that were starting up their industrial operation; the concentration spikes have since been avoided due to more consistent operation from the industrial dischargers. The TSS concentrations have increased over the past decade. While some of the TSS spikes may be explained by the District's collection system cleaning program, the District staff believes that long term trend of higher TSS concentrations may be partly attributed to water conservation within the service area and the installation of water efficient fixtures and appliances. This trend has been observed in other systems/collection systems in California. Due to water conservation efforts, per capita wastewater generation flow rates in California have been observed to decrease while TSS influent loads have increased, resulting in a more concentrated influent wastewater. Influent BOD loading has been observed to have more variability compared to the influent TSS loads.

2.2 Influent Flow and Load Projections

The District's 2012 Wastewater Master Plan Update assumed wastewater flow and loading rates increase proportionally with population growth. The 2012 update considered population growth rates in the 2006 Douglas County Master Plan (DCMP). The 2006 DCMP projected an annual population growth rate of 6.9 percent, which was considered to be aggressive. Therefore, the District's 2012 Wastewater Master Plan Update utilized an annual growth rate of 3.4%, which was based on historical influent flow increases from 1980 to 2010.

For the 2022 Master Plan Update, flow and load projections were developed taking into consideration the following: (1) Douglas County population projections prepared as part of the 2020 DCMP, (2) equivalent dwelling unit (EDU) projections for the District's service area developed by Hansford Economic Consulting (HEC) as part of the District's 2022 rate study, and (3) historical observed growth in influent flows and loads to the WWTP. Influent flows and loads were assumed to increase proportionally with population growth. The following summarizes the projections that were considered followed by a summary of the projections used for this master plan update.

2.2.1 2020 Douglas County Master Plan

The DCMP addresses growth for all of Douglas County. The District's service area is a subset of Douglas County.

The 2020 DCMP states that the average annual percent change in population growth from 2013 to 2018 was 0.9%. The 2020 DCMP considered four growth scenarios for Douglas County, as presented below.

1. State Demographer: 0.1%
2. Low Growth: 1.0%
3. Historic Growth: 1.3%
4. Maximum Growth: 2.0%

The 2020 DCMP states that "given the growth management strategies that Douglas County has in place, future growth will likely trend between the very slow (0.1%) and slow (1%) growth rates over the next 20 years...".

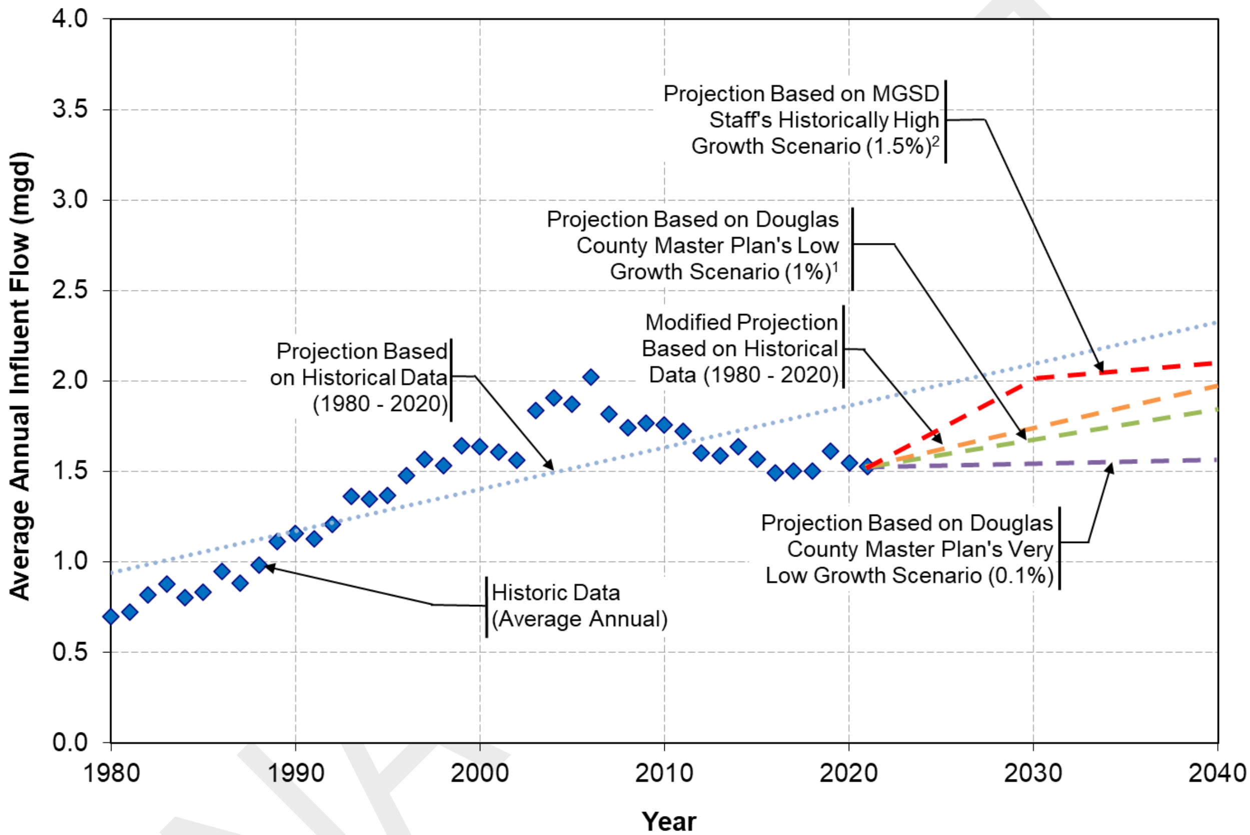
2.2.2 MGSD 2022 Rate Study by HEC

In 2021, the District contracted with HEC to perform a rate study. As part of the rate study, HEC to reviewed historical EDU growth rates and projected future growth in terms of EDUs for the District's service area. Influent wastewater flow rates were projected with the EDU growth rates. Based on recent inquiries at the District by developers and new developments in the area, an annual average growth rate of 1% per year was utilized for the rate study. This growth rate was applied to EDUs and influent wastewater flow projections. This growth rate is also within the 2020 DCMP projection range. It should be noted that the rate study includes as the existing baseline flows and loads (and EDUs) from Pine View Estates. The District anticipates that in the next one to two years, the Pine View

Estates development will move away from existing septic tanks and will connect to the District's collection system.

2.2.3 Historical Data Review

Historical influent wastewater flow and load data was reviewed to confirm historical trends. The average influent flow growth rate from 2015 to 2020 is 0.8% per year. The TSS and BOD loads had similar trends. The observed growth trend of 0.8% per year is in alignment with the growth projections developed by HEC and by the county in the 2020 DCMP.



1) HEC's average projection is the same as Douglas County's projection for low growth scenario (1%)
2) Historically high growth scenario is based on growth between late 1990s and early 2000s.

Figure 2-7. Historical Average Annual Influent Flows (1980-2020)

As shown in Figure 2-7, the 2020 DCMP and HEC EDU projections are similar and result in similar average annual flow projections. These projections assume population/EDU growth rate of 1 percent per year and is similar to the District's average flow and load increase from years 2015 through 2021. This Wastewater Master Plan assumes that growth follows the HEC projections for the planning horizon (i.e., through 2040) because the HEC projections were developed specifically for the District's service area. Buildout flow and load conditions were developed using land use data from the DCMP as further described below.

2.2.4 Wastewater Flow Projections

This section provides the wastewater flow projections for the planning horizon and for buildout conditions.

HEC EDU projections were used to project flows through 2040. Average annual flow projections were estimated by applying the 1% projected growth rate to the current 2020 influent flow[1] as described in Section 2.1. Future maximum month, maximum day, and peak instantaneous wet weather flows were estimated by applying the peaking factors in Table 2-2. to the projected average annual flows. A summary of current and future flows is shown in Table 2-8.

The following details the approach taken for developing buildout flows. Unit factors for estimating the wastewater generation based on land use were estimated based on information provided in the DCMP and are summarized in Table 2-3. These unit factors were applied to the land use acreage within the service area to estimate the buildout wastewater flow that would be conveyed to the District's WWTP. Based on this approach, the buildout flow is estimated to be about 6.1 mgd.

Table 2-3. Wastewater Generation by Land Use

Land Use Type	Unit Factor
All Residential	80 gallons per capita per day
Commercial	1,000 gallons per acre per day
Community Facility - Recreation	2,500 gallons per acre per day
Community Facility - Support and Institution	600 gallons per acre per day
Industrial	1,000 gallons per acre per day
Future Development and Receiving Area	80 gallons per capita per day
Agriculture Domestic	80 gallons per capita per day

The land use map included in the 2006 DCMP was compared to the 2020 DCMP, the comparison is summarized in table 2-4. The land designated for agricultural, commercial and forest and range decreased. While land designated for "future development and receiving area" was substantially increased contributing to a meaningful increase in the buildout capacity estimate.

Table 2-4. Comparison Between 2006 and 2020 Douglas County Master Plan Land Use

Land Use Description	2006 Master Plan (acres)	2020 Master Plan (acres)	Percent Change
Agricultural	5366.9	3801.9	-29%
Commercial	646.6	504.9	-22%
Community Facilities	703.5	679.2	-3%
Forest & Range	1895.7	1345.6	-29%
Industrial	495.9	512.7	3%

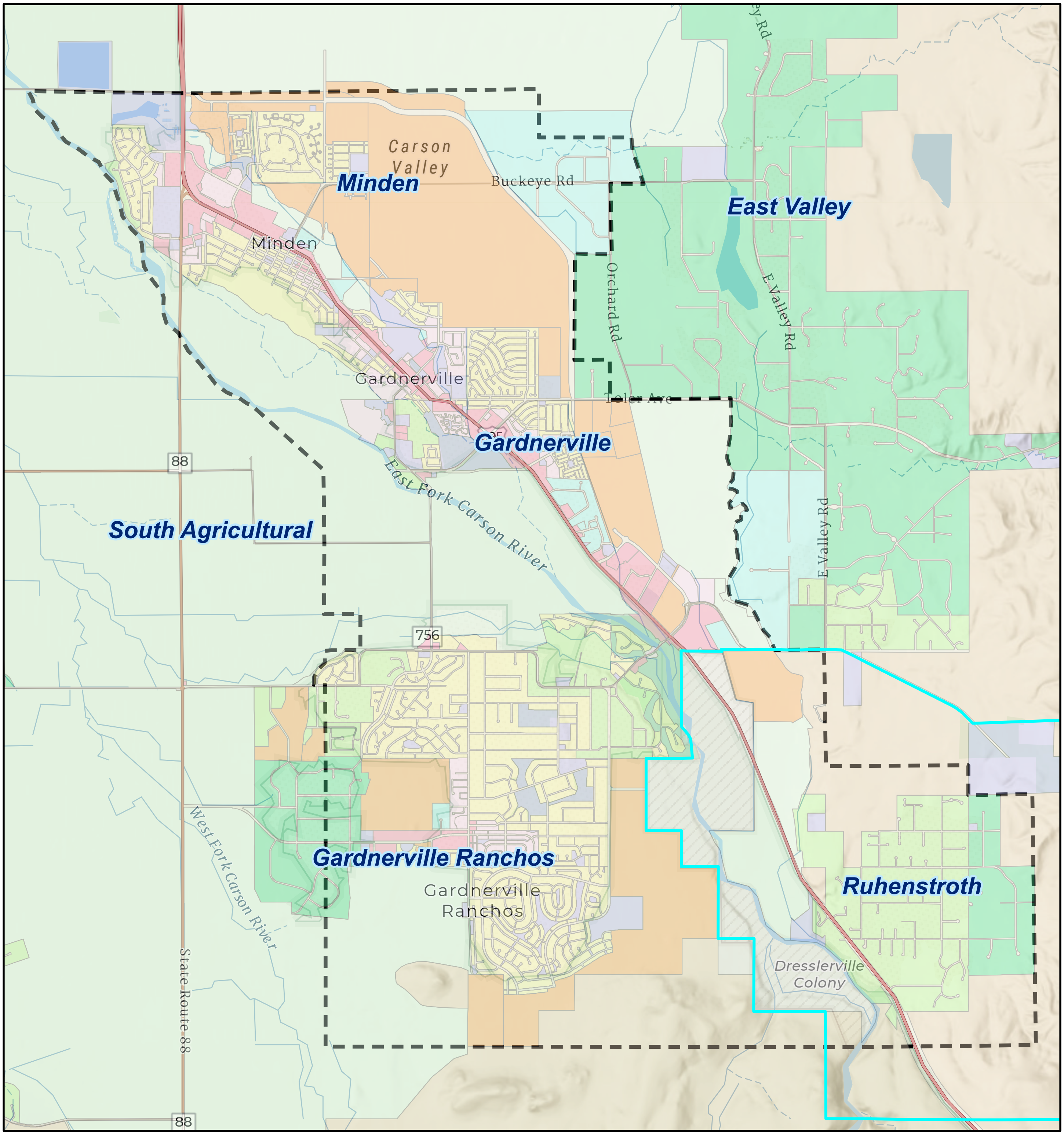
[1] 2020 Average flow is based on the average annual flow for the time period 2015-2021.

Land Use Description	2006 Master Plan (acres)	2020 Master Plan (acres)	Percent Change
Multi-Family Residential	356.1	369.0	4%
Future Development & Receiving Area	572	2623.7	359%
Recreation	103.2	121.1	17%
Rural Residential (do not require urban services)	-	465.9	-
Single-Family Estates	1419	1262.8	-11%
Single-Family Residential	2315	1980.4	-14%
Washoe Tribe Land	809.5	809.4	0%

Table 2-5. Projected Influent Flows

	Influent Flow (mgd)			
Flow Condition	2020	2030	2040	Buildout
Average Annual	1.59	1.75	1.88	6.09
Maximum Month	1.75	1.93	2.07	6.70
Maximum Day	2.07	2.28	2.44	7.92
Peak Wet Weather	4.70	5.26	5.64	18.27

Figure 2-8 Land Uses within the District's Service Area



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Community Area Future Land Use

- Rural Residential
- Single Family Estates
- Single Family Residential
- Commercial
- Multi-Family Residential
- Industrial
- Community Facilities
- Agricultural
- Recreation
- Forest and Range
- Receiving Area
- Washoe Tribe Land
- MGSD Service Area

*Per 2020 Douglas County Master Plan

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

ArcGIS Web AppBuilder

Created from the area file DCFIRE | Reference and acknowledge the Bureau of Land Management in products derived from this map. Bureau of Land Management, Nevada State Office - Nevada,

2.3 Wastewater Load Projections

Projected BOD and TSS loads were calculated based on the estimated concentrations in Table 2-2 and the projected flows in Table 2-5. A summary of current and future BOD and TSS loads is shown in Table 2-5 and Table 2-6.

Table 2-6. Projected Influent BOD Loads

	Influent BOD Loads (lb/day)			
Condition	**2020**	**2030**	**2040**	**Buildout**
Average Annual	3,170	3,495	3,748	12,142
Maximum Month	3,985	4,893	5,247	16,992
Maximum Day	5,551	6,291	6,746	21,864

Table 2-7. Projected Influent TSS Loads

	Influent TSS Loads (lb/day)			
Condition	**2020**	**2030**	**2040**	**Buildout**
Average Annual	2,924	3,224	3,457	11,201
Maximum Month	3,604	3,868	4,149	13,436
Maximum Day	4,631	4,835	5,186	16,808

2.4 Summary of Wastewater Flows and Loads

A summary of the projected flows and loads is provided in Table 2-8.

Table 2-8. Summary of Projected Flows and Loads

Condition	Units	2020	2030	2040	Buildout
Average Annual					
Flow	mgd	1.59	1.75	1.88	6.09
BOD Load	lb/day	3,170	3,495	3,748	12,142
TSS Load	lb/day	2,924	3,224	3,457	11,201
Maximum Month					
Flow	mgd	1.75	1.93	2.07	6.7
BOD Load	lb/day	3,985	4,893	5,247	16,992
TSS Load	lb/day	3,604	3,868	4,149	13,436
Maximum Day					
Flow	mgd	2.07	2.28	2.44	7.92
BOD Load	lb/day	5,551	5,247	6,746	21,864
TSS Load	lb/day	4,631	4,835	5,186	16,808
Peak Wet Weather					
Flow	mgd	4.70	5.26	5.64	18.27

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3.0 Regulatory Requirements

This section provides a description of regulatory requirements for the District's wastewater treatment facilities. The following paragraphs include information regarding existing regulations and potential future changes.

3.1 Discharge Permit Requirements

The Nevada Division of Environmental Protection (NDEP) has the authority to implement all aspects of the regulations pertaining to the District's WWTP, including those pertinent to both water quality and air quality. The jurisdiction of the NDEP also includes both the treated effluent and biosolids, or sludge, produced during treatment.

The District is currently regulated by discharge permit No. NEV40027, which includes provisions for WWTP operation, on-site reuse irrigation, and the distribution of biosolids meeting Class B treatment standards for land application uses. A copy the discharge permit is provided in Appendix A.

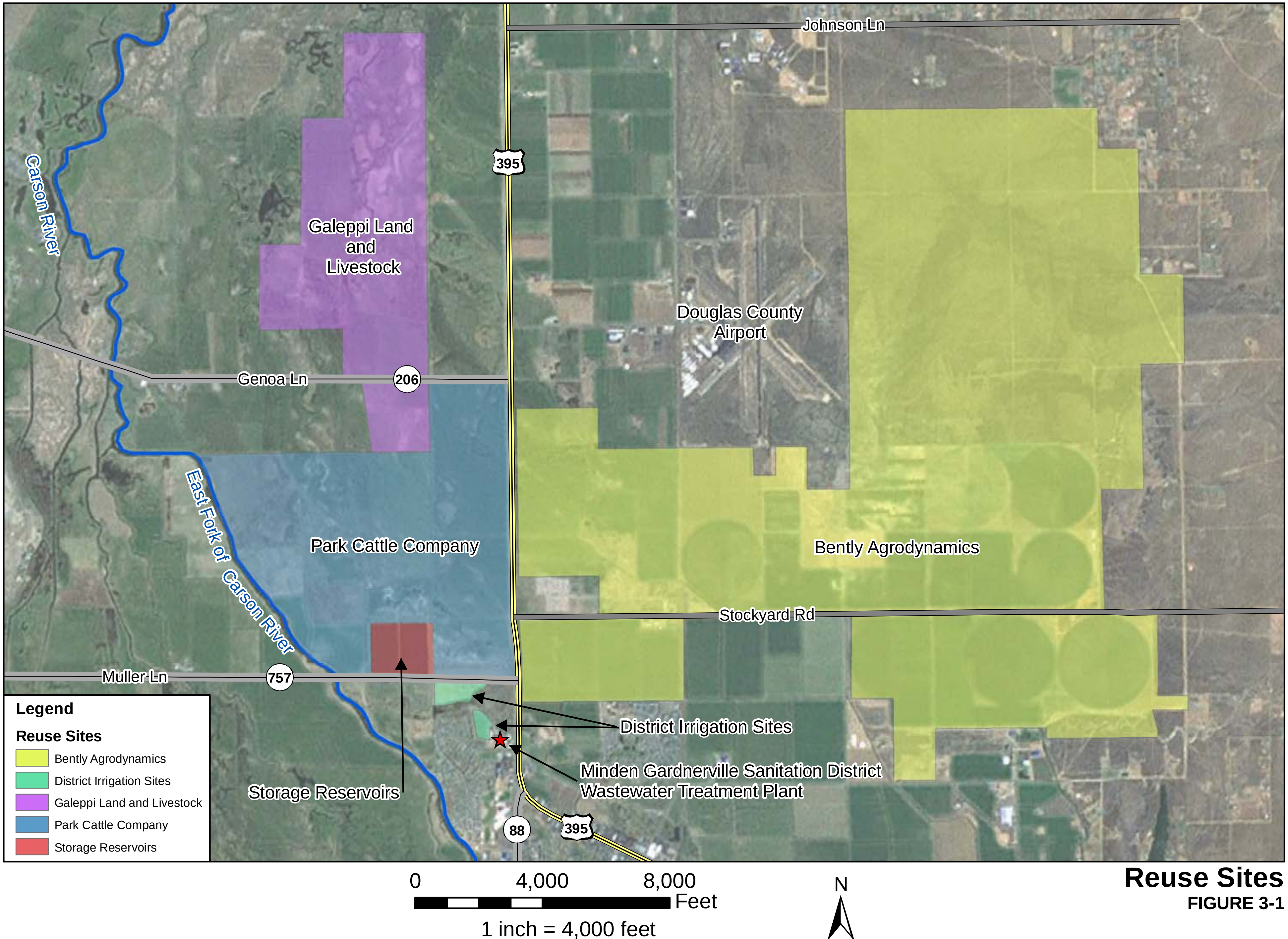
Effluent limitations at the discharge from the chlorine contact tank are summarized in Table 3-1. The District's permit also includes specific requirements for monitoring and reporting locations and frequencies on both effluent and groundwater monitoring wells around the land application area maintained by the District.

Table 3-1. Effluent Discharge Limitations

		Discharge Limitations	
Parameter	**Units**	**30-Day Average**	**Daily Maximum**
Influent Flow	mgd	2.8	3.1
BOD	mg/L	30	45
TSS	mg/L	30	45
Fecal Coliform	MPN/100 mL	200	400
Total Phosphates	mg/L	Monitor & Report	Monitor & Report
pH	su	6 to 9	

3.2 Reuse Sites

Following disinfection at the WWTP, all effluent is discharged for irrigation reuse. There is no direct discharge of effluent to ground or surface waters. Treated effluent is either stored in two clay-lined reservoirs or used for irrigation on about 28 acres owned by the District. The storage reservoirs have a total capacity of 650 acre-ft and are located northwest of the WWTP, as shown in Figure 3-1. Treated effluent is released from the reservoirs on an as-needed basis for irrigation of forage crops by Galeppi Land & Livestock, Park Cattle Company, and pumped to Bently Agrowdynamics. These off-site irrigation locations are administered by each entity under separate discharge permits.



Reuse Sites

FIGURE 3-1

HDR

Effluent reuse by the Park Cattle Company is regulated by discharge permit NEV2000501. The location of the Park irrigation fields is north of the District's WWTP as shown in Figure 3-1. Effluent is delivered to Park by the Rosser Ditch, Middle Ditch, and the Highway 395 Ditch. Effluent is land applied by flood irrigation on selected fields totaling 1,025 acres. Grass hay and meadow pasture are the primary irrigated crops. Park Cattle Company is permitted to receive up to 375 ac-ft per year of effluent from MGSD.

Effluent reuse by the Gallepi Land and Livestock Company (Gallepi) is regulated by discharge permit No. NEV200513. The location of the Gallepi irrigation fields is north of the Park irrigation fields as shown on Figure 3-1. Effluent is delivered to Gallepi by the Rosser Ditch and the Middle Ditch. Effluent is land applied by flood irrigation on selected fields totaling 760 acres. Pasture grasses, clover hay, and alfalfa are the irrigated crops. Gallepi is permitted to receive up to 375 ac-ft per year of effluent from MGSD.

Effluent reuse by Bently Agrowdynamics (Bently) is regulated by discharge permit No. NEV2009507. The location of the Bently irrigation fields is northeast of the District's WWTP as shown on Figure 3-1. Bently receives effluent from the District and Douglas County Sewer Improvement District No. 1. Effluent from the MGSD is pumped from the District's Effluent Pump Station No. 4, located at the northwest corner of the District's storage reservoirs. Effluent is pumped through a force main to Bently's storage reservoir, located to the east of Bently's irrigation fields.

Bently receives the balance of effluent that is not used by Park and Gallepi, and MGSD irrigation within District properties. Bently is permitted to receive the balance of the effluent from the District. Effluent is applied to 3,300 acres of selected irrigated fields within Bently's 5,200 acre site. Approximately 2,850 acres grow alfalfa and small grain using central pivot irrigation systems. The remaining effluent reuse area is irrigated with portable solid set irrigation systems.

3.3 Nitrogen Removal

The District's discharge contains various nitrogen forms, which includes ammonia, nitrite, nitrate, and organic nitrogen. Although the current permit does not require reduction of any nitrogen species, all the ionic species (ammonia, nitrite, and nitrate) are prone to regulation. Ammonia/nitrite are considered toxic to both humans and animals. In particular, the ecosystem is sensitive to ammonia levels as evidenced by limits being more stringent for wastewater plants than drinking water plants. Nitrate is a health concern related to methemoglobinemia (i.e., blue-baby syndrome) and its ability to pollute groundwater.

The removal of nitrogen during wastewater treatment is primarily achieved by (1) assimilation of nitrogen into biomass and (2) biochemical oxidation/reduction processes that convert organic nitrogen and ammonia to nitrogen gas through a two-step process. The two-step process is commonly referred to as nitrification and denitrification. The nitrogen cycle, illustrating nitrification and denitrification pathways, is shown in Figure 3-2.

Nitrification is a two-step process where ammonium (NH_4^+) is oxidized first to nitrite (NO_2^-), followed by nitrite oxidation to nitrate (NO_3^-) by nitrifying organisms (Figure 3-2). Overall, the process stoichiometry is as follows:

$$NH_4^+ + 2O_2 \rightarrow NO_3^- + H_2O + 2H^+ \quad (1)$$

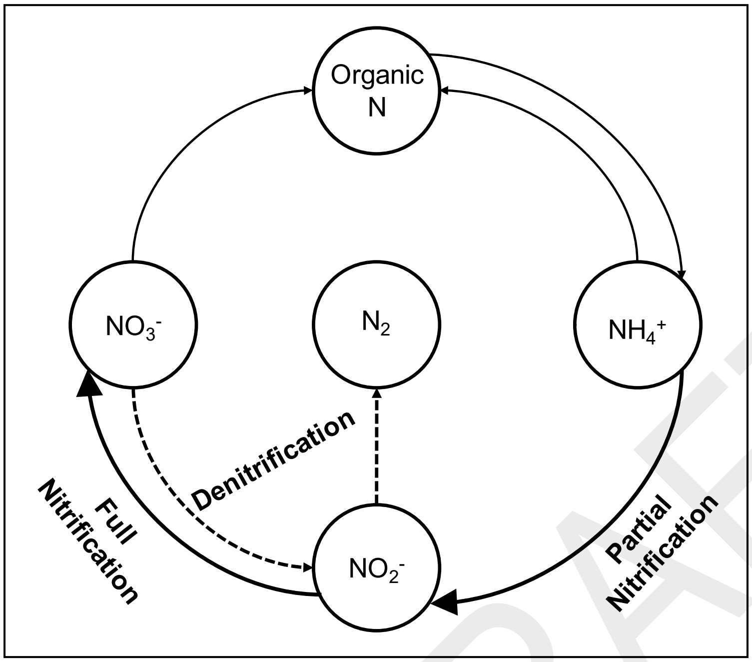


Figure 3-2. Primary Biological Nitrogen Transformations

Denitrification is a biological process where denitrifying bacteria reduce nitrate first to nitrite, followed by subsequent reduction to nitrogen gas. Denitrification requires a carbon (C) source (such as BOD or methanol). Overall, the process stoichiometry with methanol as the carbon substrate is as follows:

$$6NO_3^- + 5CH_3OH + CO_2 \rightarrow 3N_{2(g)} + 6HCO_3^- + 7H_2O \qquad (2)$$

The District does not currently remove ammonia or total nitrogen in the trickling filter or solids contact/aeration process. If nitrogen removal becomes a requirement in the future, the District could remove nitrogen within the solids contact/aeration process, as a tertiary add-on process, or a combination of the two.

If nitrification is accomplished within the solids contact/aeration process, the number of additional aeration basins was estimated based on an oxygen uptake rate (OUR) of 60 mg/L/hr for maximum month conditions. To handle 2040 flows, nine additional basins would be required (total of 14 basins) with the ability to take one basin offline for maintenance. At buildout, 20 additional basins would be required (total of 25 basins).

A large number of basins are required at buildout to provide nitrification. Therefore, rather than expand the solids contact/aeration process to three to five times the current footprint, a tertiary add-on process, such as a biological active filter (BAF) or moving bed biofilm reactor (MBBR), may be more practical.

A more detailed discussion on nitrification/denitrification, as well as various treatment configurations can be found in the *Water Environment Federation Nutrient Removal Manual* (2010).

3.4 Phosphorous Removal

The District's current permit requires total phosphorous concentrations in the effluent to be monitored and reported. A phosphorous limit has not been imposed on the District, but could potentially be included in a future permit.

Wastewater treatment plants remove phosphorus by biological, chemical, or combined biological/chemical approaches. Biological removal requires a process that operates in a sequential anaerobic-aerobic fashion coupled with a source of readily degradable BOD. The District's current WWTP operation is not capable of phosphorous removal, as the solids contact clarifier is fully aerated and the readily degradable BOD required for phosphorus removal is removed in the trickling filters.

If phosphorous becomes and issue in the future and removal is required, metal salt (i.e., ferric chloride or alum) can be added in a solids separation process, such as primary clarifiers or secondary clarifiers. A chemical feed system and storage would be required to deliver the metal salt to the liquid stream.

3.5 Odor Control

The NDEP is the agency primarily responsible for implementing and enforcing air quality regulations in Nevada. Currently, there are no specific requirements or limitations regarding the District's WWTP. However, because commercial and residential developments have encroached into the area surrounding the WWTP, the District has installed several measures to control odors. The District uses a chemical scrubber to treat odorous gases from the headworks. Primary Clarifiers No. 1 and 2 are partially covered and Primary Clarifier No. 3 is completely covered for odor capture. The air is discharged through a biofilter for biological treatment of the odor causing compounds. Air is also down-drafted through the trickling filters for odor capture, and the pulled air vented through the odor neutralization beds.

3.6 Biosolids Disposal and Future Uncertainty

Biosolids can either be sent for disposal or sent to Bently Agrowdynamics for composting. Bently's biosolids compost facility is regulated by permit No. NEV97012. Bently also receives biosolids from Incline Village General Improvement District, Douglas County Lake Tahoe Sewer Authority, and the South Tahoe Public Utility District. Composted biosolids are land applied for beneficial use at Bently's agricultural operation or sold as a soil amendment and source of plant nutrients. Currently biosolids are sent to Bently Agrowdynamics.

According to news reports in the second quarter of 2022, two-thirds of Bently Enterprises properties have been advertised on the market for sale. Included in these properties are Bently's ranching and composting operations. Currently, these operations are the final destination of MGSD's treated effluent and biosolids. This development generates uncertainty for the future of effluent and biosolids disposal. The District is currently reviewing potential alternatives for biosolids disposal. This news impacts other regional municipalities as well, therefore, additional planning, in coordination with other regional municipalities, is required to generate practical alternatives to minimize long-term disposal costs.

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4.0 Treatment Facilities

The District's WWTP was constructed in 1966. Various modifications (presented in Table 1-1) have been made to the plant over its history to match increased growth within the District's service area.

4.1 Description of Existing Facilities

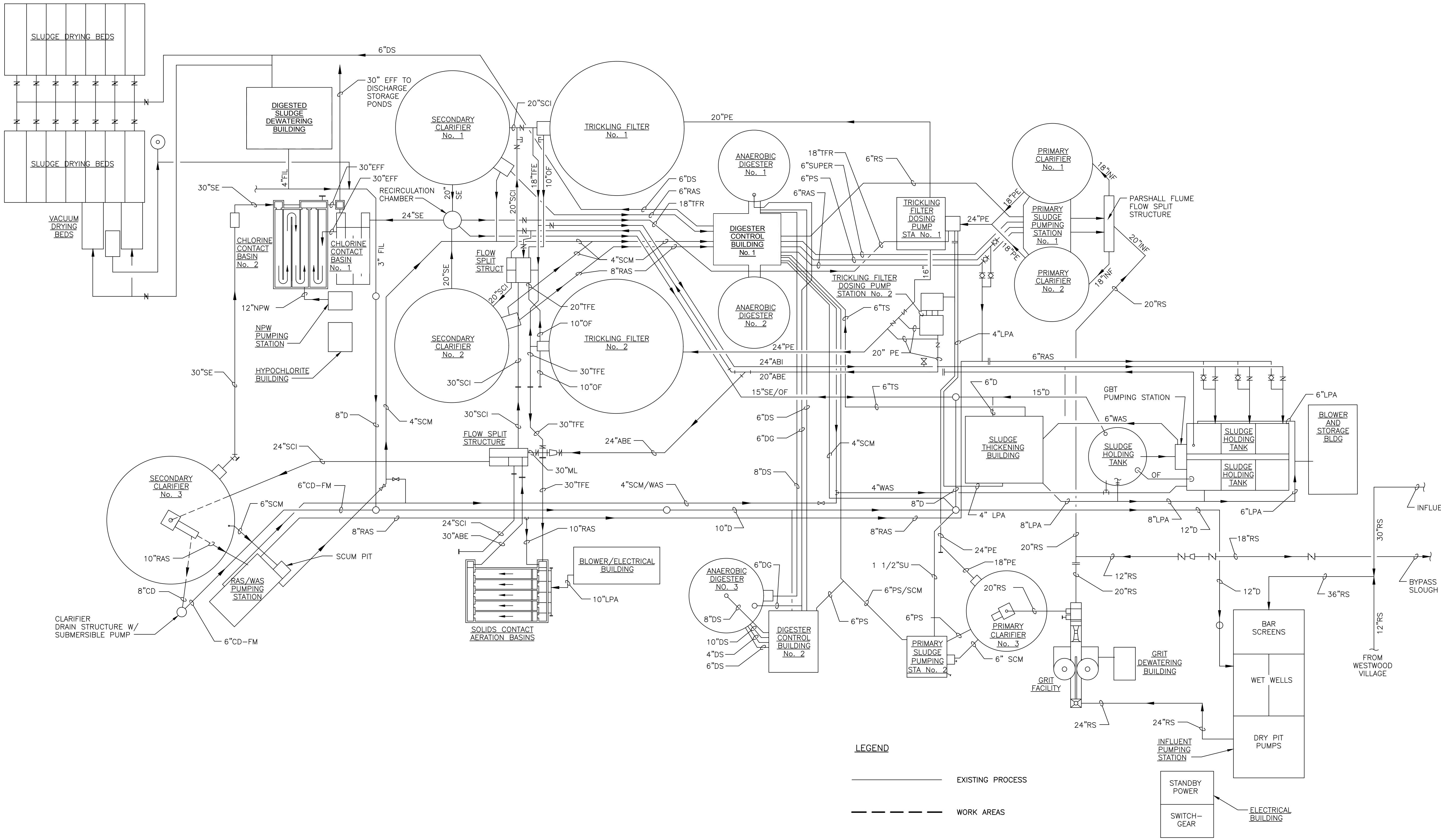
A process schematic and general location of the WWTP and the surrounding area is shown in Figure 4-1 and Figure 4-2, respectively. A general site plan to the WWTP is shown in Figure 4-3. The existing WWTP includes the following processes.

4.1.1 Influent Pumping Station

The pumping station receives all the wastewater flows from the collection system. In the pumping station the flow is split between two mechanical bar screens. Before entering the wet well, the raw sewage is screened to remove large objects and debris that could potentially plug or damage downstream treatment units. There are three 5 mgd pumps installed with space reserved for a fourth pump in the future.

4.1.2 Grit Removal

The Grit Facility consists of a forced vortex system which relies on a mechanically induced vortex to separate the organics from the flow stream and allow the grit solids to settle into a sump. The facility contains two basins. Only one of these basins is currently in operation. Grit removed is dewatered and discharged to a bin for disposal. Wastewater from the grit facility is measured by a parshall flume.



PROCESS FLOW SCHEMATIC

MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
PROCESS FLOW SCHEMATIC

Date
04-01-2022

Figure
4-1

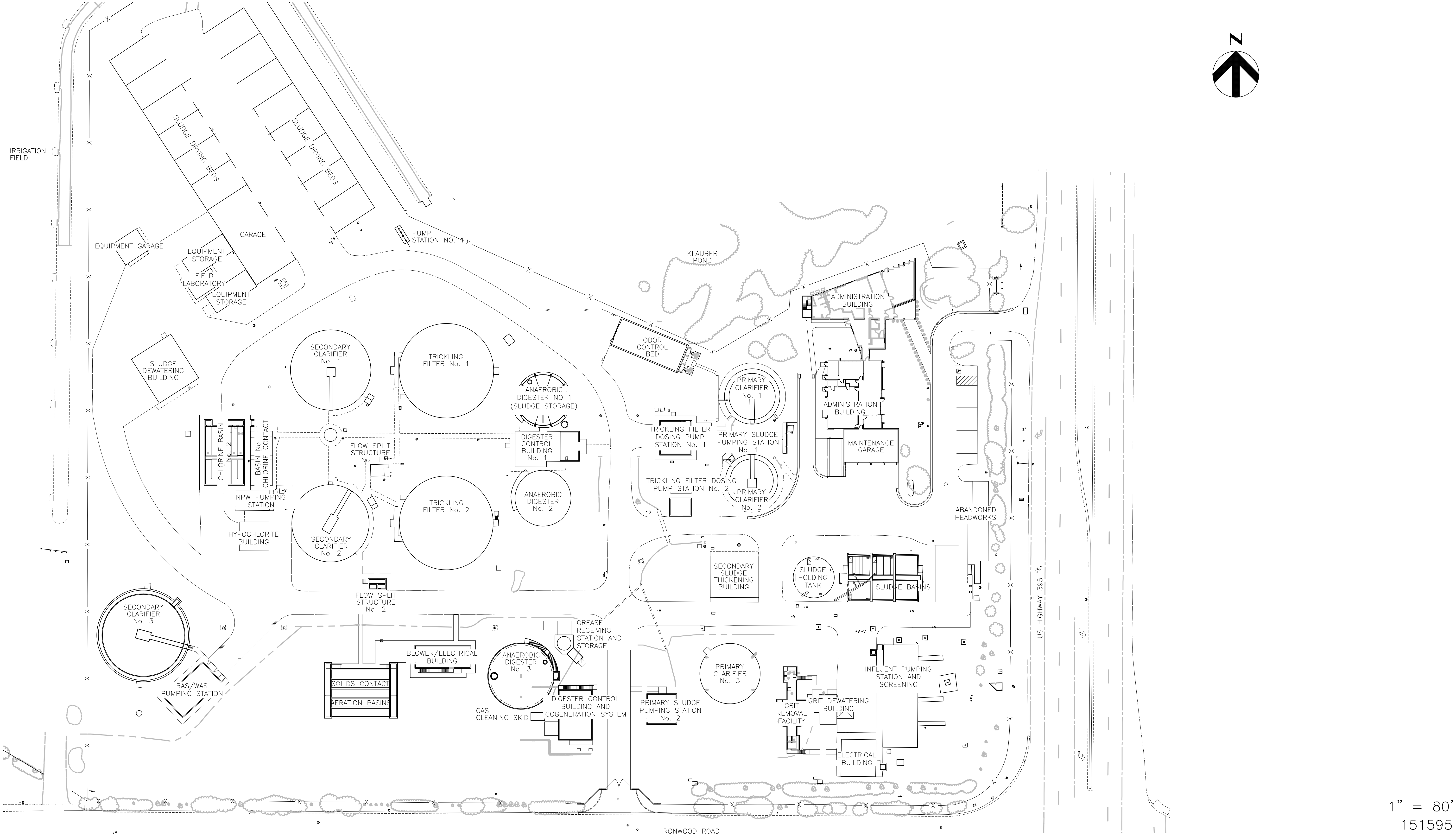
1" = 500'
151595

HDR

MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
FACILITY LOCATION, IRRIGATION FIELDS AND STORAGE RESERVOIRS

Date 04-01-2022

Figure **4-2**



1" = 80'

151595

HDR

MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
EXISTING SITE PLAN

Date	04-01-2022
Figure	**4-3**

4.1.3 Primary Clarifiers

After grit removal, the Primary Flow Split Structure splits the flow between three primary clarifiers. Space is reserved for a fourth primary clarifier in the future. In the primary clarifiers, settleable and floatable solids are removed from the wastewater.

4.1.4 Trickling Filter Pumping Stations

There are two trickling filter pumping stations. Trickling Filter Pumping Station No. 1 pumps primary effluent from the primary clarifiers and re-circulating trickling filter effluent to the top of the two trickling filters.

Trickling Filter Pumping Station No. 2 provides pumping capacity. In the event that Pumping Station No. 1 is out of service, Pumping Station No. 2 can pump primary effluent to the two trickling filters. Pumping Station No. 2 can also bypass primary effluent around the trickling filters to the solids contact and aeration basins.

4.1.5 Trickling Filters

Two trickling filters provide biological treatment of primary clarifier effluent to reduce BOD concentrations and other biodegradable compounds. Once the wastewater is applied to the top of the filters, it trickles down through crossflow plastic media and flows into an underdrain system beneath the filters and into a trickling filter effluent discharge box. Trickling filter effluent is conveyed to the solids contact and aeration system.

4.1.6 Solids Contact and Aeration

The solids contact and aeration system is a secondary treatment process, which enhances BOD removal of the trickling filter effluent and improves the solids settling characteristics. The solids contact process consists of five cells. Three of these cells are available for operation and two are provide for future expansion. The aeration basin was originally designed to operate at a low SRT (1-2 days), but in the recent years the plant staff have increased the SRT to greater than 3 days for more improvements in the settleability. Return activated sludge (RAS) is conveyed from the secondary clarifiers to the aeration basin inlet.

4.1.7 Secondary Clarifiers

Mixed liquor from the solids contact and aeration basins is split between three secondary clarifiers. The clarifiers receive either trickling filter or solids contact mixed liquor and are intended to separate the solids, scum, and any remaining settleable or floatable solids from the treated wastewater to produce a clear effluent prior to disinfection. Solids from the trickling filter / solids contact process are removed by settling in the clarifier. Solids removed in the secondary clarifiers are returned either to the solids contact aeration basins as RAS or to the Sludge Holding Basins as waste activated sludge (WAS).

4.1.8 Return Activated Sludge

There are two RAS pumping stations. Sludge removed from Secondary Clarifier No. 1 and 2 is pumped by RAS pumps located in Digester Control Building to the solids contact aeration basins. The pumps in the RAS/WAS Pumping Station provide sludge pumping for Secondary Clarifier No. 3 and a future clarifier.

4.1.9 Disinfection – Sodium Hypochlorite System

Sodium hypochlorite is stored and used for disinfection of the effluent from the secondary clarifiers. The purpose of disinfection is to destroy disease-causing bacteria, viruses, and other pathogens that may be present in the treatment plant effluent. Hypochlorite is diluted with non-potable water, mixed through a static mixer, and is injected prior to the two chlorine contact basins.

4.1.10 Chlorine Contact Basins

Effluent from Secondary Clarifier No. 1 and 2 is conveyed from the recirculation chamber to Chlorine Contact Basin No. 1. This basin is a combination of the original chlorine contact basin and an expansion in 2006. Effluent from Secondary Clarifier No. 3 is conveyed to Chlorine Contact Basin No. 2.

4.1.11 Effluent Pumping

There are three effluent pumping facilities. Effluent Pumping Station No. 1 lifts the disinfected effluent to an irrigation ditch. The irrigation ditch can be used to irrigate fields on MGSD property west of the WWTP or convey effluent to Pump Station No. 2. Pump Station No. 2 is located at the northwest corner of MGSD's property. Pump Station No. 2 primarily discharges to the MGSD storage ponds located north of Muller Lane. The discharge from Pump Station No. 2 can also be routed to irrigate files on MGSD property north of the WWTP, or discharge to the Rosser Ditch. Pump Station No 4. is located at the northwest corner of the storage ponds. Pump Station No. 4 pumps effluent from the MGSD storage ponds to the Bently storage ponds.

4.1.12 Non-Potable Water Pumping Station

The non-potable water pumping station supplies chlorinated effluent to the entire plant for process and wash down water.

4.1.13 Waste Activated Sludge Storage

Three square and one circular aerated storage basins are used as an intermediate between the RAS/WAS pump station and the WAS thickening process. The basins ensures a steady feed of WAS to the downstream sludge thickening process.

4.1.14 Sludge Thickening

A single gravity belt thickener is used to thicken WAS prior to anaerobic digestion. The return stream is returned downstream of the bar screens in the headworks.

4.1.15 Anaerobic Digestion

Biological stabilization of sludge is accomplished in three anaerobic digesters. Anaerobic Digester No. 2 and No. 3 operate in parallel. Sludge flows to Anaerobic Digester No. 1 where it is further stabilized and stored. The sludge is decomposed into inert organic and inorganic compounds, and methane gas is produced.

4.1.16 Grease Receiving Station and Co-Generation System

In 2011 a Grease Receiving Station and Co-Generation system was commissioned. A 15,000-gallon storage tank holds grease from off-site facilities, and grease is fed at a steady rate to the digesters. The grease increases digester gas production by nearly 300%, which significantly increases the volume of gas available for combustion. Methane gas from the digesters is treated and compressed in a gas polishing system and used for fuel in an 185kW engine. The Co-Generation system produces enough energy to meet more than one-half the plants daily energy demand.

4.1.17 Sludge Dewatering

Digested sludge is dewatered to reduce its volume prior to being removed from the WWTP. Dewatering is accomplished with a belt filter press. Once dewatered, the sludge is loaded on trucks to be hauled to land disposal sites or to the landfill. Filtrate from the belt filter press along with building washdown water is drained to a sump and pumped to the plant drain system which returns to the headworks.

4.1.18 Administration Building

The Administration Building is located on the northeast corner of the treatment plant property. This building houses the administrative, operations, and maintenance staff offices, in addition to the board room and other document storage areas. Located on the south end of the Administration Building is the maintenance garage. This area is used for storage, general maintenance work, vehicle services, etc.

4.2 Existing Equipment Inventory

A listing of current unit process equipment and facilities inventory for the liquid and solids streams is provided in Table 4-1 and Table 4-2, respectively.

Table 4-1. Existing (2020) Liquid Stream Process Inventory

Unit Process	Units	Current (2011)
Influent Pump Station		
Number of Influent Pumps	number	3 (2 – duty, 1 – standby)
Pump Capacity (Each)	mgd	5
Firm Capacity	mgd	10
Headworks		
Number of Screen Units	number	2
Influent Screen Firm Capacity	mgd	15
Number of Grit Units	number	1
Grit Basin Volume	gallons	5,800
Primary Clarifiers		
Total Number	number	3
Diameter	ft	Primary Clarifier No. 1 & 2 – 45 ft Primary Clarifier No. 3 – 50 ft
Depth	ft	Primary Clarifier No. 1 & 2 – 10.5 ft

Unit Process	Units	Current (2011)
		Primary Clarifier No. 3 – 12 ft
Volume	gallons	Primary Clarifier No. 1 & 2 – 125,000 Primary Clarifier No. 3 – 176,000
Clarifier Area (Total)	sq ft	5,150
Hydraulic Surface Loading Rate	gpd/sq ft	400
Hydraulic Retention Time (HRT)	hours	5.6
Solids Loading Rate	lb/sq ft/d	1
Trickling Filter Pump Station No. 1		
Number of Pumps	number	1 – 3,500 gpm 2 – 3,200 gpm
Trickling Filter Pump Station No. 2		
Number of Pumps	number	3 – 3,200 gpm
Trickling Filters		
Number of Basins	number	2
Diameter	ft	80
Solids Contact and Aeration Basins		
Total Number of Basins	number	5
Number of Basins in Service	number	3
Volume Total	gallons	100,000
Secondary Clarifiers		
Total Number	number	3
Diameter	ft	Secondary Clarifier No. 1 – 65ft Secondary Clarifier No. 2 – 65 ft Secondary Clarifier No. 3 – 78 ft
Depth	ft	Secondary Clarifier No. 1 – 10 ft Secondary Clarifier No. 2 – 16 ft Secondary Clarifier No. 3 – 16 ft
Volume	gallons	Secondary Clarifier No. 1 – 248,000 Secondary Clarifier No. 2 – 397,000 Secondary Clarifier No. 3 – 572,000
Clarifier Area (Total)	sq ft	11,400
Base RAS Ratio of Influent	% of flow	50
Chlorine Contact Basins		
Number Units	number	2
Total Volume	gallons	216,000
Effluent Pumping		

Unit Process	Units	Current (2011)
Pump Station No. 1	number and capacity	1 x 1,000 gpm 2 x 1,750 gpm
Pump Station No. 2 A.	number and capacity	2 - 6,000 gpm
Pump Station No. 2 B	number and capacity	4 - 1,000 gpm
Pump Station No. 4	number and capacity	2 - 2,300 gpm

Table 4-2. Existing (2020) Solids Stream Process Inventory

Unit Process	Units	Current (2011)
RAS Pumping Station No.1		
Number of Pumps	number	2 – 150 gpm; 2 – 75 gpm
RAS Pumping Station No.2		
Number of Pumps	number	1 – 200 gpm; 1 – 486 gpm
WAS Solids Holding Tank		
Number of Holding Tanks	number	4 (3 Square, 1 Circular)
Volume of Square Tanks (each)	gallons	34,400
Volume of Circular Tank	gallons	47,500
Sludge Thickening (Gravity Belt Thickener)		
Number of Units	number	1
Belt Width per Unit	meter	1
Firm Capacity	gpm	250
Anaerobic Digesters No. 2 and No. 3		
Number of Units	number	2
Total Volume of Digesters	gallons	643,000
Anaerobic Digester No .1		
Number of Units	number	1
Total Volume	gallons	367,000
Sludge Dewatering (Belt Filter Press)		
Number of Units	number	1 (+1 under construction)
Belt Width per Unit	meters	1
Firm Capacity	gpm	75
Grease Storage		
Number of Units	number	1
Total Volume	gallons	15,000
Cogeneration		

Unit Process	Units	Current (2011)
Volume of Gas	cf/day	70,000
Number of Engines		1
Power Production	kW	185

5.0 Process Capacity Analysis

HDR's ENVision steady state mass balance program was used to calibrate existing flows and loads within the WWTP and estimate process performance. This program provides a steady state mass balance for flows, TSS, BOD, and other constituents throughout the WWTP using models for each process.

The ENVision model provides an accurate and simple method to evaluate the process loading and process performance. The calibrated steady state mass balance was used to estimate the maximum and peak loading conditions that should be considered in the unit process analysis and the various conveyance needs throughout the plant.

5.1 Model Development and Calibration

The ENVision model was developed using physical dimensions and operating parameters of each unit process as inputs to the model. The ENVision steady state mass balance for the District's WWTP is shown in Figure 5-1.

Once the model was developed, historical sampling data from 2005 through 2020 was used to calibrate the model. In instances where the District's sampling data did not provide adequate detail for calibration of the model, typical industry values were used from a combination of the following sources:

- Past HDR experience and knowledge of the District's WWTP operations.
- Industry default values in the *Water Environment Federation (WEF) Manual of Practice Number 8* (MOP8) (WEF, 2009).
- Theoretical calculations based on the conservation of mass.

WWTP liquid and solid streams were evaluated separately. The calibration results for each are shown in Table 5-1 and Table 5-2, respectively. These tables compare the District's historical operational data (WWTP Data) with the model results (Model Results). The difference (Delta) between the WWTP Data and Model Results is used as an indicator of how well the model is calibrated to the actual operation of the District's WWTP.

A more detailed explanation of the model calibration and mass balance is provided in Appendix B. With the exception of the dewatering solids feed percent, the data along with the theoretical calculations have been calibrated to the District's WWTP operations and was used to estimate existing and future WWTP capacity.

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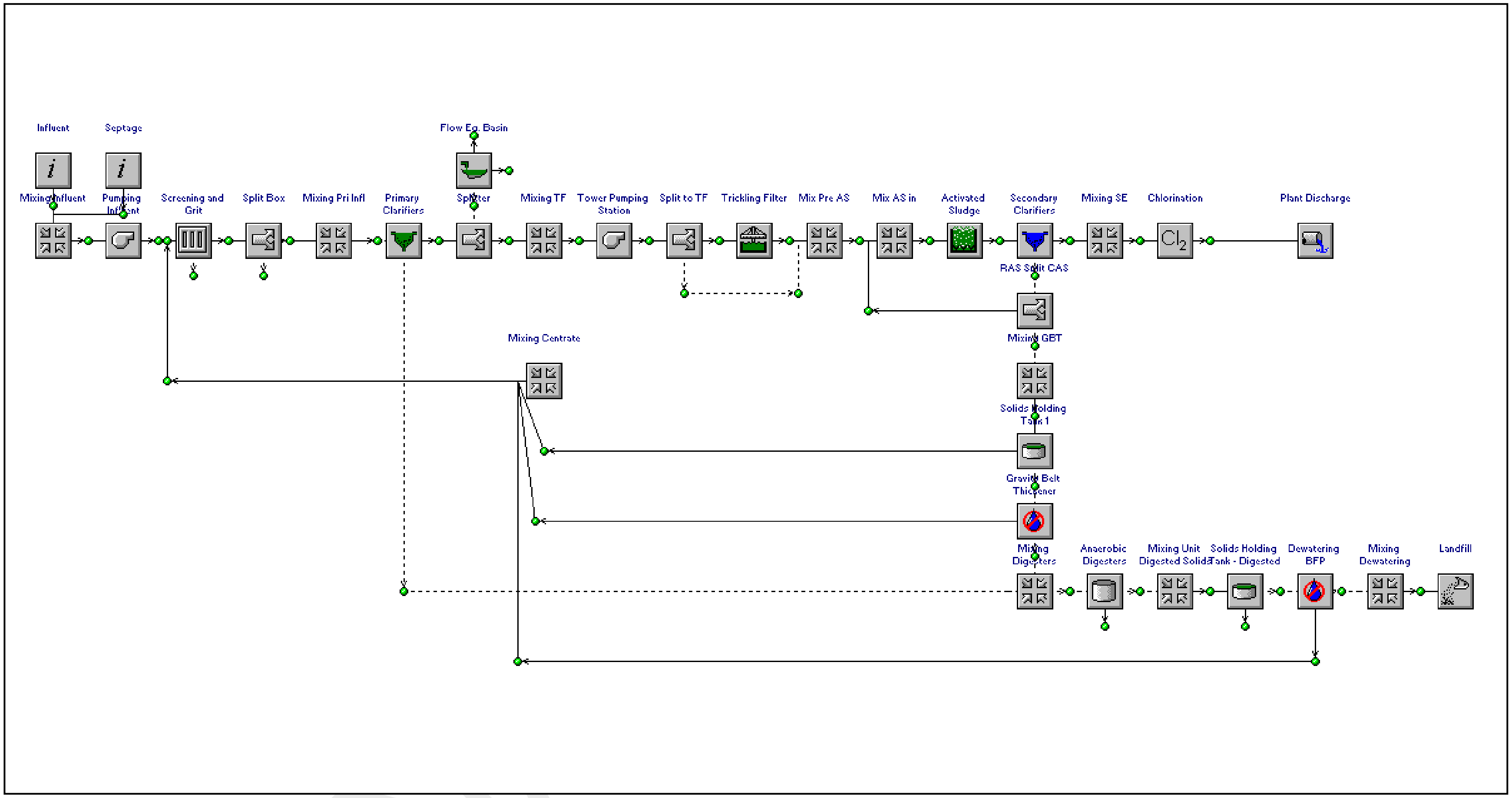

Figure 5-1. ENVision Model

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Table 5-1. Liquid Stream Calibration Results

Location	Compound	Units	WWTP Data	Model Results	Delta	Data Source
Influent	Flow	mgd	1.5	1.5	0%	Estimates in Section 2
Influent	TSS	mg/L	241	241	0%	Estimates in Section 2
Influent	BOD	mg/L	242	242	0%	Estimates in Section 2
Primary Effluent	TSS	mg/L	100	99	1%	Based on Operator Input
Primary Effluent	BOD	mg/L	230	185	20%	Based on Operator Input
Primary Removal	TSS	%	59%	59%	1%	Historical Plant Data
Primary Removal	BOD	%	5%	24%	-	Based on Operator Input
Trickling Filter	TSS	mg/L	-	115	-	HDR Estimate
Trickling Filter	BOD	mg/L	-	65	-	HDR Estimate
Solids Contact and Aeration						
Tanks in Service		number	3 out of 5	3 out of 5	-	Current WWTP Operations
Mean Cell Resistance Time (MCRT)		days	-	2.2	-	Hand-Calculated
Mixed Liquor	TSS	mg/L	1500	1500	0%	Based on Operator Input
Yield Total (includes TFs)		lb TSS/ lb BOD	0.45	0.45	1%	Hand-Calculated Based on 42% BOD removal in TFs
Secondary Clarifier Effluent	TSS	mg/L	8.5	8.5	0%	Based on Operator Input
Secondary Clarifier Effluent	BOD	mg/L	7.5	7.9	5%	Based on Operator Input
Effluent	TSS	mg/L	8.5	8.5	0%	Based on Operator Input
Effluent	BOD	mg/L	7.5	7.9	5%	Based on Operator Input

Table 5-2. Solids Stream Calibration Results

Location	Compound	Units	WWTP Data	Model Results	Delta	Comment
Primary Solids	Flow	gpm	-	3.3	0%	Hand-Calculated
Primary Solids	%	%	-	4.6%	0%	Used to Calibrate
Primary Solids	TSS Load	lb/d	-	1,800	0%	Hand-Calculated
RAS	Flow Ratio	ratio	50	50	0%	Based on Previous Data at District
RAS	TSS	mg/L	-	4400	-	Hand-Calculated
WAS	Flow	gpm	-	18.7	7%	Hand-Calculated
WAS	TSS	mg/L	-	4,400	3%	Hand-Calculated
WAS	TSS	lb/d	-	1,000	6%	Hand-Calculated
TWAS	TS	%	3.6%	3.6%	1%	Used to Calibrate
Digester Feed	Flow	gpm	-	5.5	0%	Hand-Calculated
Digester Feed	Solids	%	4.1%	4.1%	0%	Used to Calibrate
VSS Destruction	VS	%	54%	55%	2%	Hand-Calculated
Dewatering Feed	TS	%	1.3%	2.2%	41%	Hand-Calculated
Dewatered CAKE	TS	%	18%	18%	0%	Used to Calibrate

5.2 Treatment Capacity

The calibrated mass balance model was used to estimate treatment capacity based on existing equipment and facilities. For each unit process, several design criteria were analyzed. The limiting design criteria per unit process are presented in Table 5-3. These criteria were used to estimate the current capacity of each process unit as listed in Table 5-3 and shown graphically in Figure 5-2. Capacities are provided in terms of average annual flow.

Table 5-3. Unit Process Capacity

		Average Annual Capacity (mgd) [2]	
Unit Process	**Capacity Criteria [1]**	**Existing [3]**	**With Improvements**
Influent Pump Station	Firm Capacity at PWWF (1 standby pump)	*3.3*	6.6
Influent Screens	15 mgd at PWWF (All Screens in Service)	*5.0*	
Grit Removal[5]	30 sec HRT at PWWF	10.6	
Primary Clarifiers	2,500 gpd/sq ft at PWWF	*4.3*	7.0
Trickling Filter Pumping			
Pumping Station No. 1	Firm Capacity at PWWF (1 standby pump)	3.4	
Pumping Station No. 2	Firm Capacity at PWWF (1 standby pump)	3.4	
Total		6.9	
Trickling Filters	100 lb/1000 cu ft/d at AA Flow	6.7	
Solids Contact and Aeration	60 mg/L/hr Oxygen Uptake Rate at MM Flow	***1.5 for 3 basins in service***	7.2 for 9 basins in service
Secondary Clarifiers	2 hr at PWWF	*3.2*	7.7
RAS Pumping[4]			
Pumping Station No. 1	50 percent of MM Flow (1 standby pump)	*0.7*	1.6
Pumping Station No. 2	50 percent of MM Flow (1 standby pump)	*1.0*	1.9
Total		*1.7*	3.5
Chlorination	15 min at PWWF	6.9	
Sludge Thickening	48 hr/week at MM Flow	7.1	
Anaerobic Digesters	16 days at MM Flow	6.6	
Dewatering	35 hr/week at MM Flow	6.9	

1) AA = Average Annual; MM = Maximum Month; MD = Maximum Day; PWWF = Peak Wet Weather Flow
2) Capacities are provided in terms of average annual flow.
3) Processes in orange require improvement or expansion to handle buildout flows, while those in red require improvements to handle 2040 average annual flows.
4) Capacity is 50% of MM flow.
5) Grit capacity is with all units in service.

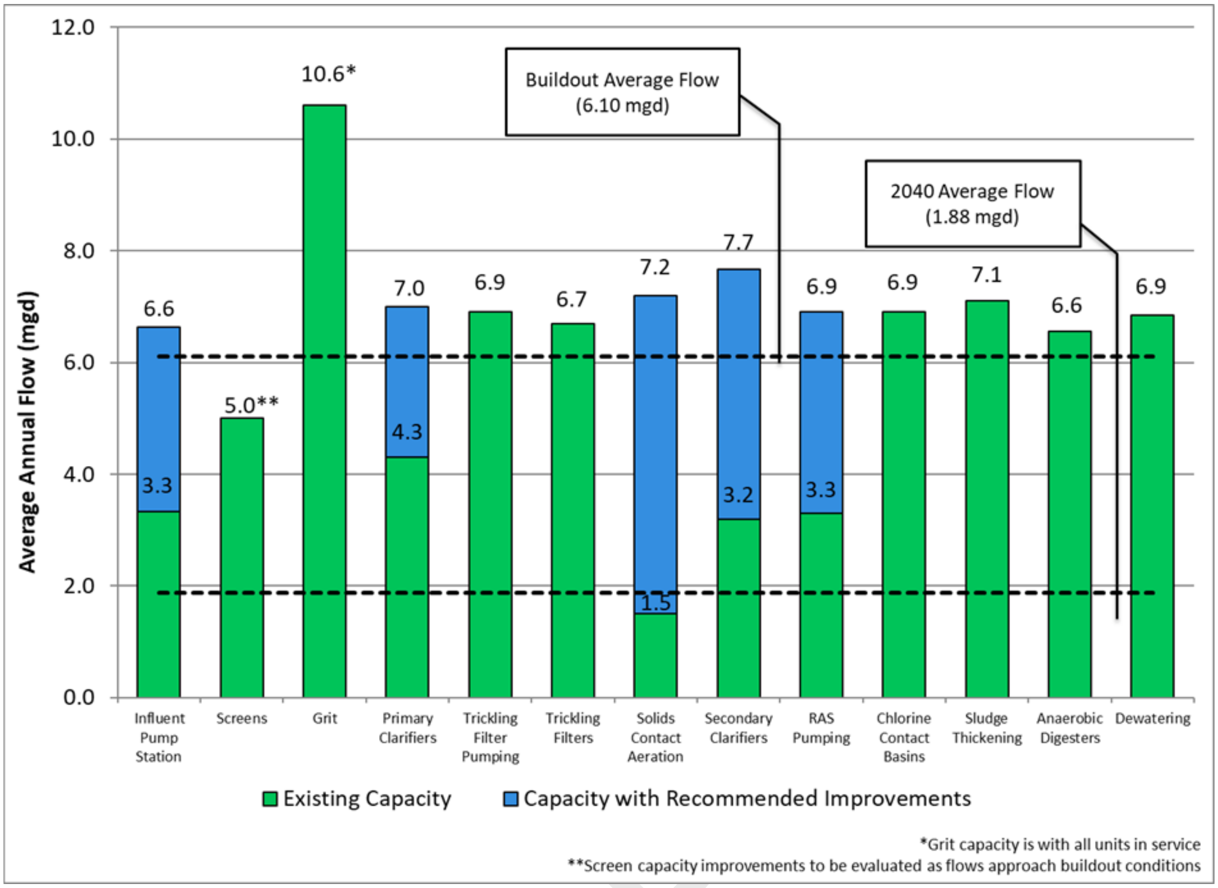

Figure 5-2. Treatment Capacity

5.3 Facility Requirements and Improvements

Sludge thickening is accomplished with a single gravity belt thickener (GBT). It is recommended that the District consider installing an additional unit to serve as backup in the case of an emergency or maintenance. This will improve the reliability of the sludge thickening process.

The projected average annual flow in the year 2040 is approximately 1.88 mgd. Based on the existing capacity of each unit process, additional capacity in the solids contact and aeration basins are required by the year 2040. The following facilities are recommended to increase capacity and are described in more detail in Section 7.

- Install the aeration equipment in Aeration Basins 4 and 5.
- Install a third aeration blower.

The projected average annual flow at buildout is about 6.1 mgd. Several unit processes will require expansion to meet buildout capacity requirements. The following facilities are recommended to increase capacity and are also described in more detail in Section 7.

- Expand influent screening capacity.
- Install a fourth influent pump.
- Construct a fourth primary clarifier.
- Add four additional aeration basins, independent of the two existing basins without diffusers.
- Replace the three existing aeration blowers to increase capacity.
- At a minimum construct a fourth secondary clarifier, however, a fifth one may be necessary without relevant operational adjustments.
- Install the third RAS pump in the RAS/WAS Pumping Station and replace the two existing RAS pumps to increase overall capacity
- Replace the RAS pumps in the Digester Control Building to increase capacity.

For all the unit processes, it is important to note that although capacity might exist for a particular unit process, the equipment might reach the end of their useful lives prior to buildout.

5.4 Biogas Utilization

The District currently accepts deliveries of fats, oils, and grease (FOG) to their anaerobic digesters. The primary benefit of accepting FOG deliveries is to increase the biogas production, thereby increasing the energy production of the plant. Biogas produced in the anaerobic digesters is either used in the boiler (for digester heating) or is utilized in the District's 185 kW cogeneration engine. Typically, the District will first send biogas to the Cogen engine, and use remaining gas in the boiler, as needed. If excess biogas is produced, it is flared. The District is considering an increase in FOG deliveries to increase biogas production and to decrease reliance on supplemental natural gas.

As depicted in Figure 5-2, anaerobic digester capacity is not limiting FOG deliveries for 2040 average annual flows, but rather it is the ability for the plant to effectively utilize all its produced biogas that makes accepting any additional FOG deliveries an unattractive option. The electricity generation from the anaerobic digesters varies for multiple reasons, including variable timing of FOG deliveries, variable FOG characteristics, seasonal temperature changes, and the inability to effectively meter FOG into the digesters. The variable timing of FOG deliveries requires the Staff to pump down the FOG tank at a suboptimal rate and feed FOG to digester more quickly to create room for new delivery. This means more variability in gas production. As a result, biogas that could be used for power is often flared off when there is no additional capacity from the co-generator or boilers to utilize it. Due to this, it is recommended that additional FOG storage be constructed for the purpose of even flow attenuation. Flow attenuation can also be improved by metering FOG into anaerobic digester #2 in addition to anaerobic digester #3 where it is currently solely metered. Furthermore, an option to add a co-generation unit with a greater capacity should be further reviewed, A larger co-generation unit may be better suited to fully utilizing the produced biogas after anaerobic digester operations become more stable.

The recommendations above will result in the ability for the District to utilize more of its produced biogas, making the acceptance of additional FOG deliveries a more appealing and economical option. Using industry values, previous plant experience, and input from current operating staff Figures 5-3 and 5-4 show the theoretical relative increase in biogas production when increasing FOG deliveries from 3 truckloads a week, which is in line with current WWTP operations, to 4 truckloads a week.

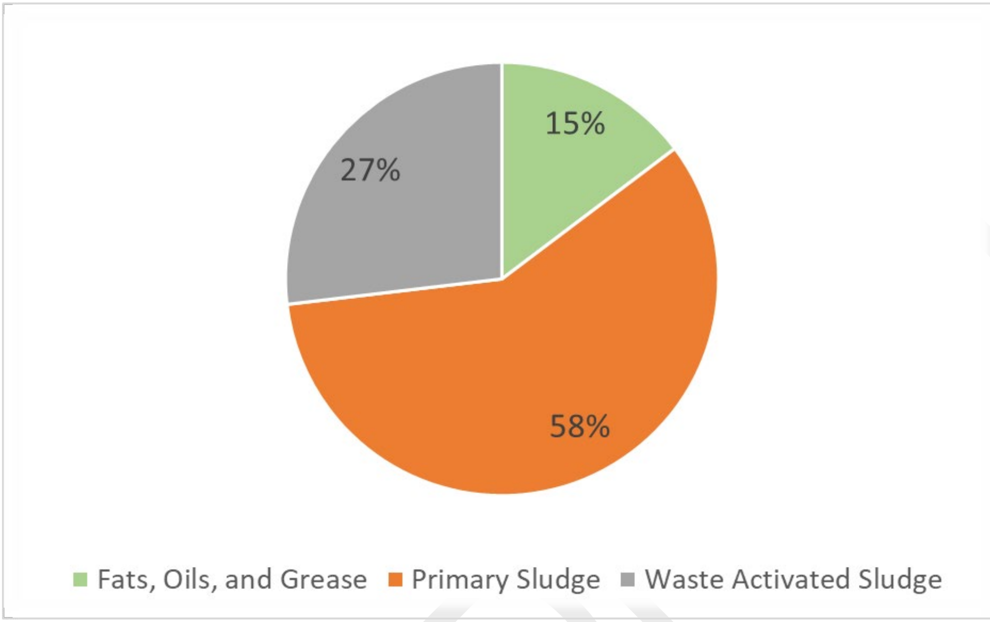

Figure 5-3. Relative Contribution to Biogas Production – Three Truckloads of FOG

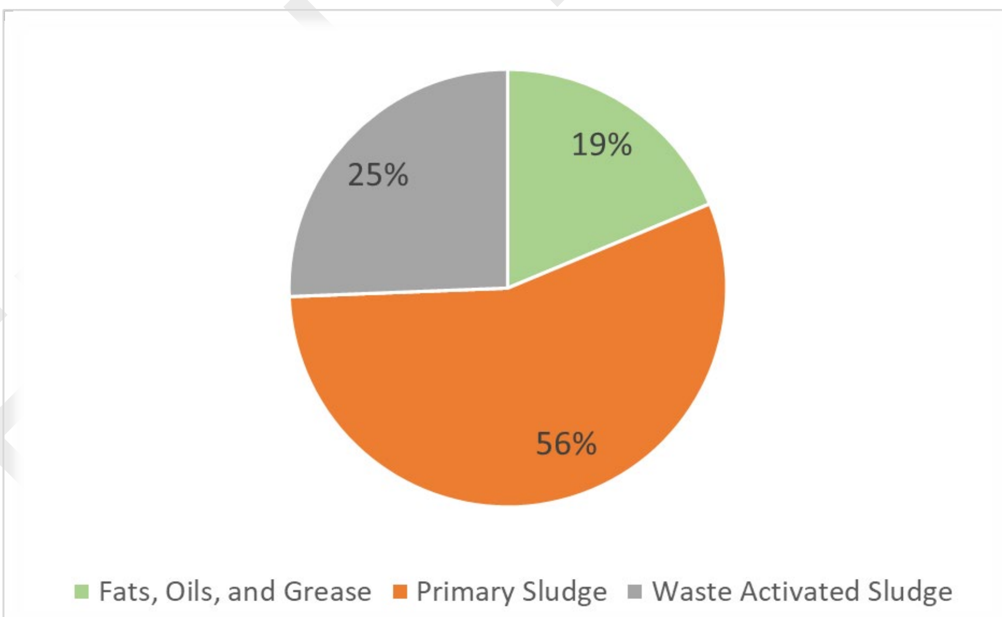

Figure 5-4. Relative Contribution to Biogas Production – Four Truckloads of FOG

Note that Figures 5-3 and 5-4 are based on assumed FOG characteristics, biogas characteristics, and anaerobic digester performance metrics.

A separate biogas optimization study is recommended which will investigate, in greater detail, the biogas characteristics, utilization, and potential for optimization. This study should review:

1. Biogas utilization.
2. Additional FOG storage to optimize metering-in operation.
3. Addition of other biogas generations sources, such as 4th FOG truck delivery.
4. Review FOG equipment, such feed pump, sizing.
5. System optimization via addition of instrumentation and automated controls and additional FOG storage, with the goal to:
   a. Decrease wasting via the flare.
   b. Optimization of operations between winter and summer.

This study may include sampling and off-gas measurements to develop a model which more closely resembles the district's biogas system.

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6.0 Recommended Improvements

The following recommended improvements are based on the process and hydraulic capacity analyses discussed in Section 5 and 6 to meet buildout flow and loading conditions.

6.1 Influent Pumping Station

The existing influent pumping station is equipped with three 3,500 gpm (5 MGD) pumps. The firm capacity of the pumping station (with one pump serving as standby) is 10 MGD. Once the average annual flow reaches 3.3 MGD the district should start planning for additional pumping capacity. The existing influent pumping station has space for a fourth pump, refer to Figure 6-1, but as flows approach buildout conditions, additional evaluation will be required to install a fifth pump. The evaluation assumes one standby pump at peak hour flows.

6.2 Influent Screening Upgrades

The existing screens have a firm capacity of 15 MGD, which translates to an average annual capacity of 5.0 MGD, which is inadequate for the buildout condition of 6.1 MGD. Currently, the headworks building does not have room to add a third screen. Therefore, as the average annual flows approach buildout conditions the District should evaluate alternatives to address this capacity deficit. The existing capacity is estimated to be adequate for approximately 50 years.

6.3 Primary Clarifier No. 4

The existing three primary clarifiers have a combined annual average capacity of about 4.3 mgd. A fourth primary clarifier (Primary Clarifier No. 4) will be needed to meet buildout flow conditions. The new primary clarifier will be located south of Primary Clarifier No. 3, as shown in Figure 6-2.

Wastewater will be conveyed to Primary Clarifier No. 4 after grit removal. Downstream of the Grit Removal Facility is the primary flow split structure which splits the grit basin effluent to the primary clarifiers. The primary flow split structure is already equipped with an outlet box to divert flows to a fourth clarifier. A 20-inch pipeline will connect Primary Clarifier No. 4 to the flow split structure.

An 18-inch primary effluent pipeline will convey effluent from Primary Clarifier No. 4 to the existing 24-inch pipeline. The 24-inch pipeline conveys effluent from Primary Clarifier No. 3 and 4 to the Trickling Filter Dosing Pump Stations.

Primary sludge and scum will be conveyed by 6-inch pipelines to the existing Primary Sludge Pumping Station No. 2. This pumping station is currently equipped with one sludge pump and one scum pump with space reserved for a second sludge pump. The second sludge pump will be installed with the construction of Primary Clarifier No. 4.

Odor control is provided for the existing primary clarifiers due to the odors created by turbulence as water falls into the effluent launders. Odor control will also be provided for Primary Clarifier No. 4. It will be completely covered for odor capture similar to Primary Clarifier No. 3. Foul air will be discharged through a 16-inch pipeline to a biofilter for biological treatment of the odor causing compounds.

6.4 Trickling Filter Pumping Stations

There are two trickling filter pumping stations. Trickling Filter Pumping Station No. 1 pumps primary effluent and recirculated trickling filter effluent to the two trickling filters. Trickling Filter Pumping Station No. 2 is capable of pumping to the two trickling filters and bypassing the primary effluent to the aeration basins.

Trickling Filter Pumping Station No. 1 has two 3,200 gpm pumps and one 3,500 gpm pump. Trickling Filter Pumping Station No. 2 has three 3,200 gpm pumps. With one pump offline, each pumping station has an average annual capacity of 3.4 mgd, or a total combined average annual capacity of 6.9 mgd. Together these pumping stations have the capacity to handle buildout flows. If only Trickling Filter Pumping Station No. 1 is used to pump to the trickling filters and the rest of the flow is bypassed to the aeration basins, the aerations basins will have adequate capacity to treat the primary effluent.

6.5 Aeration Basins

Currently there are five basins in the solids contact and aeration system. Three of these basins are available for operation while two provide for future expansion. The three operational basins have a combined average annual capacity of about 1.5 mgd.

6.5.1 2040 Improvements

To provide adequate capacity for 2040 average annual flows, the aeration equipment should be installed in Aeration Basin No. 4 as shown in Figure 6-3. The average annual capacity with all 4 basins in service is about 2.0 mgd. It is recommended that the District install the aeration equipment in Aeration Basin No. 5 as well to provide operational flexibility and allow one basin to be taken off-line for an emergency or maintenance.

Medium bubble diffusers will be installed in Aeration Basin No. 4 and 5 similar to the existing operational basins. The diffusers will be capable of supplying 170 scfm per channel for a combined aeration rate of 680 scfm with four basins in operation. The diffusers will be connected to the existing 6-inch air piping by a 4-inch stainless steel pipe. Air flow adjustments will be made at the drop pipe with a butterfly valve.

Currently there are two 30 HP positive displacement blowers located in the Blower/Electrical Building, each providing 510 scfm of air to the aeration basins. There is space reserved for an additional blower. This blower should be installed to provide redundancy and allow one blower to be taken offline for an emergency or maintenance. An evaluation should be conducted during the pre-design phase to determine the best blower equipment for installation.

6.5.2 Buildout Improvements

The solids contact and aeration basins will be able to provide 3.0 mgd average annual capacity with all five basins in service. To provide adequate capacity for buildout flows (6.1 mgd), four additional aeration basins (9 total aeration basins) are required.

The new basins will be constructed south of the existing basins as shown in Figure 6-3. The inlet and outlet channels will be extended to convey water in and out of the aeration basins. The main

10-inch pipeline conveying air to the basins will be extended to the south to supply air to the new aeration basins.

A total of about 1,360 scfm of air is required for eight aeration basins. The two existing blowers in the Blower/Electrical Building will need to be replaced with 680 scfm blowers to provide the required air.

6.6 Secondary Clarifiers

The three existing secondary clarifiers have a combined annual average capacity of about 3.2 mgd. Therefore, no additional secondary clarifier is required to accommodate 2040 flows, however, additional secondary clarifier(s) will be required for buildout condition.

The secondary clarifier capacity was determined by considering several parameters: surface overflow rate, solids loading rate and the HRT at peak wet weather flow conditions. The 2-hour HRT criteria at peak wet weather conditions governed the capacity rating of the secondary clarifiers and using this criterion two new secondary clarifiers would be needed at buildout conditions. The 2-hr HRT criteria value is based on HDR historical empirical data, which is thought to be conservative for MGSD as this criterion includes relatively wet areas that typically have longer sustained peak flows (atypical for MGSD). This assumption may be conservative and should be further investigated as flows and loads approach buildout conditions. Due to site constraints, a fifth secondary clarifier may be challenging to construct, therefore, the District may want to consider alternatives such building an additional aeration basin. Additionally, the District may consider conducting secondary clarifier settling tests and stress testing to confirm performance at peak loading rates.

6.7 RAS Pumping

Digester Control Building No. 1 contains four RAS pumps, (two 150-gpm pumps and two 75 gpm pumps) which remove settled solids from Secondary Clarifiers No. 1 and No. 2. The RAS/WAS Pumping Station contains two RAS pumps (one 200-gpm pump and one 486 gpm pump) which remove settled solids from Secondary Clarifier No. 3. The recommended total RAS pumping capacity is 50% of the maximum month (MM) influent flow and is currently met by the existing pumps.

Future RAS pumping requirements are dependent on the operation of the secondary treatment process including the number of clarifiers on-line and the recycle flow required by the aeration basins. Replacement of smaller RAS pumps to meet future capacity is dependent on future growth and wastewater flows to the plant, and it is anticipated that replacement will occur after 2040. Close monitoring of maximum month flows and clarifier operation will assist in determining the future date for RAS pump replacement, and recommended pump capacity.

6.8 Sludge Thickening – Gravity Belt Thickener

The existing GBT has capacity greater than buildout conditions. However, there is only one unit which puts the District at risk when the unit must be taken off-line due to an emergency or maintenance. It is recommended that the District consider installing an additional unit to serve as backup. An evaluation should be conducted during the pre-design phase to determine the best equipment for installation whether it be another GBT or a rotary drum thickener.

The existing GBT is located in the Sludge Thickening Building. There is no space available in this building for a second unit. A new building would have to be constructed, as shown in Figure 6-5, to the west of the existing building. WAS would be conveyed to the new unit by extending the existing 6-inch WAS pipe from the sludge holding tanks. Thickened sludge would be conveyed by a 6-inch pipe which would connect to the existing 6-inch TS pipe which conveys the thickened sludge to the Digester Control Building.

6.9 Biogas Utilization Study and Additional FOG Storage

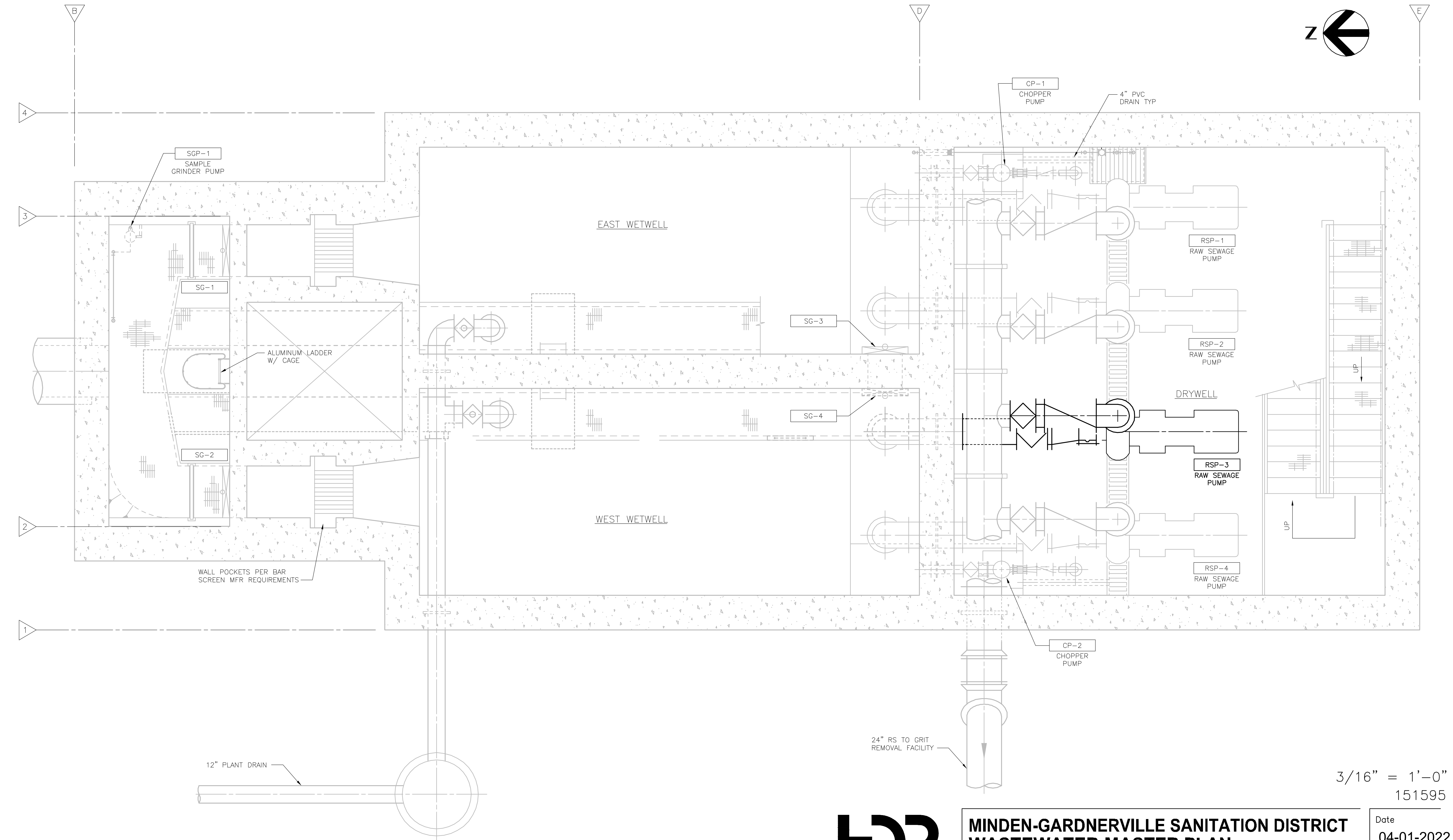
The existing biogas system has been modified over the years, but a comprehensive review of biogas utilization has not been performed, which have manifested via system inefficiencies, such as excess wasting of biogas. The recommended study will investigate, in greater detail, the biogas characteristics, utilization, and potential for optimization. This study should review, but shall not be limited to, the following:

1. Biogas utilization.
2. Additional FOG storage to optimize metering-in operation.
3. Addition of other biogas generations sources, such as a 4th FOG truck delivery.
4. Review FOG equipment, such feed pump, sizing.
5. System optimization via addition of instrumentation and automated controls with the goal to:
    a. Decrease wasting via the flare.
    b. Optimization of operations between winter and summer.

This study may include sampling and off-gas measurements to develop a model which more closely resembles the district’s biogas system.

6.10 Administration Building Improvements

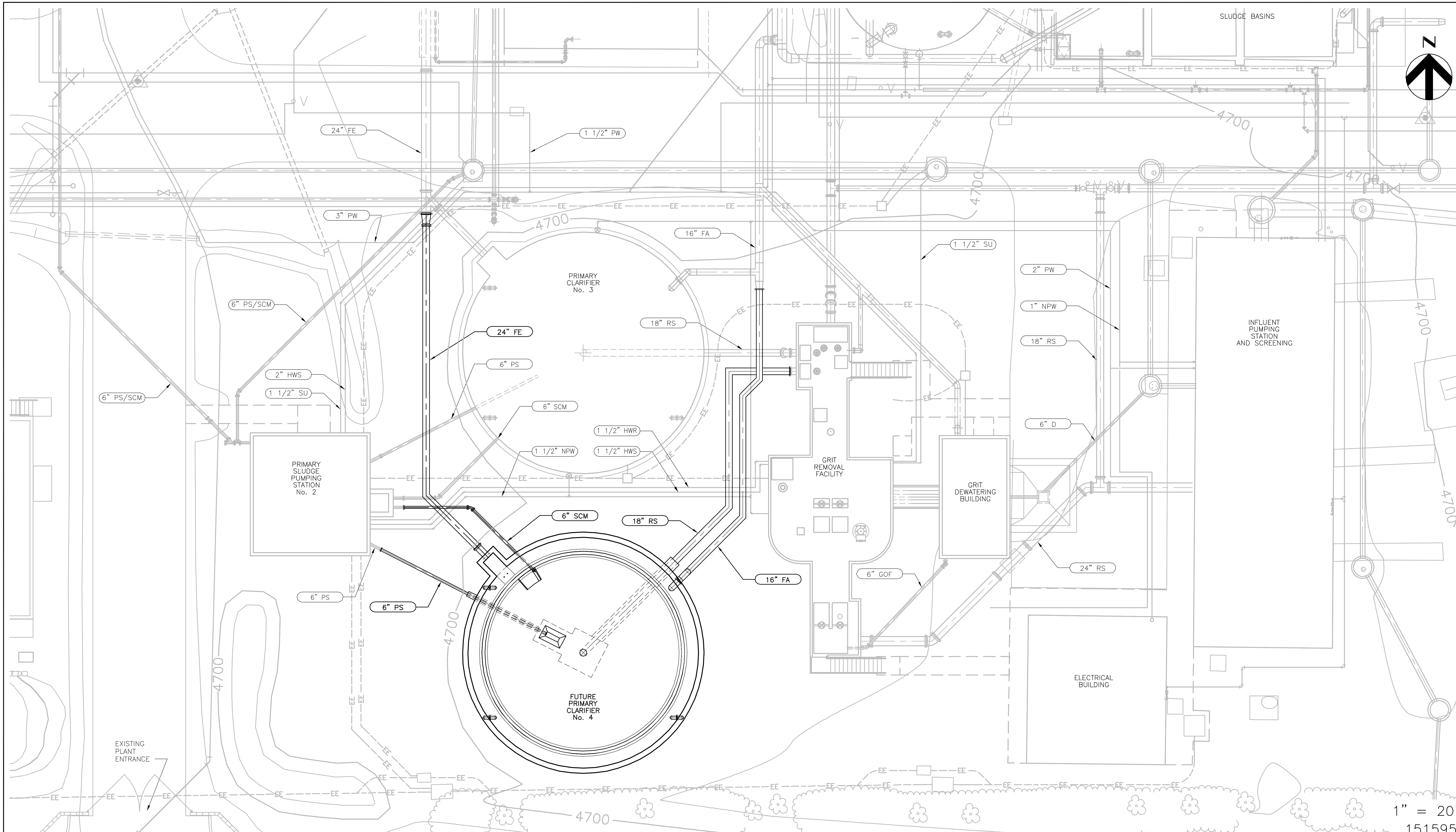
Although not directly related to treatment capacity, many District staff share the Administration building where spatial constraints have developed over time due to growing staff and storage requirements. Additionally, the open floor layout is not conducive to important administrative functions, which are confidential in nature, such as the financial duties of the district controller and employee relations duties of human resources. Therefore, the construction of two additional, fully enclosed, office rooms is recommended to accommodate the district’s growing space requirements. Furthermore, given the periodic inclement weather conditions present at the plant, weather-proof parking spots are recommended to facilitate critical, frequently time sensitive, functions at the District.



MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
INFLUENT PUMPING STATION LOWER LEVEL PLAN

Date
04-01-2022

Figure
6-1

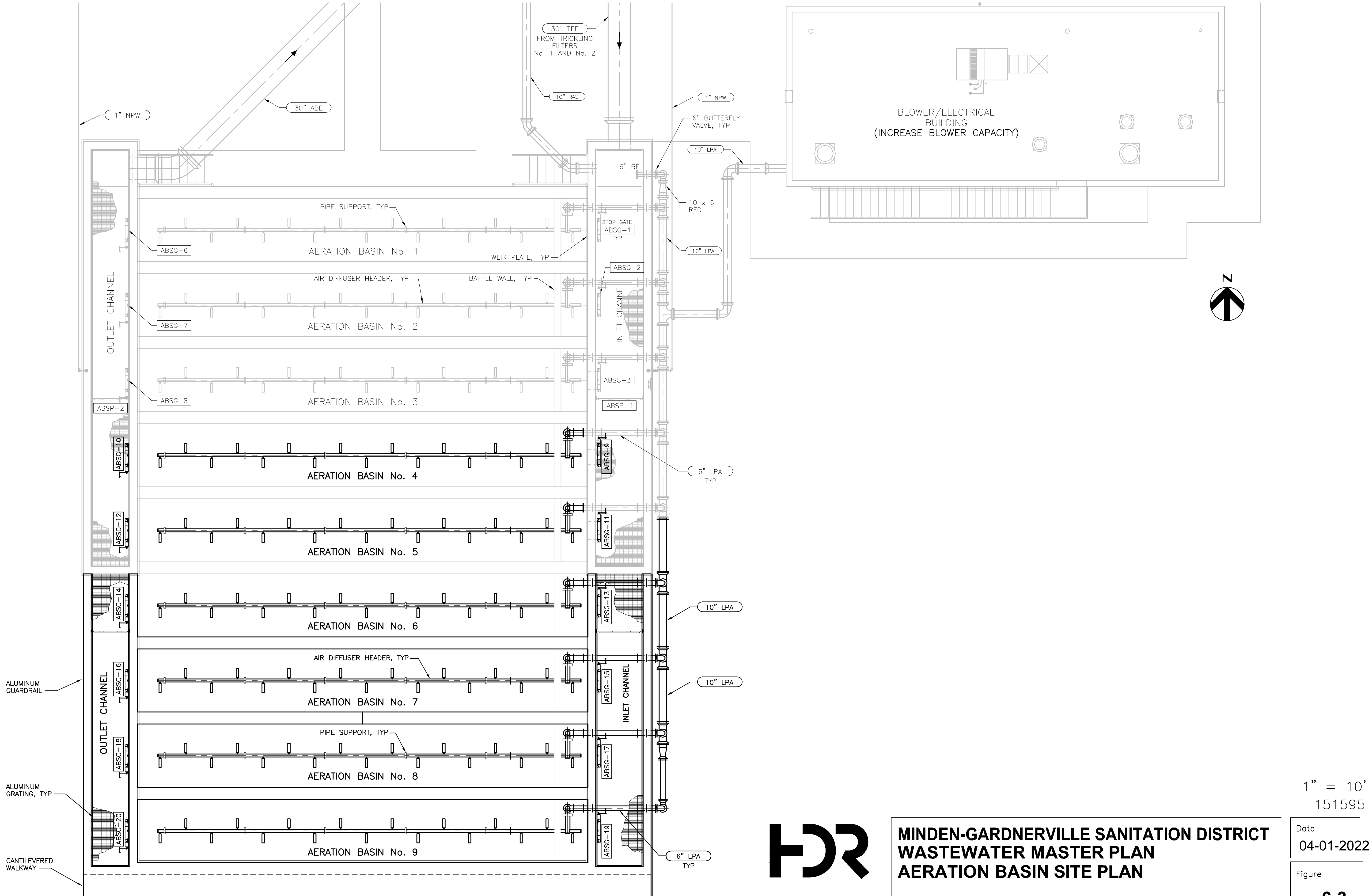


HDR

MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
PRIMARY CLARIFIER No. 4 SITE PLAN

Date
04-01-2022

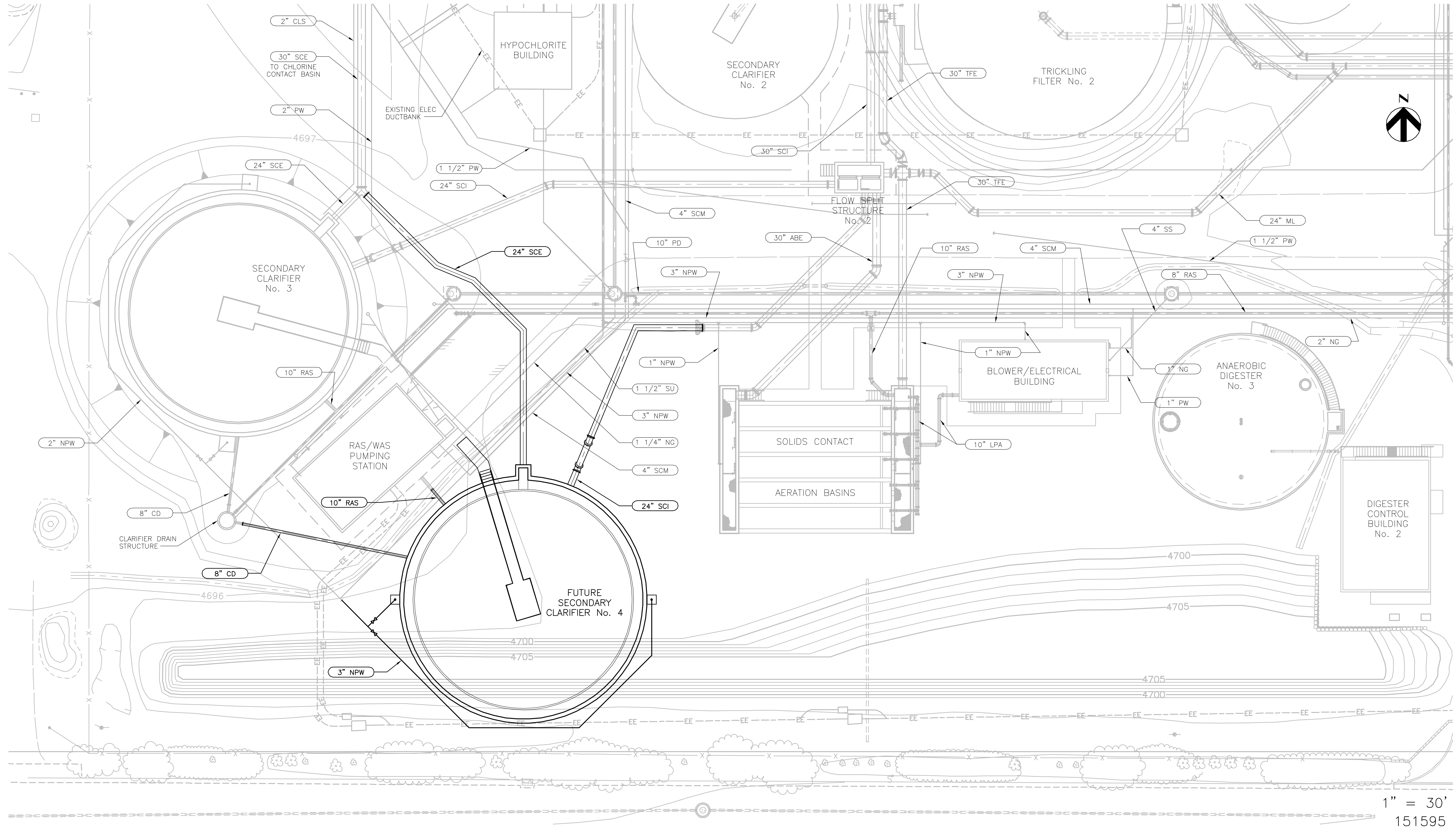
Figure
6-2



MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
AERATION BASIN SITE PLAN

Date
04-01-2022

Figure
6-3



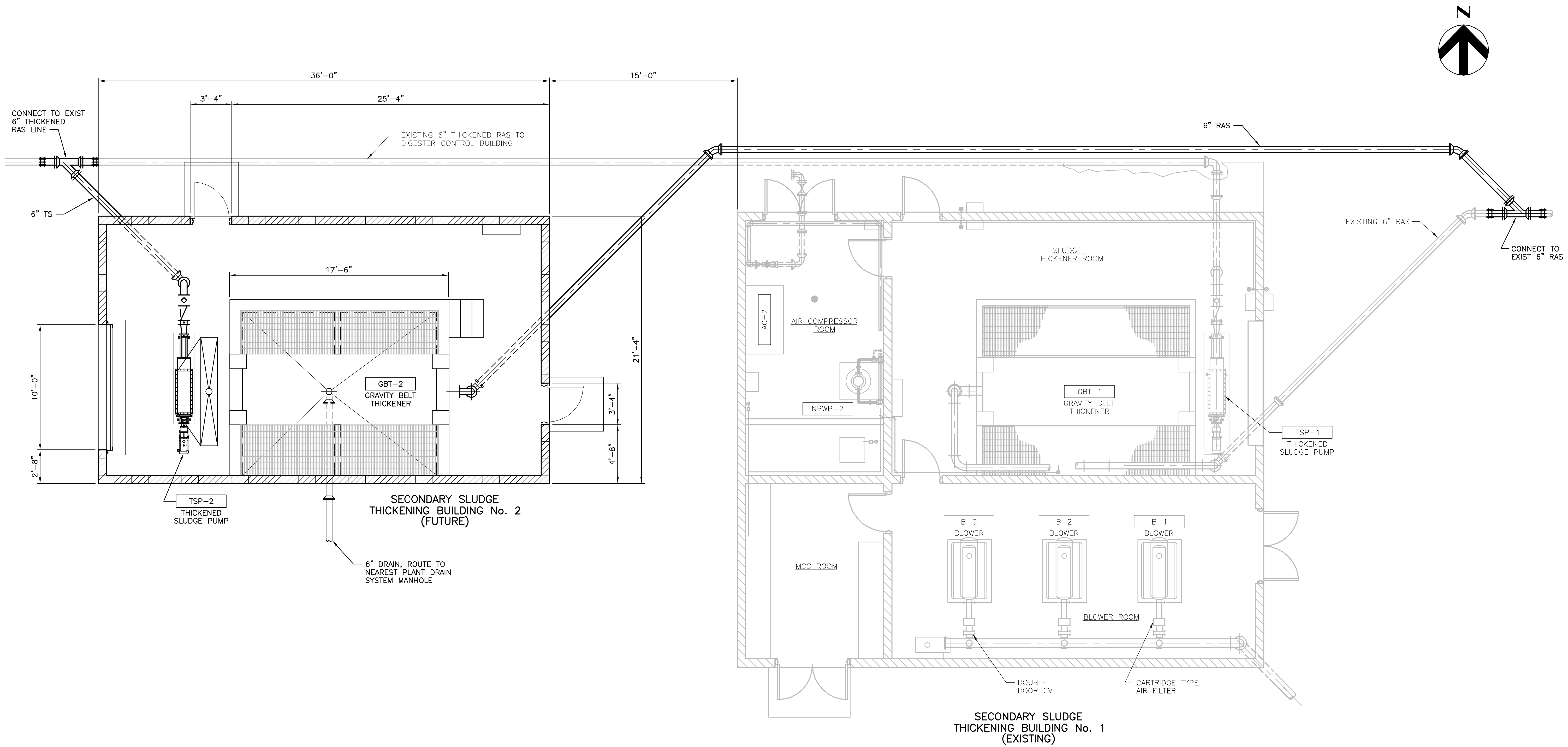
1" = 30'

151595

MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
SECONDARY CLARIFIER No. 4 SITE PLAN

Date
04-01-2022

Figure
6-4



1/8" = 1'-0"

151595

HDR

MINDEN-GARDNERVILLE SANITATION DISTRICT
WASTEWATER MASTER PLAN
SLUDGE THICKENING BUILDING No. 2 PLAN

Date
04-01-2022

Figure
6-5

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7.0 Implementation Plan

This section describes the implementation plan, including schedule, project costs, and permitting for the improvements recommended in Section 7.

7.1 Implementation Schedule

Table 7-1 provides a summary of the facilities required to provide adequate capacity for buildout flows. Facility improvements are flow based, and specific date projections past 2040 may not accurately represent future design requirements, these items are designated "After 2040" in Table 7-1. Capital improvement program (CIP) implementation schedules were developed to estimate project costs by year through 2040. The CIP implementation schedules are shown in Table 7-2. For facilities requiring expansion prior to 2040 these tables indicate when pre-design, design, bidding, and construction will occur. An estimation of escalated costs for facility expansion after 2040 is also provided in Table 7-2, however since these improvements are based on flow they are subject to change.

Table 7-1. Implementation Schedule

Recommended Project	Average Annual Flow (mgd)	Year	Driver
Sludge Thickening	2	2023	Operations resiliency
Aeration Basin No. 4 and 5	2.2	2023	Capacity limitations
Biogas Utilization Study and Additional FOG storage	-	2023	Process Optimization
Administrative Building Improvements	-	2025	Capacity limitations
RAS Pumping	3.2	After 2040	Capacity limitations
Influent Pump No. 4	3.7	After 2040	Capacity limitations
Aeration Basin No. 6 through 9	3.7	After 2040	Capacity limitations
RAS Pumping (Buildout Capacity)	4	After 2040	Capacity limitations
Secondary Clarifier No. 4	4	After 2040	Capacity limitations
Primary Clarifier No. 4	4.8	After 2040	Capacity limitations

7.2 Opinion of Probable Project Costs

A summary of the opinion of probable project costs for the recommended facilities is provided in Table 7-2. These costs are based on quantity takeoffs from the preliminary facility layouts provided in Section 7. They also include a contingency and design, construction management, administration, and permitting allowances. A detailed breakdown of the costs is included in Appendix E.

Table 7-2. Opinion of Probable Project Costs

Facility Requirement	Estimated Cost
Sludge Thickening	$2,679,000
Aeration Basin No. 4 and 5	$741,000
Biogas Utilization Study and Additional FOG storage	$954,000
Administrative Building Improvements	$300,000
RAS Pumping	$1,541,000
Influent Pump No. 4[1]	$884,000
Aeration Basin No. 6 through 9	$4,533,000
Secondary Clarifier No. 4[2]	$6,439,000
Primary Clarifier No. 4	$5,967,000
Total	**$24,038,000**

1. Does not include provisions for a fifth influent pump, which may be required to meet buildout conditions.
2. Assumes only one secondary clarifier required to meet buildout conditions

7.3 Environmental Documentation

The District may prepare a Programmatic Environmental Impact Report (PEIR) followed by Focused EIRs. An EIR may be prepared on a series of actions that can be characterized as one large project and are related by geography, actions, rules, regulations, plans, or other general criteria, or as individual activities under the same statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways. The PEIR provides a more comprehensive consideration of effects, alternatives, and cumulative impacts and allows the District to consider broad policy alternatives and program-wide mitigation measures early in the process.

The PEIR would cover both immediate and future project needs. Immediate specific projects can be described in detail in the PEIR, and therefore, would not require any other environmental documentation. Future projects can be described in general in the PEIR and will require future environmental documentation (i.e. focused EIR). The focused EIR will determine whether project efforts were fully analyzed in the PEIR and will evaluate any additional environmental effects and/or any new or additional mitigation measures not addressed in the PEIR.

Alternatively, the District may continue to prepare environmental documentation on a project by project basis when a project is authorized and prior to project approval by the District Board. Some of the recommended near term project work is exempt, while other projects will likely only require a negative declaration rather than an EIR.

7.4 Permitting

The construction of WWTP facilities will require a variety of permits. The permits that may potentially be required for design and construction are described in Table 7-3 and the potential environmental permits that may be required are described in Table 7-4.

Table 7-3. Potential Design and Construction Permits

Permit	Description
NDEP Bureau of Water Pollution Control – Construction Stormwater Permit	Notice of Intent (NOI) may be filed prior to construction. Contractor will have to finalize to obtain storm water pollution prevention plan (SWPPP).
NDEP Bureau of Pollution Control – Air permits required for construction	Air permits required for construction. These are obtained by the contractors to cover the construction equipment to be used.
Douglas County – Transportation Permit	May be required by County and covers movement of large vehicles on County roads. The contractors are responsible for obtaining transportation permits.
Douglas County – Grading Permit	The County may issue a grading permit prior to any construction activities. This is typically obtained by the contractors.
Douglas County – Fire Department	The Fire Marshall will conduct a review of construction documents for conformance with County standards and Fire Code.
Douglas County – Trenching Permit	The Contractor may be required to obtain a Trenching Permit.
Occupational Safety and Health Administration (OSHA) Mining and Tunneling Unit – Underground Classifications	An application will be submitted to OSHA after the 60% submittal, once alignments have been finalized.

Table 7-4. Potential Environmental Permits

Permit	Description
US Army Corps of Engineers (USACE) – Clean Water Act (CWA) Section 404 Individual or Nationwide Permit for impacts to jurisdictional waters	This permit will depend on the jurisdictional waters delineation report that will be submitted to the USACE for their review. USACE will determine if they have jurisdiction.
NDEP Bureau of Water Quality Planning – CWA 401 Water Quality Certification	This permit will depend on whether the USACE Section 404 permit is required.
National Marine Fisheries Service and US Fish and Wildlife Service – Endangered Species Act	This permit will depend on the Special Status Species Report and the completion of environmental documents.

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Appendix A

Discharge Permit

Permit Type: Groundwater Discharge

Permit No. NS0040027

Nevada Division of Environmental Protection

AUTHORIZATION TO DISCHARGE

In compliance with Chapter 445A of the Nevada Revised Statutes,

MINDEN GARDNERVILLE SANITATION DISTRICT
1790 U.S. HIGHWAY 395
MINDEN, NV - 89423

is authorized to discharge from a facility located at:

MINDEN GARDNERVILLE SANITATION DISTRICT
1790 U.S. HIGHWAY 395, MINDEN, NV - 89423
LATITUDE: 38.965556, LONGITUDE: -119.781111
TOWNSHIP: 13N, RANGE: 20E, SECTION: 30

to receiving waters named:

GROUNDWATER OF THE STATE VIA EFFLUENT REUSE

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Sections A, B, and C hereof.

This permit shall become effective on May 01, 2015.

This permit and the authorization to discharge shall expire at midnight, April 30, 2020.

Signed this 20th day of April 2015.

Alan Pineda
Staff I Associate Engineer
Bureau of Water Pollution Control

SECTION A

A.1. Introduction:

A.1.1. The Minden Gardnerville Sanitation District (MGSD) operates a wastewater treatment plant located at the corner of U.S. Highway 395 and Ironwood Drive in Minden, Douglas County, Nevada. Wastewater from residential and commercial sources is treated to meet secondary treatment standards, partially denitrified, and disinfected. The treated effluent meets Category D quality (NAC 445A.276) and is used for agricultural irrigation on MGSD fields and off-site property administered under effluent reuse permits NS2000501 (Park Cattle Company), NS2002513 (Galeppi Land & Livestock), and NS2009507 (Bently Family Limited Partnership). The facility has a design treatment capacity of 5 million gallons per day (MGD) and is permitted to treat up to 3.1 MGD. Changes made to the wastewater treatment plant since issuance of the 2008 permit include the addition of an anaerobic digester, a grease receiving facility, and a co-generation facility. Biosolids produced at the facility are treated to Class B standards and used by Bently Family Limited Partnership composting facilities as a beneficial soil amendment under permit NS0097012.

A.2. Effluent Limitations, Monitoring Requirements And Conditions:

A.2.1. There shall be no discharge from the facility property except as authorized by this permit.

A.2.2. During the period beginning on the effective date of this permit, and lasting until the permit expires, the Permittee is authorized to:

supply treated biosolids to Bently Family Limited Partnership composting facilities and to discharge treated effluent from the MGSD chlorine contact tank (002) to the MGSD storage reservoirs, from the MGSD chlorine contact tank to the MGSD irrigation fields (003), and from the MGSD storage reservoirs (004) to off-site reuse irrigation locations (Galeppi, Park, and Bently).

Effluent samples and measurements taken in compliance with the monitoring requirements specified below shall be taken at:

Sample Location	Location Type	Location Name
001	Influent Structure	INFLUENT
002	External Outfall	CHLORINE CONTACT TANK
003	Land Application Site	MGSD IRRIGATION FIELDS
004	External Outfall	STORAGE RESERVOIRS
005	Monitoring Well	MW-2
006	Monitoring Well	MW-3
007	Monitoring Well	MW-4
008	Monitoring Well	MW-5
009	Monitoring Well	MW-6
010	Monitoring Well	MW-7
011	Monitoring Well	MW-8
012	Monitoring Well	MW-9
013	Monitoring Well	MW-10

The discharge shall be limited and monitored by the Permittee as specified below. As applicable, exceptions to standard language in this permit are identified and authorized in the Special Approvals / Conditions table:

WWTP Discharge Limitations Table for Sample Location 001 (Influent) To Be Reported Monthly

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Solids, total suspended	Daily Maximum		M&R Milligrams per Liter (mg/L)	Raw Sewage Influent[1]	001	Weekly	COMPOS
Solids, total suspended	30 Day Average		M&R Milligrams per Liter (mg/L)	Raw Sewage Influent[1]	001	Weekly	COMPOS
BOD, carbonaceous, 05 day, 20 C	Daily Maximum		M&R Milligrams per Liter (mg/L)	Raw Sewage Influent[1]	001	Weekly	COMPOS
BOD, carbonaceous, 05 day, 20 C	30 Day Average		M&R Milligrams per Liter (mg/L)	Raw Sewage Influent[1]	001	Weekly	COMPOS
Flow rate	Daily Maximum	<= 3.1 Million Gallons per Day (Mgal/d)		Raw Sewage Influent[2]	001	Continuous	METER
Flow rate	30 Day Average	<= 2.8 Million Gallons per Day (Mgal/d)		Raw Sewage Influent[2]	001	Continuous	METER

Notes (WWTP Discharge Limitations Table):

1. At the influent pump station wet well.
2. At the intake Parshall flume.

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Monthly

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
pH, maximum	Monthly Maximum		<= 9 Standard Units (SU)	Effluent Gross	002	Weekly	DISCRT
pH, minimum	Monthly Minimum		>= 6 Standard Units (SU)	Effluent Gross	002	Weekly	DISCRT
Coliform, fecal, colony forming units	Daily Maximum		<= 400 Colony Forming Units per 100ml T (CFU/100mL)	Effluent Gross	002	Weekly	DISCRT
Coliform, fecal, colony forming units	30 Day Average		<= 200 Colony Forming Units per 100ml T (CFU/100mL)	Effluent Gross	002	Weekly	DISCRT
Solids, suspended percent removal	Monthly Minimum		> 85 Percent (%)	Effluent Gross	002	Monthly	CALCTD
Solids, total suspended	Daily Maximum		<= 45 Milligrams per Liter (mg/L)	Effluent Gross	002	Weekly	COMPOS
Solids, total suspended	30 Day Average		<= 30 Milligrams per Liter (mg/L)	Effluent Gross	002	Weekly	COMPOS
BOD, 5-day, percent removal	Monthly Minimum		> 85 Percent (%)	Effluent Gross	002	Monthly	CALCTD
BOD, carbonaceous, 05 day, 20 C	Daily Maximum		<= 45 Milligrams per Liter (mg/L)	Effluent Gross	002	Weekly	COMPOS
BOD, carbonaceous, 05 day, 20 C	30 Day Average		<= 30 Milligrams per Liter (mg/L)	Effluent Gross	002	Weekly	COMPOS
pH	Monthly Average		M&R Standard Units (SU)	Effluent Gross	002	Weekly	DISCRT

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Quarterly

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Phosphate, total (as PO4)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Effluent Gross	002	Quarterly	DISCRT
Phosphate, total (as PO4)	Quarterly Average		M&R Milligrams per Liter (mg/L)	Effluent Gross	002	Quarterly	DISCRT

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Phenanthrene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
N-Nitrosodiphenylamine	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
N-Nitrosodi-N-propylamine	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
N-Nitrosodimethylamine (NDMA)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Nitrobenzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Naphthalene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Isophorone	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Indeno(1,2,3-cd)pyrene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Hexachloroethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Hexachlorocyclopentadiene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Hexachlorobutadiene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Hexachlorobenzene	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Fluorene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Fluoranthene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Di-n-octyl phthalate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Di-n-butyl phthalate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Dimethyl phthalate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Diethyl phthalate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Dibenzo(a,h)anthracene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Chrysene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Butyl benzyl phthalate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Bis(2-ethylhexyl) phthalate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Bis(2-chloroisopropyl) ether	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Bis(2-chloroethyl) ether	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Bis(2-chloroethoxy)methane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Benzo(k)fluoranthene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Benzo(ghi)perylene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Benzo(b)fluoranthene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Benzo(a)pyrene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Benzo(a)anthracene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Benzidine	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Anthracene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Acenaphthylene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Acenaphthene	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4-Chlorophenyl phenyl ether	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4-Bromophenyl phenyl ether	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
3,3-Dichlorobenzidine	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2-Chloronaphthalene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2,6-Dinitrotoluene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2,4-Dinitrotoluene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
1,4-Dichlorobenzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,3-Dichlorobenzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,2-Diphenylhydrazine	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
1,2-Dichlorobenzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
1,2,4-Trichlorobenzene	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Cyanide, total (as CN)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Asbestos	Daily Maximum		M&R Fibers per Milliliter (Fib/mL)	Effluent Gross	002	Annual	COMPOS
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Zinc, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Thallium, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Silver total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Selenium, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Nickel, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Mercury, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Lead, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Copper, total recoverable	Daily Maximum		M&R Micrograms per Liter	Effluent Gross	002	Annual	COMPOS

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
			(ug/L)				
Chromium, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Cadmium, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Beryllium, total recoverable (as Be)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Arsenic, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Antimony, total recoverable	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Phenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Pentachlorophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4-Nitrophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4-Chloro-3-methylphenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2-Nitrophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2-Methyl-4,6-dinitrophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
2-Chlorophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2,4-Dinitrophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2,4-Dimethylphenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2,4-Dichlorophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
2,4,6-Trichlorophenol	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Toxaphene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
PCB-1260	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
PCB-1254	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
PCB-1248	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
PCB-1242	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
PCB-1232	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
PCB-1221	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
PCB-1016	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Heptachlor epoxide	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Heptachlor	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
.gamma.-BHC	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Endrin aldehyde	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
.alpha.-BHC	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Aldrin	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4,4-DDT	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4,4-DDE	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
4,4-DDD	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Vinyl chloride	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Trichloroethylene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Toluene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Tetrachloroethylene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Methylene chloride	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Methyl chloride (Chloromethane)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Methyl bromide (Bromomethane)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Ethylbenzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Dichlorobromomethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Dibromochloromethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Chloroform	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Endrin	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Endosulfan sulfate	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Dieldrin	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
.delta.-BHC	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Chlordane (tech mix. and metabolites)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
.beta.-Endosulfan	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
.beta.-BHC	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
.alpha.-Endosulfan	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS
Chlorobenzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Carbon tetrachloride	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Bromoform	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Chloroethane	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Benzene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Acrylonitrile	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Acrolein	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
2-Chloroethyl vinyl ether, (mixed)	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,3-Dichloropropene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
trans-1,2-Dichloroethylene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,2-Dichloropropane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,2-Dichloroethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,1-Dichloroethylene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,1-Dichloroethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
			M&R				

WWTP Discharge Limitations Table for Sample Location 002 (Chlorine Contact Tank) To Be Reported Annually[1]

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
1,1,2-Trichloroethane	Daily Maximum		Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,1,2,2-Tetrachloroethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
1,1,1-Trichloroethane	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	DISCRT
Pyrene	Daily Maximum		M&R Micrograms per Liter (ug/L)	Effluent Gross	002	Annual	COMPOS

Notes (WWTP Discharge Limitations Table):

1. The Permittee shall submit the results of an annual priority pollutant analysis with the fourth quarter report.

Groundwater Monitoring Wells Table for Sample Location 005 (Monitoring Well Mw-2) To Be Reported Quarterly

		Discharge Limitations		Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	005	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	005	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	005	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	005	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	005	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	005	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation above mean sea level (AMSL)

Groundwater Monitoring Wells Table for Sample Location 006 (Monitoring Well Mw-3) To Be Reported Quarterly

		Discharge Limitations		Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	006	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	006	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	006	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	006	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	006	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	006	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 007 (Monitoring Well Mw-4) To Be Reported Quarterly

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	007	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	007	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	007	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	007	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	007	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	007	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 008 (Monitoring Well Mw-5) To Be Reported Quarterly

		Discharge Limitations		Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	008	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	008	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	008	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	008	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	008	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	008	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 009 (Monitoring Well Mw-6) To Be Reported Quarterly

		Discharge Limitations		Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	009	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	009	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	009	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	009	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	009	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	009	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 010 (Monitoring Well Mw-7) To Be Reported Quarterly

				Discharge Limitations		Monitoring Requirements	
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	010	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	010	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	010	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	010	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	010	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	010	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 011 (Monitoring Well Mw-8) To Be Reported Quarterly

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	011	Quarterly	DISCRT
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	011	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	011	Quarterly	CALCTD
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	011	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	011	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	011	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 012 (Monitoring Well Mw-9) To Be Reported Quarterly

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	012	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	012	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	012	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	012	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	012	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	012	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Groundwater Monitoring Wells Table for Sample Location 013 (Monitoring Well Mw-10) To Be Reported Quarterly

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Depth to water level ft below landsurface	Quarterly Maximum	M&R Feet (ft)		Groundwater	013	Quarterly	VISUAL[1]
Water level relative to mean sea level[2]	Quarterly Maximum	M&R Feet (ft)		Groundwater	013	Quarterly	CALCTD
Nitrogen, nitrate total (as N)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	013	Quarterly	DISCRT
Nitrogen, total	Quarterly Maximum		<= 10 Milligrams per Liter (mg/L)	Groundwater	013	Quarterly	DISCRT
Chloride (as Cl)	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	013	Quarterly	DISCRT
Solids, total dissolved	Quarterly Maximum		M&R Milligrams per Liter (mg/L)	Groundwater	013	Quarterly	DISCRT

Notes (Groundwater Monitoring Wells Table):

1. Field measurement
2. Groundwater elevation AMSL

Re-use Discharge Limitations Table for Sample Location 003 (Mgsd Irrigation Fields) To Be Reported Monthly

		Discharge Limitations		Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Flow rate	Monthly Total	M&R Million Gallons per Day (Mgal/d)		Prior to Reuse[4]	003	Monthly	METER
Nitrogen, nitrate total (as N)	30 Day Average		M&R Milligrams per Liter (mg/L)	Prior to Reuse[4]	003	Monthly[1]	COMPOS
Nitrogen, total	30 Day Average		M&R Milligrams per Liter (mg/L)	Prior to Reuse[4]	003	Monthly[1]	COMPOS
Flow, total [2]	Monthly Total	M&R Million Gallons (Mgal)[3]		Prior to Reuse[4]	003	Monthly[1]	CALCTD

Notes (Re-use Discharge Limitations Table):

1. During reuse. When not in reuse season, this condition shall be indicated on the Discharge Monitoring Report (DMR).
2. The annual application volume applied only to those fields managed by the MGSD.
3. Report in million gallons per acre. Volume determined for/from Consumptive Use Balance.
4. At the discharge of the chlorine contact tank prior to MGSD field application.

Re-use Discharge Limitations Table for Sample Location 003 (Mgsd Irrigation Fields) To Be Reported Quarterly

		Discharge Limitations		Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Nitrogen, total	Quarterly Total	M&R Pounds per Quarter (lb/qtr)[1]		Prior to Reuse[2]	003	Quarterly	CALCTD

Notes (Re-use Discharge Limitations Table):

1. **Actual Nitrogen Loading** should be reported in lbs/acre/quarter and should be less than the allowable Nitrogen Loading Value listed in the Effluent Management Plan (EMP).

   Mass determined in accordance with guidance document *WTS-1B: General Criteria for Preparing an Effluent Management Plan* for fields managed by the MGSD.

   The total annual nitrogen applied (lbs/acre/year) shall not be greater than 110% of the total annual nitrogen uptake (lbs/acre/year). Calculations and monitoring data (submitted quarterly) shall use the **total nitrogen** in the applied wastewater (monitored by the treatment facility), total nitrogen from fertilizer applications, nitrogen uptake by crops or vegetation, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization. Quarterly calculations shall be used to reconcile available nitrogen balance, prorated based on the allocated limitation (lbs/acre/year) defined in the EMP, and an annual report shall be submitted for the fourth quarter of every year demonstrating compliance with the Annual Nitrogen Balance limitation.
2. At the discharge of the chlorine contact tank prior to MGSD field application.

Re-use Discharge Limitations Table for Sample Location 003 (Mgsd Irrigation Fields) To Be Reported Annually

	Discharge Limitations			Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Nitrogen, total[2]	Cumulative Total	M&R Pounds per Year (lb/yr)[1]		Prior to Reuse[5]	003	Quarterly	CALCTD
Nitrogen, total[2]	Annual Mass Loading	M&R Pounds per Year (lb/yr)[3]		Prior to Reuse[5]	003	Quarterly[4]	CALCTD

Notes (Re-use Discharge Limitations Table):

1. **Cumulative Annual Nitrogen Loading <u>to Date</u>** shall be reported in lbs/acre/year and shall be less than the allowable Nitrogen Loading Value listed in the EMP.

   Mass determined in accordance with guidance document *WTS-1B: General Criteria for Preparing an Effluent Management Plan* for fields managed by the MGSD.

   The total annual nitrogen applied (lbs/acre/year) shall not be greater than 110% of the total annual nitrogen uptake (lbs/acre/year). Calculations and monitoring data (submitted quarterly) shall use the **total nitrogen** in the applied wastewater (monitored by the treatment facility), total nitrogen from fertilizer applications, nitrogen uptake by crops or vegetation, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization. Quarterly calculations shall be used to reconcile available nitrogen balance, prorated based on the allocated limitation (lbs/acre/year) defined in the EMP, and an annual report shall be submitted for the fourth quarter of every year demonstrating compliance with the Annual Nitrogen Balance limitation.
2. For each reporting year.
3. **Allowable Nitrogen Loading** shall be reported in lbs/acre/year.

   Calculated in the required EMP for irrigation fields managed by the MGSD and incorporated by reference as the effluent limitation for the allowable application of nitrogen mass in lbs/acre/year. The amount of nitrogen applied shall not exceed 110% of the amount of nitrogen consumed by irrigated crops.
4. The calculated Annual Nitrogen Loading value included in the EMP must be reported on each quarterly DMR.
5. At the discharge of the chlorine contact tank prior to MGSD field application.

Re-use Discharge Limitations Table for Sample Location 004 (Storage Reservoirs) To Be Reported Monthly

Discharge Limitations				Monitoring Requirements			
Parameter	**Base**	**Quantity**	**Concentration**	**Monitoring Loc**	**Sample Loc**	**Measurement Frequency**	**Sample Type**
Nitrogen, nitrate total (as N)	30 Day Average		M&R Milligrams per Liter (mg/L)	Prior to Reuse	004	Monthly	COMPOS
Nitrogen, total	30 Day Average		M&R Milligrams per Liter (mg/L)	Prior to Reuse	004	Monthly	COMPOS
Flow rate	Monthly Total	M&R Million Gallons per Day (Mgal/d)		Prior to Reuse	004	Monthly	METER

A.3. Schedule of Compliance

The Permittee shall implement and comply with the provisions of the schedule of compliance after approval by the Administrator, including in said implementation and compliance, any additions or modifications, which the Administrator may make in approving the schedule of compliance. All compliance deliverables shall be addressed to the attention, Bureau of Water Pollution Control:

SOC – Schedule of Compliance Table

Item #	Description	Due Date
1	The Permittee shall submit a new Effluent Management Plan (EMP) to the Division. The EMP shall be prepared and wet-stamped by a Nevada Registered Professional Engineer in accordance with guidance document *WTS-1B: General Criteria for Preparing an Effluent Management Plan*.	8/1/2015
2	The Permittee shall submit a revised Operation and Maintenance (O&M) Manual to the Division. The O&M Manual shall be prepared in accordance with guidance document *WTS-2: Minimum Information Required for an Operation and Maintenance Manual for a Wastewater Treatment Plant*.	8/1/2015
3	The Permittee shall submit a Biosolids Monitoring Report (BMR) for the previous calendar year to the Division.	1/28/2016

SA – Special Approvals / Conditions Table

Item #	Description
1	The cumulative mass of nitrogen applied to irrigation plots shall be reported in each quarterly report for comparison with estimates of annual nitrogen uptake and consumption.
2	Nitrogen balance calculations and a cumulative reconciliation between mass of nitrogen applied to irrigation plots versus the calculated mass of nitrogen uptake determined for the crops actually grown and irrigated during the calendar year must be reported annually in the fourth quarter report.
3	Should monitoring results indicate questionable or anomalous data, confirmation samples shall be collected and analyzed within six weeks of any compliance samples yielding potentially unreliable data. All confirmation sampling results shall be reported with any anomalous data detected during a reporting period.
4	Only *influent flow* shall be reported on the plot required by section A.4.2. of this permit. The Permittee is exempt from having to submit plots for any other analyzed constituent identified in the Monitoring Table.
5	Biosolids shall be sampled at the discharge of the belt press after the digester.

DLV– Deliverable Schedule for Reports, Plans, and Other Submittals

Item #	Description	Interval	First Scheduled Due Date
1	Quarterly DMRs	Quarterly	7/28/2015
2	Annual Report	Annually	1/28/2016
3	Annual BMR	Annually	1/28/2016

A.4. MONITORING AND REPORTING:

A.4.1. Sampling and measurements: Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge and must comply with any Division approved sampling plan as required by the Schedule of Compliance. Analyses shall be performed by a State of Nevada certified laboratory. Results from this lab must accompany the Discharge Monitoring Report.

A.4.2. Annual Report: The fourth quarter report shall contain plots of concentration (y-axis) versus date (x-axis) for each analyzed constituent identified in the Monitoring Table. The plots shall include data from the preceding five years, if available. Any data point from the current year that is greater than the limits identified in the applicable tables and conditions above must be explained by a narrative.

A.4.3. Quarterly Reporting: Monitoring results obtained during the previous three (3) months shall be summarized for each month and reported on a Discharge Monitoring Report (DMR) Form received in this office no later than the 28th day of the month following the completed reporting period. The first report is due on July 28, 2015. An original signed copy of these, and all other reports required herein, shall be submitted to the State at the following address:

Division of Environmental Protection
Bureau of Water Pollution Control
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701

A.4.4. Discharge Monitoring Reports: Analytical data and monitoring results shall be summarized and/or tabulated for presentation in standardized Discharge Monitoring Reports (DMRs). Laboratory reports for quantitative analyses conducted by State of Nevada certified laboratories must accompany DMR submittals.

A.4.5. Schedule: DMRs shall be received by the 28th day of the month following the third month of each quarter (reporting period). Quarterly and annual reporting periods are based on the standard annual cycle, January 1 through December 31. The first report is due on July 28, 2015. If no discharge occurs during the reporting period, report "no discharge" on the submitted DMR.

A.4.6. Recording the Results: For each measurement or sample taken pursuant to the requirements of this permit, the Permittee shall record the following information:

A.4.6.1. The exact place, date, and time of sampling;

A.4.6.2. The dates the analyses were performed;

A.4.6.3. The person(s) who performed the analyses;

A.4.6.4. The analytical techniques or methods used; and

A.4.6.5. The results of all required analyses.

A.4.7. Additional Monitoring by Permittee: If the Permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

A.4.8. Test Procedures: Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the Act, under which such procedures may be required unless other procedures are approved by the Division. Other procedures used may be:

A.4.8.1. Selected from SW-846;

A.4.8.2. Selected from 40 CFR 503; or

A.4.8.3. An alternate test procedure approved by the Nevada Division of Environmental Protection, Environmental Laboratory Services.

A.4.8.4. All laboratory analyses conducted in accordance with this discharge permit must have detection at or below the permit limits.

A.4.8.5. All analytical results must be generated by analytical laboratories certified by the state of Nevada laboratory certification program

A.4.9. **Reporting Limits:** Unless otherwise approved by the Division, the approved method of testing selected for analysis must have reporting limits which are:

A.4.9.1. Half or less of the discharge limit; or, if there is no limit,

A.4.9.2. Half or less of the applicable water quality criteria; or, if there is no limit or criteria,

A.4.9.3. The lowest reasonably attainable using an approved test method.

A.4.9.4. This requirement does not apply if a water quality standard is lowered after the issuance of this permit; however, the Permittee shall review methods used and by letter notify the division if the reporting limit will exceed the new criterion, and if so the Division may reopen the permit to impose new monitoring requirements.

A.5. Fees

A.5.1. The Permittee shall remit an annual review and services fee in accordance with NAC 445A.232 starting July 01, 2015 and every year thereafter until the permit is terminated.

A.6. Certified Operators

A.6.1. The facility shall be operated by a Nevada Certified Class Operator (or higher) of classification

☐ None, ☐ Grade 1, ☐ Grade 2, ☒ Grade 3, or ☐ Grade 4.

A.7. **Water Quality Standards:** There shall be no discharge of substances that would cause the groundwater quality to degrade below drinking water standards.

A.8. **Visibility Parameters:** There shall be no discharge of floating solids or visible foam in other than trace amounts.

A.9. **Solid Waste Management:** All solid, toxic, or hazardous waste shall be properly handled and disposed of pursuant to applicable laws and regulations. Any sludge generated during this operation shall be characterized and disposed of in accordance with local, State, and Federal regulations.

A.10. **Presumption of Possession and Compliance:** Copies of this permit, any subsequent modifications, and the O&M Manual shall be maintained at the permitted facility at all times.

A.11. **Records Retention:** All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation, and recordings from continuous monitoring instrumentation, shall be retained for a minimum of five (5) years, or longer if required by the Administrator.

A.12. **Other information:** Where the Permittee becomes aware of failure to submit any relevant facts in a permit application or the submittal of incorrect information in a permit application or in any report to the Administrator, the Permittee shall promptly submit such facts or information.

A.13. **Prerogative to Reopen:** There shall be no discharge of substances that would cause a violation of water quality standards of the State of Nevada as defined by the permit. The permit may be reopened, and additional limits imposed, if it is determined that the discharge is causing a violation of ambient water quality standards of the State of Nevada.

SECTION B

Site specific requirements are on the following pages:

B.TF. Treatment Facilities / Operations

B.TF.1. There shall be no objectionable odors from the collection system or wastewater treatment, disposal and reuse facilities.

B.TF.2. There shall be no discharge from the collection system or wastewater treatment, disposal and reuse facilities except as authorized by this permit.

B.TF.3. There shall be no discharge of substances that would cause an exceedance of drinking water standards in the groundwater.

B.TF.4. The wastewater treatment and disposal facilities shall be adequately posted and properly fenced.

B.TF.5. The wastewater collection, treatment, disposal and reuse facilities shall be constructed in conformance with plans approved by the Division. The plans must be approved by the Division prior to the start of construction. All changes to the approved plans must be approved by the Division.

B.TF.6. The facility shall be operated in accordance with the Division approved O&M Manual.

B.TF.7. An operations logbook, including the name of the operator, date, time, and general condition of the wastewater treatment facility, must be kept and maintained on the site premises. The operator shall inspect the site at the frequency prescribed in the O&M Manual.

B.TF.8. Flow Rate Notification: The Permittee shall notify the Administrator, by letter, not later than ninety (90) days after the 30-day average daily influent flow rate first equals or exceeds 85% of the design treatment capacity of the Permittee's facility given in Section A. above. The letter shall include:

B.TF.8.1. The 30-day average daily influent flow rate;

B.TF.8.2. The maximum 24-hour flow rate during the 30-day period reported above and the date the maximum flow occurred;

B.TF.8.3. The Permittee's estimate of when the 30-day average influent flow rate will equal or exceed the design treatment capacity of the Permittee's facility;

B.TF.8.4. A status report on the treatment works which will outline but not be limited to past performance, remaining capacity of the limiting treatment and disposal units or sites, past operational problems and improvements instituted, modifications to the treatment works which are needed to attain the permitted flow rate due to changing site specific conditions or design criteria; and

B.TF.8.5. The Permittee's schedule of compliance to provide additional treatment capacity before the 30-day average daily influent flow rate equals the present design treatment capacity of the Permittee's facility.

B.TF.9. Color photograph(s) of the Permitted facilities and operations, labeled and dated, shall be submitted to this office annually as part of the 4th quarter DMR.

B.MW. Monitoring Wells:

B.MW.1. Discrete groundwater samples shall be collected to confirm the effective protection of groundwater under the established discharge conditions of this permit.

B.MW.2. All wells shall be monitored in accordance with the parameters identified in the Groundwater Monitoring Well Table(s).

B.MW.3. Increasing concentrations of total nitrogen as nitrogen (-N) in groundwater samples invoke the following response requirements:

B.MW.3.1. If the total nitrogen-N concentration increases to 7.0 mg/L, an alternate method of process wastewater and/or manure storage must be prepared and submitted to the Division for review and approval;

B.MW.3.2. If the total nitrogen-N concentration increases to 9.0 mg/L, construction of the approved alternate process wastewater and/or manure storage facility shall begin; and

B.MW.3.3. If the total nitrogen-N concentration increases to 10.0 mg/L, discharge to groundwater shall cease unless authorized with written approval from the Division.

B.MW.4. To continue discharges under the terms of this permit, the Permittee may submit for review and approval an alternative approach, stamped by a Nevada Registered Professional Engineer, that ensures no further degradation of waters of the State.

B.MW.5. Groundwater monitoring and data rendering activities shall be conducted by, or under the supervision of, an Environmental Manager certified in the State of Nevada, or other qualified person approved by the Division

B.MW.6. Groundwater monitoring wells shall be conspicuously labeled, capped to prevent migration of surface contaminants to the groundwater, and locked to restrict access.

B.MW.7. **Well Abandonment:** Abandonment of any groundwater monitoring wells shall be conducted under the approval of, and in accordance with the requirements established by, the Division and the Division of Water Resources.

B.RU. Re-Use

B.RU.1. The facility shall be operated in accordance with the Division-reviewed EMP Manual.

B.RU.2. The effluent reuse facility shall provide a copy of a brief document describing the possible hazards and proper hygiene of working with and around reclaimed water to all workers and other affected personnel. A copy shall be included in the EMP.

B.RU.3. If the annual application volume exceeds the calculated annual application limit, the Permittee shall prepare a report which includes an evaluation of the application rates in the EMP, an explanation of conditions (over seeding, reseeding, weather conditions, etc.) which led to the exceedance, and any planned changes the Permittee deems necessary. The evaluation shall be submitted with the fourth quarter Discharge Monitoring Report (DMR).

B.RU.4. The total nitrogen applied (lbs/year) shall not be greater than the maximum yearly nitrogen application defined in the EMP.

B.RU.5. If the Permittee determines that the calculated nitrogen application rate has been exceeded in any one year, the Permittee shall prepare a report which includes an evaluation of the application rates in the approved EMP, an explanation of conditions which led to the exceedance, and any planned changes the Permittee deems necessary. The evaluation shall be submitted with the fourth quarter DMRs.

B.RU.6. Effluent Management Plan (EMP):

B.RU.6.1. The EMP shall be prepared and stamped by a Nevada Registered Professional Engineer.

B.RU.6.2. Pursuant to Section A, the EMP shall be prepared and submitted for review in accordance with the Division's General Criteria for Preparing an Effluent Management Plan (WTS-1B). http://ndep.nv.gov/bwpc/wts1b.pdf

B.RU.6.3. The irrigation storage pond(s), distribution system, and ancillary facilities shall be operated in accordance with the EMP.

B.RU.6.4. The EMP shall contain the information required to comply with this permit.

B.RU.6.5. As applicable, the EMP shall detail the procedures for collecting monitoring samples required by this permit.

B.RU.6.6. The Permittee shall not use the reclaimed water prior to having an EMP, unless granted otherwise by the Division.

B.RU.7. The reclaimed water irrigation system and storage ponds shall not cause objectionable odors on or off the site.

B.RU.8. The irrigation system, storage pond(s), and ancillaries shall be constructed in accordance with plans reviewed by the Division. All plans must be reviewed by the Division prior to the start of construction. Any significant system changes that result in the expansion of the areas of irrigation and/or change in the methods of reclaimed water application must be reviewed by the Division.

B.RU.9. Irrigation areas and pond(s) shall be posted with signs clearly stating that reclaimed water is utilized and to avoid direct contact. Ancillary equipment used for reclaimed water irrigation shall be clearly marked to indicate use with reclaimed water.

B.RU.10. Drinking water fountains located in areas subject to irrigation spray drift shall be covered during irrigation to prevent reclaimed water from contacting the fountain. Additionally, food preparation locations shall be shielded from reclaimed water spray.

B.RU.11. Irrigation shall be performed in such a manner as to reduce standing water to a minimum and to prevent runoff of reclaimed water from the site or into water courses.

B.RU.12. Ponds shall be designed and managed to meet conditions listed in this permit.

B.RU.13. All terms and conditions stated herein shall not supersede the requirements of the Nevada Division of Water Resources.

B.RU.14. The Permittee shall achieve compliance with the discharge limitations upon issuance of the permit.

B.RU.15. When applicable,monitoring wells shall be constructed in accordance with "WTS-4: Monitoring Well Design Requirements" (NDEP, February 1997). Monitoring wells shall be installed and sampled prior to irrigation.

B.BS. Biosolids and Sewage Sludge

B.BS.1. **Disposal:** The Permittee shall comply with all applicable sections of the following regulations for biosolids which are disposed of, and inform any biosolids disposer of the requirement that they must comply with the following regulations as applicable:

B.BS.1.1. 40 CFR 257 and 258 for biosolids and solid waste screenings disposed of in municipal solid waste landfills as approved by the Administrator and the County;

B.BS.1.2. 40 CFR 503 Subpart C for biosolids placed in surface disposal sites (dedicated land disposal sites or monofills) and Subpart E for biosolids incinerated.

B.BS.2. **Reuse:** The Permittee shall comply with any applicable sections of 40 CFR 503 Subpart B for biosolids that are land applied.

B.BS.2.1. The Permittee is responsible for informing any biosolids preparer, applier, or disposer, of all requirements and the applicable regulations listed above.

B.BS.2.2. Facilities which are regulated under 40 CFR part 503 shall monitor the parameters listed in B.BS.2.3, and shall also monitor the pathogen density requirements in 40 CFR 503.32 (a) and (b)(2) through (4), if using pathogens or fecal coliforms to demonstrate pathogen reduction at the frequencies listed below.

Dry Biosolids Disposal rate in metric tons/yr.	**Frequency**
>0 - <290	each year
≥290 -<1500	once a quarter
≥1500 -<15000	once every 2 months
≥15000	once a month

B.BS.2.3. Biosolids that are land applied shall be monitored for As, Cd, Cu, Pb, Hg, Mo, Ni, Se, and Zn, using the methods in SW-846. Biosolids placed in a surface disposal site shall be monitored for As, total Cr, and Ni, if the surface disposal site is unlined.

B.BS.2.4. Biosolids to be land applied shall be tested for organic nitrogen as N, ammonia as N, nitrate as N, and Total Nitrogen as N at the frequency required above.

B.BS.2.5. Records of any operational parameters used to demonstrate Class B pathogen reduction and Vector Attraction Reduction shall be maintained.

B.BS.3. If biosolids are stored at any facility owned or operated by the Permittee for over two years from the time they are generated, the Permittee shall notify the Division within 30 days and shall ensure compliance with all the requirements of surface disposal in 40 CFR 503 Subpart C, or must submit a written notification to the Division and EPA with the information listed at 40 CFR 503.20 (b) demonstrating the need for longer temporary storage.

B.BS.4. Biosolids treatment or storage facilities owned or operated by the Permittee shall be designed to divert stormwater run-on for the 100-year storm event, and be designed to prevent erosion, which could cause biosolids to run-off.

B.BS.5. The Permittee shall take all appropriate precautions to inform biosolids haulers that all necessary measures to contain the biosolids should be taken before leaving the treatment facility.

B.BS.6. The Permittee shall comply with the following notification requirements either directly or through contractual arrangements with a biosolids management contractor:

B.BS.6.1. If biosolids are shipped to another state or to Indian lands, the Permittee shall send notice of the shipment to the state permitting authorities, the EPA Regional Office of the region receiving the biosolids, or the Indian authorities.

B.BS.6.2. For land application on un-permitted disposal sites, the Permittee shall notify the Division at least 180 days prior to shipping any biosolids to enable the site to obtain a permit.

B.BS.7. **Biosolids Monitoring Report (BMR):** The Permittee shall submit a BMR for the previous calendar year in accordance with the Section A. The report shall contain all the required biosolids analytical data; the tonnage of biosolids generated that year; any tonnage accumulated from previous year(s); descriptions of pathogen and vector attraction reduction methods and the required certifications as required by 40 CFR 503.17 and 27; the names, mailing and street addresses and telephone numbers of all facilities which received biosolids for storage, disposal, use, treatment, land application, or any other use or disposal methods not mentioned and the volume of biosolids taken to each facility.

B.PT. **Pretreatment of Industrial Wastewaters**

B.PT.1. The Permittee shall implement and enforce a pretreatment program under 40 CFR Part 403 (hereinafter 403), including any subsequent regulatory revisions to 403, and be responsible for and liable for the performance of all Control Authority pretreatment requirements contained in 403. Where 403 or subsequent revision places mandatory actions upon the Permittee as Control Authority but does not specify a timetable for completion of the actions, the Permittee shall complete the required actions within 6 months from the issuance date of this permit or the effective date of the 403 revisions, whichever comes later. For violations of pretreatment requirements, the Permittee shall be subject to enforcement actions, penalties, fines, and other remedies by the U.S. EPA or other appropriate parties, as provided in the Act. EPA may initiate enforcement action against a non-domestic user for noncompliance with applicable standards and requirements as provided in the Act and as provided by the EPA in the enforcement agreement.

B.PT.1.1. The Permittee shall comply with an EPA-approved Pretreatment Program. This program shall include written agreements that provide the Permittee with the legal authority to enforce the pretreatment program with all sewage agencies who contribute flows to the treatment facility. The Permittee shall comply with all parts of the schedule listed below:

B.PT.1.1.1. The Permittee shall enforce the requirements promulgated under sections 307(b) through (d) and 402(b) of the Act with timely, appropriate and effective enforcement actions. The Permittee shall cause all non-domestic 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 nondomestic user, upon commencement of the discharge.

B.PT.1.1.2. The Permittee shall perform the pretreatment functions as required in 403, including but not limited to:

B.PT.1.1.2.1. Implementing the necessary legal authorities as provided in 403.8(f)(1);

B.PT.1.1.2.2. Enforcing the pretreatment requirements under 403.5 and 6;

B.PT.1.1.2.3. Implementing the programmatic functions as provided in 403.8(f)(2); and

B.PT.1.1.2.4. Providing the requisite funding and personnel to implement the pretreatment program as provided in 403.8(f)(3).

B.PT.1.2 The Permittee shall submit annually a report to the Division and EPA describing its pretreatment activities over the previous year. In the event the Permittee is not in compliance with any conditions or requirements of this permit, the Permittee shall also include reasons for noncompliance and state how and when the Permittee shall comply with such conditions and requirements. This annual report shall cover operations for the previous calendar year and shall be submitted in accordance with the DLV Table (Section A). The report shall contain, but is not limited to, the following information:

B.PT.1.2.1. A summary of the analytical results from representative, flow proportioned, 24-hour composite sampling of the Publicly Owned Treatment Work's (POTW's) influent and effluent for those pollutants EPA has identified under section 307(a) of the Act which are known or suspected to be discharged by non-domestic users. This will consist of an annual full priority pollutant scan, with quarterly samples analyzed only for those pollutants detected in the full scan. Sludge shall be sampled during the same 24-hour period and analyzed for the same pollutants as the influent and effluent. The sludge analyzed shall be a composite sample of a minimum of twelve discrete samples taken at equal time intervals over a 24-hour period or a composite of discrete samples taken every two hours when the sludge production period is less than 24 hours. Wastewater and sludge sampling and analysis shall be performed a minimum of once per quarter. The Permittee shall also provide any influent or effluent monitoring data for non-priority pollutants which the Permittee believes may be causing or contributing to interference or pass through, or adversely impacting sludge quality. Sampling and analysis shall be performed with the techniques prescribed in 40 CFR 136;

B.PT.1.2.2. A discussion of upset, interference, or pass through incidents, if any, at the treatment plant which the Permittee knows or suspects were caused by non-domestic users of the POTW system. The discussion shall include the reasons why the incidents occurred, the corrective actions taken, and the name and address of the non-domestic user responsible, if known. The discussion shall also include a review of the applicable pollutant limitations to determine whether any additional limitations or changes to existing requirements may be necessary to prevent pass through or interference;

B.PT.1.2.3. An update of the Permittee's significant industrial users (SIUs), including their names and addresses, and a list of deletions, additions, and SIU name changes keyed to the previously submitted list. The Permittee shall provide a brief explanation for each change. The list shall identify the SIUs subject to federal categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate which SIUs are subject to local limitations;

B.PT.1.2.4. The Permittee shall characterize the compliance status of each SIU by providing a list or table which includes the following information:

B.PT.1.2.4.1. Name of the SIU;

B.PT.1.2.4.2. Category, if subject to federal categorical standards;

B.PT.1.2.4.3. The type of wastewater treatment or control process in place;

B.PT.1.2.4.4. The number of samples taken by the POTW during the year;

B.PT.1.2.4.5. The number of samples taken by the SIU during the year;

B.PT.1.2.4.6. For an SIU subject to discharge requirements for total toxic organics, written documentation that all required certifications were provided;

B.PT.1.2.4.7. A list of the standards violated during the year. Identify whether the violations were for categorical standards or local limits;

B.PT.1.2.4.8. Whether the facility was in significant noncompliance (SNC) as defined at 40 CFR 403.8(f)(2)(viii) at any time during the year;

B.PT.1.2.4.9. A summary of enforcement or other actions taken during the year to return the SIU to compliance. Describe the type of action, final compliance date, and the amount of fines and penalties collected, if any. Describe any proposed actions for bringing the SIU into compliance;

B.PT.1.2.5. A brief description of any programs the POTW implements to reduce pollutants from non-domestic users that are not classified as SIUs;

B.PT.1.2.6. A brief description of any significant changes in operating the pretreatment program which differ from the previous year including, but not limited to, changes concerning the program's administrative structure, local limits, monitoring program or monitoring frequencies, legal authority, enforcement policy, funding levels, or staffing levels;

B.PT.1.2.7. A summary of the annual pretreatment budget, including the cost of the pretreatment program functions and equipment purchases; and,

B.PT.1.2.8. A summary of activities to involve and inform the public of the program including a copy of the newspaper notice, if any, required under 40 CFR 403.8(f)(2)(viii).

B.PT.1.3. The permittees shall evaluate their Pretreatment program once every permit cycle and provide a written technical evaluation to EPA and NDEP of the need to revise local limits under 40 CFR 403.5(c)(1), as changes are required.

B.PT.2. **EPA Submittal Address:**

B.PT.2.1. A signed copy of all Discharge Monitoring Reports and any other reports shall be submitted to the Regional Administrator at the following address:

U.S. Environmental Protection Agency, Region IX
Pretreatment Coordinator (WTR-2-3)
75 Hawthorne Street
San Francisco, CA 94105

SECTION C

C.1. Definitions

C.1.1. **CWA** means the Clean Water Act (formerly referred to as either the Federal Water Pollution Act or the Federal Water Pollution Control Act Amendments of 1972), Public Law 92-500, as amended by Public Law 96-217, Public Law 96- 576, Public Law 97-117, and Public Law 100-4.

C.1.2. **Waters of the State** means all waters situated wholly or partly within or bordering upon this state including but not limited to all streams, lakes, ponds, impounding reservoirs, marshes, water courses, waterways, wells, springs, irrigation systems, and drainage systems; and all bodies or accumulations of water, surface and underground, natural or artificial.

C.1.3. **30-day average discharge** means the total discharge during a month divided by the number of samples in the period for that discharge facility. Where less than daily sampling is required by this permit, the 30-day average discharge shall be determined by the summation of all the measured discharges divided by the number of samples during the period when the measurements were made.

C.1.4. **7-day average concentration** means the arithmetic mean of measurements made during a week. If there is more than one measurement per day, the measurements may be averaged in accordance with Section A (Monitoring: Additional Monitoring by Permittee).

C.1.5. **Daily maximum** means the highest measurement during the monitoring period.

C.1.6. **30-day average concentration**, other than for fecal coliform bacteria, means the arithmetic mean of measurements made during a month. If there is more than one measurement per day, the measurements may be averaged in accordance with Section A (Monitoring: Additional Monitoring by Permittee). The "30-day average concentration" for fecal coliform bacteria means the geometric mean of measurements made during a month. The geometric mean is the "nth" root of the product of "n" numbers. Geometric mean calculations where there are non-detect results for fecal coliform shall use one half the detection limit as the value for the non-detect results.

C.1.7. **mg/L** means milligrams per liter.

C.1.8. **gpd** means gallons per day.

C.1.9. **MG** means million gallons.

C.1.10. **MGD** means million gallons per day.

C.1.11. **Mgal/d** means million gallons per day.

C.1.12. **"-N"** means measured as nitrogen.

C.1.13. **"–P"** means measured as phosphorus.

C.1.14. **mg/kg** means milligrams per kilogram.

C.1.15. **DWB** means Dry Weight Basis.

C.1.16. **CFU** means Colony Forming Unit.

C.1.17. **MPN** means Most Probable Number.

C.1.18. **mL** means milliliter.

C.1.19. **NMP** means Nutrient Management Plan.

C.1.20. **AC** means acre.

C.1.21. **lbs/A** means pounds per acre.

C.1.22. **lbs/day** means pounds per day.

C.1.23. **TDS** means total dissolved solids.

C.1.24. **Cfs** means cubic feet per second.

C.1.25. **CP** means center pivot.

C.1.26. **S** means summer.

C.1.27. **W** means winter.

C.1.28. **Discrete sample** means any individual sample collected in less than 15 minutes.

C.1.29. **For flow-rate measurements a "composite"** sample means the arithmetic mean of no fewer than six individual measurements taken at equal time intervals for 24 hours, or for the duration of discharge, whichever is shorter.

C.1.30. **For other than flow-rate a "composite"** sample means a combination of no fewer than six individual flow-weighted samples obtained at equal time intervals for 24 hours, or for the duration of discharge, whichever is shorter. Flow-weighted sample means that the volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling.

C.1.31. **Acute Toxicity** is defined in the whole effluent testing procedures presented in this permit Section A (Whole Effluent Toxicity Testing).

C.1.32. **Biosolids** are non-hazardous sewage sludge or domestic septage as defined in 40 CFR 503.9.

C.1.33. **A "bypass"** means the intentional diversion of waste streams from any portion of a treatment facility.

C.1.34. **An "upset"** means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

C.1.35. Sewage sludge means solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

C.1.36. Agricultural land means land on which a food crop, a feed crop, or a fiber crop is grown. This includes rangeland and land used as pasture.

C.1.37. Agronomic rate means the whole sludge application rate (dry weight basis) designed:

C.1.37.1. To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and

C.1.37.2. To minimize the amount of nitrogen that passes below the root zone of the crop or vegetation grown on the land to the groundwater.

C.1.38. Manure means animal excrement and is defined to include bedding, compost, and raw materials or other materials commingled with animal excrement or set aside for disposal.

C.1.39. Production area means the portion of the facility that is not used for land application and includes all areas used for animal product production activities. This includes but is not limited to the animal confinement areas, the manure storage areas, the raw materials storage areas, and the waste containment areas.

C.1.40. Process wastewater means water directly or indirectly used in the operation of the facility for any of the following:

C.1.40.1. Spillage or overflow from animal watering systems;

C.1.40.2. Washing, cleaning, or flushing pens, barns, manure pits, or other process components;

C.1.40.3. Direct contact swimming, washing, or spray cooling of animals;

C.1.40.4. Dust control, not including uncontaminated groundwater used outside of the production area; and

C.1.40.5. Any water which comes into contact with, or is a constituent of, any raw materials, products, or byproducts including manure, feed, milk, eggs or bedding.

C.1.41. Land application means the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

C.1.42. Land application area means land under the control of the Permittee, whether it is owned, rented, or leased, to which manure or process wastewater from the production area is or may be applied.

C.1.43. 25-year, 24-hour storm event means a precipitation event with a probable recurrence interval of once in twenty-five years, as defined by the National Weather Service in Technical Paper No. 40, “Rainfall Frequency Atlas of the United States,” May, 1961, or equivalent regional or State rainfall probability information developed from this source.

C.1.44. **100-year, 24-hour storm event** means a precipitation event with a probable recurrence interval of once in one hundred years, as defined by the National Weather Service in Technical Paper No. 40, "Rainfall Frequency Atlas of the United States," May, 1961, or equivalent regional or State rainfall probability information developed from this source.

C.1.45. **Chronic precipitation event** means a series of wet weather conditions that precludes reducing the volume of properly designed, constructed, operated, and maintained waste storage and/or treatment facilities and that total a volume in excess of the 25-year, 24-hour storm event.

C.1.46. **Vegetated buffer** means a permanent strip of dense perennial vegetation established parallel to the contours of, and perpendicular to, the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants leaving the field and reaching surface waters.

C.1.47. **Feed crops** means crops produced primarily for consumption by animals.

C.1.48. **Food crops** means crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.

C.2. **Operations and Maintenance (O&M) manual:**

C.2.1. Pursuant to Section A, the O&M manual shall be prepared and submitted to NDEP for review in accordance with the Division's Operations and Maintenance Manual guidance (WTS-2). http://ndep.nv.gov/bwpc/wts-2.pdf

C.2.2. The operator shall inspect the site at the frequency prescribed in the O&M Manual.

C.2.3. The Permittee shall maintain an operations logbook (hardcopy or electronic) on-site as referenced in the O&M manual.

C.2.4. The logbook shall include the name of the operator, date, time, and general condition of the facility.

C.3. **Planned changes:** The Permittee shall give notice to the Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when the alteration or addition to a permitted facility:

C.3.1. May meet one of the criteria for determining whether a facility is a new source (40 CFR 122.29 (b));

C.3.2. Could significantly change the nature or increase the quantity of pollutants discharged; or

C.3.3. Results in a significant change to the Permittee's sludge management practice or disposal sites.

C.4. **Anticipated non-compliance:** The Permittee shall give advance notice to the Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C.5. **Change in Discharge:** All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions or treatment modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Any changes to the permitted treatment facility must comply with Nevada Administrative Code (NAC) 445A.The permit may be modified to specify and limit any pollutants not previously limited.

C.6. **Facilities Operation-Proper Operation and Maintenance:** The Permittee shall at all times maintain in good working order and properly operate all treatment and control facilities, collection systems, and pump stations installed or used by the Permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures.

C.7. **Adverse Impact-Duty to Mitigate:** The Permittee shall take all reasonable steps to minimize releases to the environment resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge. The Permittee shall carry out such measures, as reasonable, to prevent significant adverse impacts on human health or the environment. If the monitoring program (as required by this permit) identifies exceedances of ambient water quality standards at the boundary of the mixing zone, the Permittee shall notify the Division of the exceedances and describe any mitigation measures being implemented as part of the quarterly monitoring report requirements.

C.8. **Noncompliance, Unauthorized Discharge, Bypass and Upset**

C.8.1. Any diversion, bypass, spill, overflow or discharge of treated or untreated wastewater from a treatment works or other permitted facilities under the control of the Permittee to navigable waters is prohibited except as authorized by this permit. The Division may take enforcement action for a diversion, bypass, spill, overflow, or discharge of treated or untreated wastewater to waters of the state except as authorized by this permit. In the event the Permittee has knowledge that a diversion, bypass, spill, overflow or discharge not authorized by this permit is probable, the Permittee shall notify the Administrator immediately.

C.8.2. The Permittee shall notify the Administrator at (775) 687-9418 during normal business hours AND through the NDEP Spill Hotline (1-888-331-6337) within twenty-four (24) hours after identifying any diversion, bypass, spill, upset, overflow or release of treated or untreated discharge from the treatment works or other permitted facilities under the control of the Permittee that imminently and substantially endangers human health, the environment, or reaches a waters of the state. A written report shall be submitted to the Administrator within five (5) days of diversion, bypass, spill, overflow, upset or discharge, detailing the entire incident, including:

C.8.2.1. Time, date, and duration of discharge;

C.8.2.2. Exact location and estimated amount of discharge;

C.8.2.3. Flow path and any bodies of water which the discharge reached;

C.8.2.4. The specific cause of the discharge;

C.8.2.5. The preventive and/or corrective actions taken to mitigate the spill;

C.8.2.6. Future preventative actions to ensure a similar spill will not recur; and,

C.8.2.7. Assessment of public contact with the spill and any notification provided to other public or private entities that may have been affected by the spill.

C.8.2.8. The Administrator reserves the right to waive the requirement for this written report on a case-by-case basis, or request additional information.

C.8.3. The following shall be included as information which must be reported within 24 hours:

C.8.3.1. Any unanticipated bypass which exceeds any effluent limitation in the permit;

C.8.3.2. Any upset which exceeds any effluent limitation in the permit; and

C.8.3.3. Violation of a limitation for any toxic pollutant or any pollutant identified as the method to control a toxic pollutant.

C.8.4. The Permittee shall report all instances of noncompliance not reported under Section C (Noncompliance, Unauthorized Discharge, Bypassing and Upset) at the time monitoring reports are submitted. The reports shall contain the information listed in Section C (Noncompliance, Unauthorized Discharge, Bypassing and Upset).

C.8.5. **Bypass not exceeding limitations:** The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of the applicable section of Section C (Noncompliance, Unauthorized Discharge, Bypassing and Upset including Prohibition of Bypass).

C.8.6. **Anticipated bypass:** If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of bypass.

C.8.7. **Prohibition of Bypass:** Bypass is prohibited, and the Administrator may take enforcement action against a Permittee for bypass, unless:

C.8.7.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

C.8.7.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

C.8.7.3. The Permittee submitted notices as required under Section C (Noncompliance, Unauthorized Discharge, Bypassing and Upset).

C.8.8. The Administrator may approve an anticipated bypass, after considering its adverse effects, if the Administrator determines that it will meet the three conditions listed in Section C.

C.8.9. **Effect of an upset:** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Section C (Noncompliance, Unauthorized Discharge, Bypassing and Upset: Conditions necessary for a demonstration of an upset) are met.

C.8.10. **Conditions necessary for a demonstration of an upset:** A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence, that:

C.8.10.1. An upset occurred and that the Permittee can identify the cause(s) of the upset;

C.8.10.2. The permitted facility was at the time being properly operated;

C.8.10.3. The Permittee submitted notice of the upset as required under this section; and

C.8.10.4. The Permittee complied with any remedial measures required under Section C (Noncompliance, Unauthorized Discharge, Bypassing and Upset).

C.8.11. In selecting the appropriate enforcement option, the Administrator shall consider whether or not the noncompliance was the result of an upset. The burden of proof is on the Permittee to establish that an upset occurred.

C.9. All solid waste screening and sewage sludge shall be disposed of or reused in a manner approved by the Division and the County. Facilities that generate and dispose of sewage sludge, or prepare it for reuse, shall monitor the concentrations of arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium and zinc and report in mg/dry kg of sludge as outlined below. A monitoring report which includes the analytical data, volume disposed of, facility name, address, phone number and contact where sludge was disposed or reused shall be submitted with the quarterly Discharge Monitoring Report (DMR). Facilities which sample annually shall submit the information annually with the 4th quarter DMR.

Dry Biosolids Disposal rate in metric tons/yr.	Frequency
>0 - <290	each year
≥290 -<1500	once a quarter
≥1500 -<15000	once every 2 months
≥15000	once a month

C.10. **Removed Substances:** Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of waste waters shall be disposed of in a manner such as to prevent any pollution from such materials from entering any navigable waters.

C.11. **Safeguards to Electric Power Failure:** In order to maintain compliance with the effluent limitations and prohibitions of this permit the Permittee shall either:

C.11.1. Provide at the time of discharge an alternative power source sufficient to operate the wastewater control facilities; or

C.11.2. Halt or reduce all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

C.12. **Right of Entry and Inspection:** The Permittee shall allow the Administrator and/or his authorized representatives, upon the presentation of credentials, to:

C.12.1. Enter at reasonable times upon the Permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit;

C.12.2. Have access to and copy any records required to be kept under the terms and conditions of this permit at reasonable times;

C.12.3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations required in this permit; and

C.12.4. Perform any necessary sampling or monitoring to determine compliance with this permit at any location for any parameter.

C.13. **Transfer of Ownership or Control:** In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the Permittee shall notify the succeeding owner or controller of the existence of this permit, by letter, a copy of which shall be forwarded to the Administrator. The Administrator may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary. The Administrator shall approve ALL transfers of permits.

C.14. **Availability of Reports:** Except for data determined to be confidential under Nevada Revised Statute (NRS) 445A.665, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the office of the Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NRS 445A.710.

C.15. **Furnishing False Information and Tampering with Monitoring Devices:** Any person who intentionally or with criminal negligence makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained by the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, or who falsifies, tampers with or knowingly renders inaccurate any monitoring device or method required to be maintained under the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, is guilty of a gross misdemeanor and shall be punished by a fine of not more than $10,000 or by imprisonment. This penalty is in addition to any other penalties, civil or criminal, provided pursuant to NRS 445A.300 to 445A.730, inclusive.

C.16. **Penalty for Violation of Permit Conditions:** NRS 445A.675 provides that any person who violates a permit condition is subject to administrative and judicial sanctions as outlined in NRS 445A.690 through 445A.705.

C.17. **Permit Modification, Suspension or Revocation:** After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

C.17.1. Violation of any terms or conditions of this permit;

C.17.2. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

C.17.3. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;

C.17.4. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;

C.17.5. Material and substantial alterations or additions to the permitted facility or activity;

C.17.6. The Administrator has received new information;

C.17.7. The standards or regulations have changed; or

C.17.8. The Administrator has received notification that the permit will be transferred.

C.18. **Minor Modifications:** With the consent of the Permittee and without public notice, the Administrator may make minor modifications in a permit to:

C.18.1. Correct typographical errors;

C.18.2. Clarify permit language;

C.18.3. Require more frequent monitoring or reporting;

C.18.4. Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the permit and does not interfere with attainment of the final compliance date;

C.18.5. Allow for change in ownership;

C.18.6. Change the construction schedule for a new discharger provided that all equipment is installed and operational prior to discharge;

C.18.7. Delete an outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits; or

C.18.8. Reallocate the IWLA as long as the ΣIWLA does not change.

C.19. **Toxic Pollutants:** Notwithstanding Section C (Permit Modification, Suspension or Revocation), if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the Permittee so notified.

C.20. **Liability:** Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable Federal, State or local laws, regulations, or ordinances. However, except for any toxic effluent standards and prohibitions imposed under section 307 of the Clean Water Act or toxic water quality standards set forth in NAC 445A.144, compliance with this permit constitutes compliance with Clean Water Act sections 301, 302, 306, 307, 318, 403, 405(a) and (b), and with NRS 445A.300 through 445A.730.

C.21. **Property Rights:** The issuance of this permit does not convey any property rights, in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

C.22. **Severability:** The provisions of this permit are severable, and if any provision of this permit, or the application of any provisions of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

C.23. **Duty to Comply:** The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; permit termination; revocation and reissuance, or modification; or denial of a permit renewal application.

C.24. **Need to Halt or Reduce Activity Not a Defense:** It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this permit.

C.25. **Duty to Provide Information:** The Permittee shall furnish to the Administrator, within a reasonable time, any relevant information which the Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Administrator, upon request, copies of records required to be kept by this permit.

C.26. **Reapplication:** If the Permittee desires to continue to discharge, he shall reapply not later than 180 days before this permit expires on the application forms then in use. The Permittee shall submit the sludge information listed in 40 CFR 501.15(a)(2) with the renewal application. The renewal application shall be accompanied by the fee required by NAC 445A.232.

C.27. **Signatures, Certification Required on Application and Reporting Forms:** All applications, reports, or information submitted to the Administrator shall be signed and certified by making the following certification. “I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

C.27.1. All applications, reports or other information submitted to the Administrator shall be signed by one of the following:

C.27.1.1. A principal executive officer of the corporation (of at least the level of vice president) or his authorized representative who is responsible for the overall operation of the facility from which the discharge described in the application or reporting form originates;

C.27.1.2. A general partner of the partnership;

C.27.1.3. The proprietor of the sole proprietorship; or

C.27.1.4 A principal executive officer, ranking elected official or other authorized employee of the municipal, state or other public facility.

C.28. **Changes to Authorization:** If an authorization under Section C.31 (Signatures, Certification Required on Application and Reporting Forms) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Section C.31 (Signatures, Certification Required on Application and Reporting Forms) must be submitted to the Administrator prior to or together with any reports, information, or applications to be signed by an authorized representative.

C.29. **Holding Pond Conditions:** If any wastewater from the Permittee's facilities is placed in ponds owned or operated by the Permittee, such ponds shall be located and constructed so as to:

C.29.1. Contain with no discharge the once-in-the twenty-five year, 24-hour storm at said location;

C.29.2. Withstand with no discharge the once-in-one-hundred year flood of said location; and

C.29.3. Prevent escape of wastewater by leakage other than as authorized by this permit, unless otherwise approved by the Division.

C.30. **Publicly Owned Treatment Works** [40 CFR 122.42(b)]: All POTWs must provide adequate notice to the Administrator of the following:

C.30.1. Any new introduction of pollutants into the Permittee's facilities from an indirect discharger which would be subject to section 301 or 306 of the Act if it were directly discharging those pollutants;

C.30.2. Any substantial change in the volume or character of pollutants being introduced into the Permittee's facilities by a source introducing pollutants into the Permittee's facilities at the time of issuance of the permit.;

C.30.3. For the purposes of this part, adequate notice shall include information on: (1) the quality and quantity of effluent introduced into the Permittee's facilities and (2) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the Permittee's facilities.

C.31. **Existing Manufacturing, Commercial, Mining, and Silvicultural Dischargers** [40 CFR 122.42(a)]: In addition to the reporting requirements under 40 CFR 122.41(l), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Administrator as soon as they know or have reason to believe:

C.31.1. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

C.31.1.1. One hundred micrograms per liter (100 μg/l);

C.31.1.2. Two hundred micrograms per liter (200 μg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

C.31.1.3. Five times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

C.31.1.4. The level established by the Administrator in accordance with 40 CFR 122.44(f).

C.31.2. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

C.31.2.1. Five hundred micrograms per liter (500 μg/l);

C.31.2.2. One milligram per liter (1 mg/l) for antimony;

C.31.2.3. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

C.31.2.4. The level established by the Administrator in accordance with 40 CFR 122.44(f).

Appendix B

Envision Model Development, Calibration and Steady State Mass Balance Results

Liquid Stream Calibration

Current flows and BOD and TSS concentrations estimated in Section 2 were used as inputs in the model for the wastewater entering the WWTP. These values are based on historical sampling data and adequately represent the characterization of the influent wastewater. Therefore, no adjustments to these values were made in the model calibration process.

Primary Clarifier BOD Removal

Recent historical data on BOD removal through the primary clarifiers was not available, however operator input suggested that primary effluent BOD has recently been around 230 mg/L. This translates to a BOD removal of 20% based on influent BOD concentrations.

Trickling Filter Effluent

Within the trickling filters, a 42 percent BOD removal and a corresponding yield of 0.90 lb TSS/lb BOD was used based on prior HDR mass balance work at the District. This value falls within the 0.8 to 1.0 lb TSS/lb BOD range recommended in MOP8.

Solids Contact and Aeration

The contact clarifier and aeration mixed liquor suspended solids (MLSS) was used to calibrate the data. Recent operator input suggested that the aeration basin is operating at an MLSS around 1,500 mg/L. Based on this operating MLSS, the biomass in the secondary clarifiers, and the wasted solids, an MCRT of 2.2 days was used for the mean cell residence time (MCRT). The overall solids yield for the total secondary process (including trickling filters, solids contact and aeration) is also based on a theoretical calculation.

Secondary Clarifier Effluent

The secondary clarifier effluent performance for TSS and BOD were calibrated by comparing model results with recent operator input.

Solid Stream Calibration

The solids stream calibration results in Table 5-2 are similar to the liquid stream provided in Table 5-1, which provide a comparison of WWTP Data and Model Results. The following is a discussion of inputs used in the model in instances where the District's sampling data did not provide adequate detail for calibration of the model.

Primary Solids

The solids leaving the primary clarifiers' underflow were set in the model based on a historically measured percent solids of 4.6 percent. In the model, the underdrain flow is calculated based on conservation of mass at steady state conditions, such that the influent mass is equal to the mass in the combined liquid and solids streams. This calculation resulted in a 3.3 gpm underdrain flow while operating 24 hours a day.

Return Activated Sludge (RAS) Flow

The RAS flow percent (50 percent) is based on previous HDR experience at the District's WWTP. TSS concentrations were calculated based on conservation of mass based on the ratio of the activated sludge MLSS, influent flow, and RAS flow. WAS flow is based on the 2.2 day MCRT.

Thickened Waste Activated Sludge (TWAS)

The TWAS percent solids is based on the historical data used to calibrate the gravity belt thickener process. The solids thickener should be able to achieve a higher solids percentage leaving the thickener.

The TWAS (3.6 percent solids) combines with the primary solids (4.6 percent solids) and is fed into the anaerobic digesters at 4.1 percent. The model was set to a VSS destruction of 55%, which historically has been between 50 to 60 percent at the District's WWTP. The difference in VSS destruction between the data and the model is less than 10 percent which is reasonable for the model calibration.

Dewatering Feed

The final step in the solids stream process is dewatering by a belt filter press. The process was calibrated based on the historical percent solids in the cake (18 percent). There is a disparity (41 percent delta) between the dewatering feed data (1.3 percent) and the model value (2.2 percent). The model value is based on the percent VSS destruction coupled with the ratio of VSS/TSS. The historical data from the District appears to be larger than expected with a 50 to 60 percent VSS destruction and VSS/TSS ratio between 70 to 85 percent.

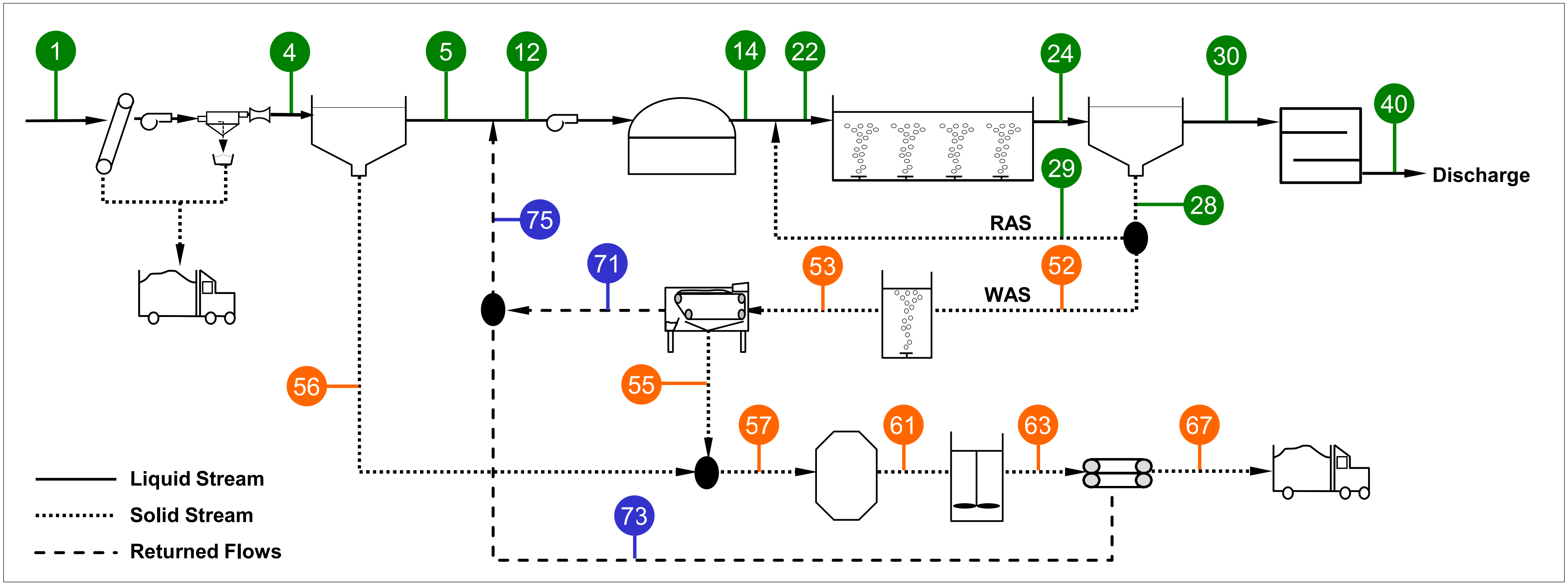

Figure B-1. Schematic of the MGSD Facility

Table B-1. Detailed Breakdown of the Calibration Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	1.53	1,061	242	3,084	241	3,071	212	2,703	25	319	35	446	230	2,931
4	Primary Clar Feed	1.53	1,061	242	3,084	241	3,071	212	2,703	25	319	35	446	230	2,931
5	Primary Clar Effl	1.52	1,058	185	2,350	99	1,259	87	1,108	25	318	29	370	230	2,922
9	Primary Efffl	1.53	1,061	242	3,084	241	3,071	212	2,703	25	319	35	446	230	2,931
12	TF Feed	1.56	1,083	185	2,403	106	1,381	92	1,196	31	398	35	457	250	3,245
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	1.56	1,083	65	842	115	1,498	93	1,215	25	319	34	440	241	3,129
22	Solids Contact and Aeration (w/RAS)	2.31	1,606	375	7,238	1,522	29,350	1,162	22,420	25	491	142	2,732	241	4,638
24	Secondary Clar Feed	2.31	1,606	349	6,727	1,501	28,960	1,143	22,040	27	528	142	2,732	241	4,639
28	Secondary Clar Underdrain	0.78	542	1,019	6,627	4,436	28,850	3,377	21,960	27	178	365	2,374	241	1,564
29	RAS	0.75	523	1,019	6,397	4,436	27,850	3,377	21,200	27	172	365	2,291	240	1,509
30	Secondary Clar Effl/Disinfection Feed	1.53	1,064	8	101	9	109	6	83	27	350	28	358	241	3,075
40	Discharge	1.53	1,064	8	101	9	109	6	83	27	350	28	358	255	3,253
52	WAS	0.03	19	1,019	229	4,436	997	3,377	759	27	6	365	82	240	54
53	WAS Thickener Feed	0.03	19	1,810	407	4,368	981	3,309	743	34	8	365	82	265	59
55	TWAS	0.00	2	10,820	280	36,000	932	27,270	706	34	1	2,761	72	265	7
56	Primary Solids	0.00	3	18,430	734	45,520	1,812	40,060	1,595	25	1	1,914	76	230	9
57	Digesters Feed	0.01	5	15,430	1,014	41,770	2,744	35,020	2,301	29	2	2,248	148	244	16
61	Digested Solids	0.01	5	7,252	477	22,510	1,479	15,760	1,035	1,249	82	2,248	148	4,601	302
63	Dewatering Feed	0.01	5	7,158	470	22,190	1,458	15,440	1,014	1,269	83	2,248	148	4,672	307
67	CAKE	0.00	1	54,200	417	180,000	1,385	125,300	964	1,269	10	9,207	71	4,672	36
71	GBT Return Stream	0.03	18	85	19	222	49	168	37	31	7	47	11	238	53
73	Centrate	0.01	7	411	33	895	73	623	51	904	74	943	77	3,326	271
75	Sum Return Flows	0.04	25	172	52	403	122	290	88	266	80	288	87	1,069	324

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Appendix C

Projected Steady State Mass Balance Results

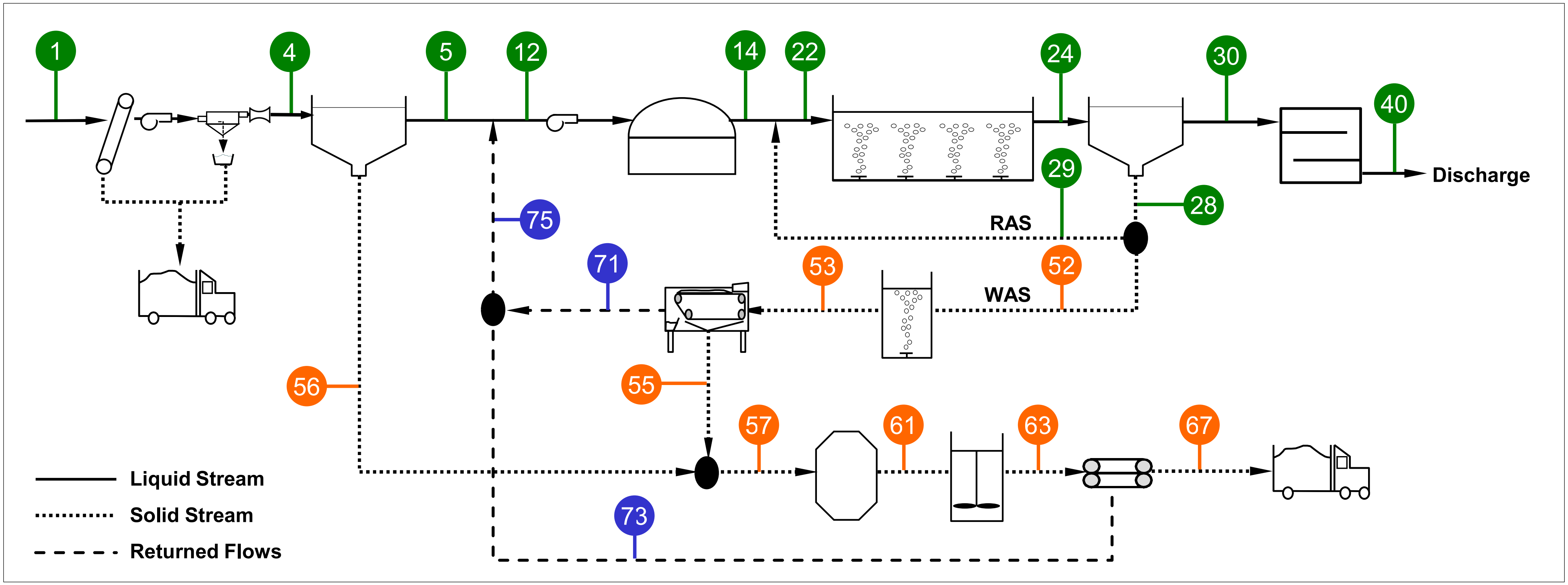

Figure C-1. Schematic of the MGSD Facility

Table C-1. Detailed Breakdown of the 2020 Average Annual Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	1.59	1,104	239	3,168	220	2,923	194	2,572	25	332	35	464	230	3,050
4	Primary Clar Feed	1.59	1,104	239	3,168	220	2,923	194	2,572	25	332	35	464	230	3,050
5	Primary Clar Effl	1.59	1,101	183	2,415	91	1,198	80	1,054	25	331	29	385	230	3,041
9	Primary Efffl	1.59	1,104	239	3,168	220	2,923	194	2,572	25	332	35	464	230	3,050
12	TF Feed	1.62	1,126	182	2,466	97	1,317	84	1,140	30	412	35	473	249	3,368
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	1.62	1,126	62	838	112	1,517	92	1,239	25	332	34	456	240	3,246
22	Solids Contact and Aeration (w/RAS)	2.41	1,670	372	7,455	1,517	30,440	1,156	23,180	26	512	141	2,830	240	4,815
24	Secondary Clar Feed	2.41	1,670	346	6,938	1,497	30,020	1,136	22,780	28	552	141	2,830	240	4,816
28	Secondary Clar Underdrain	0.81	563	1,012	6,843	4,423	29,910	3,357	22,690	28	186	363	2,455	240	1,623
29	RAS	0.78	544	1,012	6,616	4,423	28,920	3,357	21,940	28	180	363	2,374	240	1,569
30	Secondary Clar Effl/Disinfection Feed	1.60	1,107	7	95	9	113	6	86	28	366	28	375	240	3,193
40	Discharge	1.60	1,107	7	95	9	113	6	86	28	366	28	375	254	3,379
52	WAS	0.03	19	1,012	226	4,423	989	3,357	750	28	6	363	81	240	54
53	WAS Thickener Feed	0.03	19	1,807	404	4,356	974	3,289	735	34	8	363	81	264	59
55	TWAS	0.00	2	10,820	278	36,000	925	27,180	698	34	1	2,753	71	264	7
56	Primary Solids	0.00	3	19,890	753	45,520	1,724	40,060	1,517	25	1	2,090	79	230	9
57	Digesters Feed	0.01	5	16,220	1,031	41,670	2,649	34,860	2,216	29	2	2,358	150	244	15
61	Digested Solids	0.01	5	7,251	461	22,500	1,430	15,680	997	1,310	83	2,358	150	4,817	306
63	Dewatering Feed	0.01	5	7,157	455	22,190	1,410	15,370	977	1,331	85	2,358	150	4,892	311
67	CAKE	0.00	1	54,200	403	180,000	1,340	124,700	928	1,331	10	9,663	72	4,892	36
71	GBT Return Stream	0.03	18	84	19	221	49	167	37	31	7	47	10	237	52
73	Centrate	0.01	7	411	32	895	71	620	49	947	75	989	78	3,483	275
75	Sum Return Flows	0.04	25	170	51	399	119	286	86	272	81	296	88	1,093	327

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-2. Detailed Breakdown of the 2020 Maximum Month Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	1.75	1,215	273	3,983	247	3,602	217	3,170	25	365	35	511	230	3,357
4	Primary Clar Feed	1.75	1,215	273	3,983	247	3,602	217	3,170	25	365	35	511	230	3,357
5	Primary Clar Effl	1.74	1,211	209	3,035	102	1,477	89	1,300	25	364	29	424	230	3,346
9	Primary Efffl	1.75	1,215	273	3,983	247	3,602	217	3,170	25	365	35	511	230	3,357
12	TF Feed	1.78	1,238	208	3,098	110	1,628	95	1,408	31	460	36	528	251	3,727
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	1.78	1,238	74	1,101	126	1,866	103	1,523	24	357	34	510	242	3,596
22	Solids Contact and Aeration (w/RAS)	2.65	1,838	472	10,430	1,919	42,350	1,469	32,430	25	552	172	3,794	242	5,339
24	Secondary Clar Feed	2.65	1,838	442	9,760	1,898	41,880	1,449	31,970	27	598	172	3,795	242	5,340
28	Secondary Clar Underdrain	0.89	619	1,294	9,619	5,619	41,760	4,289	31,870	27	201	456	3,389	242	1,798
29	RAS	0.86	600	1,294	9,325	5,619	40,480	4,289	30,900	27	195	456	3,285	242	1,742
30	Secondary Clar Effl/Disinfection Feed	1.76	1,219	10	141	9	124	6	95	27	397	28	406	242	3,542
40	Discharge	1.76	1,219	10	141	9	124	6	95	27	397	28	406	256	3,747
52	WAS	0.03	19	1,294	293	5,619	1,273	4,289	971	27	6	456	103	242	55
53	WAS Thickener Feed	0.03	19	2,160	489	5,532	1,253	4,203	952	36	8	456	103	273	62
55	TWAS	0.00	3	10,820	358	36,000	1,190	27,350	904	36	1	2,771	92	273	9
56	Primary Solids	0.01	4	20,300	948	45,520	2,125	40,060	1,870	25	1	1,869	87	230	11
57	Digesters Feed	0.01	7	16,370	1,306	41,570	3,316	34,790	2,774	29	2	2,243	179	248	20
61	Digested Solids	0.01	7	7,232	577	22,440	1,790	15,650	1,249	1,247	99	2,243	179	4,594	366
63	Dewatering Feed	0.01	7	7,138	569	22,130	1,764	15,340	1,223	1,267	101	2,243	179	4,665	372
67	CAKE	0.00	1	54,200	505	180,000	1,676	124,800	1,162	1,267	12	9,208	86	4,665	43
71	GBT Return Stream	0.03	18	105	23	290	63	220	48	32	7	54	12	244	53
73	Centrate	0.01	8	410	41	892	88	619	61	902	89	941	93	3,322	329
75	Sum Return Flows	0.04	26	201	63	479	151	345	109	305	96	333	105	1,210	381

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-3. Detailed Breakdown of the 2020 Maximum Day Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	2.07	1,435	322	5,547	269	4,629	236	4,073	25	431	35	603	230	3,965
4	Primary Clar Feed	2.07	1,435	322	5,547	269	4,629	236	4,073	25	431	35	603	230	3,965
5	Primary Clar Effl	2.06	1,430	246	4,227	111	1,898	97	1,670	25	430	29	500	230	3,951
9	Primary Efffl	2.07	1,435	322	5,547	269	4,629	236	4,073	25	431	35	603	230	3,965
12	TF Feed	2.10	1,459	246	4,310	120	2,101	104	1,817	32	552	36	634	253	4,428
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	2.10	1,459	90	1,572	144	2,513	118	2,059	23	407	35	613	244	4,279
22	Solids Contact and Aeration (w/RAS)	3.12	2,169	644	16,760	2,620	68,230	2,011	52,380	24	634	225	5,872	244	6,363
24	Secondary Clar Feed	3.12	2,169	607	15,820	2,597	67,630	1,988	51,790	27	693	225	5,872	244	6,363
28	Secondary Clar Underdrain	1.05	729	1,781	15,600	7,706	67,490	5,900	51,670	27	233	617	5,400	244	2,140
29	RAS	1.02	710	1,781	15,190	7,706	65,720	5,900	50,320	27	227	617	5,259	244	2,084
30	Secondary Clar Effl/Disinfection Feed	2.07	1,439	13	220	9	147	7	113	27	460	27	471	244	4,224
40	Discharge	2.07	1,439	13	220	9	147	7	113	27	460	27	471	258	4,466
52	WAS	0.03	19	1,781	408	7,706	1,765	5,900	1,351	27	6	617	141	244	56
53	WAS Thickener Feed	0.03	19	2,776	636	7,587	1,738	5,782	1,324	38	9	617	141	286	66
55	TWAS	0.01	4	10,820	496	36,000	1,651	27,430	1,258	38	2	2,782	128	286	13
56	Primary Solids	0.01	5	22,010	1,321	45,520	2,731	40,060	2,403	25	2	1,720	103	230	14
57	Digesters Feed	0.01	9	17,160	1,817	41,400	4,382	34,590	3,661	31	3	2,180	231	254	27
61	Digested Solids	0.01	9	7,212	763	22,370	2,368	15,560	1,647	1,213	128	2,180	231	4,475	474
63	Dewatering Feed	0.01	9	7,118	753	22,060	2,335	15,250	1,614	1,232	130	2,180	231	4,544	481
67	CAKE	0.00	1	54,200	668	180,000	2,218	124,500	1,534	1,232	15	8,966	111	4,544	56
71	GBT Return Stream	0.02	17	144	30	422	87	321	66	34	7	66	14	255	52
73	Centrate	0.02	11	409	54	889	117	615	81	878	115	916	120	3,236	425
75	Sum Return Flows	0.04	28	247	83	604	204	436	147	362	122	397	134	1,415	477

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-4. Detailed Breakdown of the 2020 Peak Wet Weather Flows per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	4.77	3,313												
4	Primary Clar Feed	4.77	3,313												
5	Primary Clar Effl	4.76	3,306												
9	Primary Efffl	4.77	3,313												
12	TF Feed	4.80	3,334												
13	TF By-Pass	0.00	0												
14	Solids Contact and Aeration (w/out RAS)	4.80	3,334												
22	Solids Contact and Aeration (w/RAS)	7.18	4,984												
24	Secondary Clar Feed	7.18	4,984												
28	Secondary Clar Underdrain	2.40	1,667												
29	RAS	2.38	1,650												
30	Secondary Clar Effl/Disinfection Feed	4.78	3,317												
40	Discharge	4.78	3,317												
52	WAS	0.03	17												
53	WAS Thickener Feed	0.03	17												
55	TWAS	0.01	4												
56	Primary Solids	0.01	7												
57	Digesters Feed	0.02	11												
61	Digested Solids	0.02	11												
63	Dewatering Feed	0.02	11												
67	CAKE	0.00	1												
71	GBT Return Stream	0.02	15												
73	Centrate	0.02	14												
75	Sum Return Flows	0.04	29												

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-5. Detailed Breakdown of the 2030 Average Annual Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	1.75	1,215	239	3,487	220	3,217	194	2,831	25	365	35	511	230	3,357
4	Primary Clar Feed	1.75	1,215	239	3,487	220	3,217	194	2,831	25	365	35	511	230	3,357
5	Primary Clar Effl	1.75	1,212	183	2,658	91	1,319	80	1,161	25	364	29	424	230	3,347
9	Primary Efffl	1.75	1,215	239	3,487	220	3,217	194	2,831	25	365	35	511	230	3,357
12	TF Feed	1.78	1,237	183	2,714	98	1,451	85	1,256	31	454	35	521	249	3,704
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	1.78	1,237	65	967	111	1,642	90	1,338	25	368	34	502	240	3,570
22	Solids Contact and Aeration (w/RAS)	2.65	1,837	415	9,161	1,687	37,220	1,291	28,490	26	566	155	3,415	240	5,300
24	Secondary Clar Feed	2.65	1,837	389	8,576	1,668	36,810	1,273	28,090	27	606	155	3,415	240	5,301
28	Secondary Clar Underdrain	0.89	619	1,137	8,449	4,938	36,680	3,769	28,000	27	204	404	3,004	240	1,785
29	RAS	0.86	600	1,137	8,194	4,938	35,580	3,769	27,150	27	198	404	2,913	240	1,730
30	Secondary Clar Effl/Disinfection Feed	1.76	1,219	9	127	9	124	6	95	27	402	28	412	240	3,516
40	Discharge	1.76	1,219	9	127	9	124	6	95	27	402	28	412	254	3,721
52	WAS	0.03	19	1,137	254	4,938	1,104	3,769	842	27	6	404	90	240	54
53	WAS Thickener Feed	0.03	19	1,959	438	4,862	1,087	3,693	825	35	8	404	90	267	60
55	TWAS	0.00	2	10,820	310	36,000	1,032	27,340	784	35	1	2,769	79	267	8
56	Primary Solids	0.00	3	19,890	829	45,520	1,898	40,060	1,670	25	1	2,090	87	230	10
57	Digesters Feed	0.01	6	16,190	1,139	41,640	2,930	34,880	2,454	29	2	2,367	167	245	17
61	Digested Solids	0.01	6	7,238	509	22,460	1,580	15,690	1,104	1,315	93	2,367	167	4,836	340
63	Dewatering Feed	0.01	6	7,143	503	22,140	1,558	15,380	1,082	1,336	94	2,367	167	4,911	346
67	CAKE	0.00	1	54,200	446	180,000	1,480	125,000	1,028	1,336	11	9,717	80	4,911	40
71	GBT Return Stream	0.03	18	93	20	250	54	190	41	31	7	50	11	240	52
73	Centrate	0.01	7	410	36	893	78	620	54	951	83	993	87	3,497	305
75	Sum Return Flows	0.04	25	184	56	434	132	313	95	295	90	321	98	1,173	357

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-6. Detailed Breakdown of the 2030 Maximum Month Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	1.93	1,340	304	4,892	240	3,868	212	3,404	25	402	35	563	230	3,702
4	Primary Clar Feed	1.93	1,340	304	4,892	240	3,868	212	3,404	25	402	35	563	230	3,702
5	Primary Clar Effl	1.92	1,336	232	3,728	99	1,586	87	1,396	25	401	29	467	230	3,691
9	Primary Efffl	1.93	1,340	304	4,892	240	3,868	212	3,404	25	402	35	563	230	3,702
12	TF Feed	1.96	1,363	232	3,800	108	1,760	93	1,521	31	511	36	588	252	4,123
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	1.96	1,363	83	1,358	134	2,200	111	1,810	24	386	35	567	243	3,982
22	Solids Contact and Aeration (w/RAS)	2.92	2,025	564	13,720	2,290	55,710	1,758	42,760	25	600	200	4,875	243	5,916
24	Secondary Clar Feed	2.92	2,025	530	12,900	2,268	55,180	1,736	42,230	27	653	201	4,876	243	5,917
28	Secondary Clar Underdrain	0.98	682	1,554	12,710	6,725	55,040	5,147	42,130	27	220	542	4,432	243	1,991
29	RAS	0.95	663	1,553	12,360	6,725	53,510	5,147	40,950	27	213	541	4,308	243	1,934
30	Secondary Clar Effl/Disinfection Feed	1.94	1,344	11	183	9	137	7	105	27	433	28	444	243	3,926
40	Discharge	1.94	1,344	11	183	9	137	7	105	27	433	28	444	257	4,152
52	WAS	0.03	19	1,553	354	6,725	1,533	5,147	1,173	27	6	541	123	243	55
53	WAS Thickener Feed	0.03	19	2,486	567	6,621	1,509	5,044	1,149	37	8	542	123	280	64
55	TWAS	0.00	3	10,820	431	36,000	1,434	27,420	1,092	37	1	2,779	111	280	11
56	Primary Solids	0.01	4	23,220	1,164	45,520	2,282	40,060	2,008	25	1	1,919	96	230	12
57	Digesters Feed	0.01	7	17,730	1,595	41,310	3,716	34,460	3,100	30	3	2,300	207	252	23
61	Digested Solids	0.01	7	7,205	648	22,350	2,010	15,510	1,395	1,279	115	2,300	207	4,709	424
63	Dewatering Feed	0.01	7	7,112	640	22,040	1,982	15,200	1,367	1,299	117	2,300	207	4,781	430
67	CAKE	0.00	1	54,200	567	180,000	1,883	124,100	1,299	1,299	14	9,473	99	4,781	50
71	GBT Return Stream	0.03	18	125	26	358	75	273	57	33	7	60	13	250	53
73	Centrate	0.01	9	409	46	888	99	613	68	925	103	965	108	3,405	380
75	Sum Return Flows	0.04	27	223	72	541	175	390	126	342	110	374	121	1,342	433

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-7. Detailed Breakdown of the 2030 Maximum Day Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	2.28	1,583	331	6,290	254	4,836	224	4,255	25	475	35	666	230	4,373
4	Primary Clar Feed	2.28	1,583	331	6,290	254	4,836	224	4,255	25	475	35	666	230	4,373
5	Primary Clar Effl	2.27	1,578	253	4,794	105	1,983	92	1,745	25	474	29	552	230	4,359
9	Primary Efffl	2.28	1,583	331	6,290	254	4,836	224	4,255	25	475	35	666	230	4,373
12	TF Feed	2.31	1,607	253	4,884	114	2,205	99	1,905	32	609	36	700	253	4,883
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	2.31	1,607	93	1,804	144	2,770	118	2,280	23	448	35	676	245	4,719
22	Solids Contact and Aeration (w/RAS)	3.44	2,391	716	20,570	2,918	83,770	2,244	64,440	24	699	249	7,142	245	7,022
24	Secondary Clar Feed	3.44	2,391	679	19,490	2,895	83,140	2,222	63,790	27	763	249	7,143	245	7,022
28	Secondary Clar Underdrain	1.16	803	1,992	19,220	8,601	82,970	6,600	63,670	27	256	687	6,623	245	2,359
29	RAS	1.13	784	1,992	18,760	8,601	81,010	6,600	62,160	27	250	687	6,466	245	2,303
30	Secondary Clar Effl/Disinfection Feed	2.29	1,588	14	270	9	162	7	124	27	507	27	519	245	4,663
40	Discharge	2.29	1,588	14	270	9	162	7	124	27	507	27	519	259	4,930
52	WAS	0.03	19	1,992	456	8,601	1,969	6,600	1,511	27	6	687	157	245	56
53	WAS Thickener Feed	0.03	19	3,041	696	8,469	1,939	6,468	1,481	40	9	687	157	292	67
55	TWAS	0.01	4	10,820	554	36,000	1,842	27,490	1,407	40	2	2,789	143	292	15
56	Primary Solids	0.01	5	23,880	1,497	45,520	2,853	40,060	2,511	25	2	1,815	114	230	14
57	Digesters Feed	0.01	9	18,010	2,050	41,240	4,695	34,410	3,918	32	4	2,253	257	258	29
61	Digested Solids	0.01	9	7,195	819	22,320	2,541	15,480	1,763	1,253	143	2,253	257	4,619	526
63	Dewatering Feed	0.01	9	7,102	809	22,010	2,505	15,180	1,728	1,273	145	2,253	257	4,690	534
67	CAKE	0.00	1	54,200	717	180,000	2,380	124,100	1,641	1,273	17	9,286	123	4,690	62
71	GBT Return Stream	0.02	17	163	33	483	97	369	74	35	7	72	14	258	52
73	Centrate	0.02	12	408	58	887	125	611	86	907	128	946	134	3,341	472
75	Sum Return Flows	0.04	28	264	90	650	222	469	160	395	135	433	148	1,532	524

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-8. Detailed Breakdown of the 2030 Peak Wet Weather Flows per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	5.26	3,653												
4	Primary Clar Feed	5.26	3,653												
5	Primary Clar Effl	5.25	3,645												
9	Primary Efffl	5.26	3,653												
12	TF Feed	5.29	3,675												
13	TF By-Pass	0.00	0												
14	Solids Contact and Aeration (w/out RAS)	5.29	3,675												
22	Solids Contact and Aeration (w/RAS)	7.91	5,495												
24	Secondary Clar Feed	7.91	5,495												
28	Secondary Clar Underdrain	2.65	1,837												
29	RAS	2.62	1,820												
30	Secondary Clar Effl/Disinfection Feed	5.27	3,657												
40	Discharge	5.27	3,657												
52	WAS	0.03	17												
53	WAS Thickener Feed	0.03	17												
55	TWAS	0.01	5												
56	Primary Solids	0.01	7												
57	Digesters Feed	0.02	12												
61	Digested Solids	0.02	12												
63	Dewatering Feed	0.02	12												
67	CAKE	0.00	1												
71	GBT Return Stream	0.02	15												
73	Centrate	0.02	15												
75	Sum Return Flows	0.04	30												

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-9. Detailed Breakdown of the 2040 Average Annual Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	1.88	1,306	239	3,746	220	3,456	194	3,041	25	392	35	549	230	3,606
4	Primary Clar Feed	1.88	1,306	239	3,746	220	3,456	194	3,041	25	392	35	549	230	3,606
5	Primary Clar Effl	1.88	1,302	183	2,855	91	1,417	80	1,247	25	391	29	455	230	3,596
9	Primary Efffl	1.88	1,306	239	3,746	220	3,456	194	3,041	25	392	35	549	230	3,606
12	TF Feed	1.91	1,328	183	2,915	98	1,559	85	1,349	31	487	35	560	249	3,976
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	1.91	1,328	66	1,054	110	1,754	90	1,429	25	396	34	539	240	3,831
22	Solids Contact and Aeration (w/RAS)	2.84	1,973	445	10,530	1,809	42,870	1,386	32,840	26	608	164	3,892	240	5,691
24	Secondary Clar Feed	2.84	1,973	418	9,898	1,791	42,430	1,368	32,420	27	651	164	3,892	240	5,692
28	Secondary Clar Underdrain	0.96	664	1,223	9,753	5,306	42,300	4,054	32,310	27	219	433	3,450	240	1,915
29	RAS	0.93	645	1,223	9,478	5,306	41,110	4,054	31,410	27	213	433	3,353	240	1,861
30	Secondary Clar Effl/Disinfection Feed	1.89	1,309	9	145	9	134	6	102	27	432	28	442	240	3,777
40	Discharge	1.89	1,309	9	145	9	134	6	102	27	432	28	442	254	3,997
52	WAS	0.03	19	1,223	273	5,306	1,185	4,054	905	27	6	433	97	240	54
53	WAS Thickener Feed	0.03	19	2,067	462	5,225	1,167	3,972	887	36	8	433	97	269	60
55	TWAS	0.00	3	10,820	333	36,000	1,108	27,370	843	36	1	2,773	85	269	8
56	Primary Solids	0.01	4	19,890	891	45,520	2,039	40,060	1,794	25	1	2,090	94	230	10
57	Digesters Feed	0.01	6	16,190	1,224	41,640	3,147	34,890	2,637	29	2	2,368	179	246	19
61	Digested Solids	0.01	6	7,236	547	22,450	1,697	15,700	1,187	1,316	99	2,368	179	4,838	366
63	Dewatering Feed	0.01	6	7,142	540	22,140	1,673	15,390	1,163	1,337	101	2,368	179	4,913	371
67	CAKE	0.00	1	54,200	479	180,000	1,589	125,100	1,105	1,337	12	9,723	86	4,913	43
71	GBT Return Stream	0.03	18	99	21	272	58	206	44	32	7	52	11	241	52
73	Centrate	0.01	8	410	38	893	84	620	58	952	89	993	93	3,499	328
75	Sum Return Flows	0.04	26	194	60	460	142	332	103	311	96	338	104	1,231	380

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-10. Detailed Breakdown of the 2040 Maximum Month Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	2.07	1,438	304	5,246	240	4,148	212	3,651	25	432	35	604	230	3,971
4	Primary Clar Feed	2.07	1,438	304	5,246	240	4,148	212	3,651	25	432	35	604	230	3,971
5	Primary Clar Effl	2.06	1,433	232	3,998	99	1,701	87	1,497	25	430	29	501	230	3,958
9	Primary Efffl	2.07	1,438	304	5,246	240	4,148	212	3,651	25	432	35	604	230	3,971
12	TF Feed	2.10	1,460	232	4,075	108	1,888	93	1,632	31	548	36	630	252	4,418
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	2.10	1,460	84	1,478	134	2,345	110	1,929	24	415	35	608	243	4,266
22	Solids Contact and Aeration (w/RAS)	3.13	2,171	603	15,720	2,452	63,950	1,884	49,120	25	644	213	5,557	243	6,344
24	Secondary Clar Feed	3.13	2,171	569	14,830	2,431	63,390	1,862	48,570	27	700	213	5,557	243	6,344
28	Secondary Clar Underdrain	1.05	730	1,668	14,630	7,213	63,250	5,526	48,450	27	235	579	5,081	243	2,133
29	RAS	1.02	711	1,668	14,250	7,213	61,600	5,526	47,200	27	229	579	4,949	243	2,078
30	Secondary Clar Effl/Disinfection Feed	2.08	1,441	12	209	9	147	7	113	27	465	28	476	243	4,211
40	Discharge	2.08	1,441	12	209	9	147	7	113	27	465	28	476	257	4,453
52	WAS	0.03	19	1,668	380	7,213	1,642	5,526	1,258	27	6	579	132	243	55
53	WAS Thickener Feed	0.03	19	2,631	599	7,102	1,617	5,415	1,233	38	9	579	132	283	64
55	TWAS	0.01	4	10,820	462	36,000	1,536	27,450	1,171	38	2	2,783	119	283	12
56	Primary Solids	0.01	4	23,220	1,248	45,520	2,448	40,060	2,154	25	1	1,919	103	230	12
57	Digesters Feed	0.01	8	17,730	1,710	41,310	3,984	34,480	3,325	31	3	2,301	222	253	24
61	Digested Solids	0.01	8	7,203	695	22,340	2,155	15,520	1,496	1,280	123	2,301	222	4,712	454
63	Dewatering Feed	0.01	8	7,110	686	22,030	2,125	15,210	1,466	1,300	125	2,301	222	4,785	461
67	CAKE	0.00	1	54,200	608	180,000	2,019	124,200	1,393	1,300	15	9,480	106	4,785	54
71	GBT Return Stream	0.02	17	135	28	389	81	297	62	34	7	63	13	252	52
73	Centrate	0.01	10	409	49	888	106	613	73	926	111	966	116	3,408	408
75	Sum Return Flows	0.04	27	235	77	571	187	412	135	360	118	393	129	1,405	460

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-11. Detailed Breakdown of the 2040 Maximum Day Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	2.44	1,694	331	6,732	254	5,175	224	4,554	25	509	35	712	230	4,680
4	Primary Clar Feed	2.44	1,694	331	6,732	254	5,175	224	4,554	25	509	35	712	230	4,680
5	Primary Clar Effl	2.43	1,689	253	5,130	105	2,122	92	1,867	25	507	29	591	230	4,665
9	Primary Efffl	2.44	1,694	331	6,732	254	5,175	224	4,554	25	509	35	712	230	4,680
12	TF Feed	2.47	1,718	253	5,226	114	2,359	99	2,039	32	651	36	749	253	5,221
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	2.47	1,718	95	1,959	143	2,945	118	2,423	23	481	35	723	245	5,045
22	Solids Contact and Aeration (w/RAS)	3.68	2,558	764	23,470	3,116	95,720	2,399	73,680	24	749	264	8,117	245	7,512
24	Secondary Clar Feed	3.68	2,558	726	22,310	3,095	95,060	2,377	73,010	27	816	264	8,117	245	7,512
28	Secondary Clar Underdrain	1.24	859	2,133	22,000	9,198	94,880	7,065	72,870	27	274	733	7,562	245	2,523
29	RAS	1.21	840	2,133	21,510	9,198	92,780	7,065	71,260	27	268	733	7,394	245	2,467
30	Secondary Clar Effl/Disinfection Feed	2.45	1,699	15	308	9	173	7	133	27	542	27	556	245	4,989
40	Discharge	2.45	1,699	15	308	9	173	7	133	27	542	27	556	259	5,275
52	WAS	0.03	19	2,133	488	9,198	2,105	7,065	1,616	27	6	733	168	245	56
53	WAS Thickener Feed	0.03	19	3,217	736	9,057	2,072	6,923	1,584	41	9	733	168	295	67
55	TWAS	0.01	5	10,820	592	36,000	1,969	27,520	1,505	41	2	2,793	153	295	16
56	Primary Solids	0.01	6	23,880	1,602	45,520	3,053	40,060	2,687	25	2	1,815	122	230	15
57	Digesters Feed	0.01	10	18,010	2,193	41,240	5,022	34,430	4,192	32	4	2,254	275	259	32
61	Digested Solids	0.01	10	7,193	876	22,310	2,716	15,490	1,886	1,254	153	2,254	275	4,622	563
63	Dewatering Feed	0.01	10	7,100	864	22,000	2,679	15,180	1,848	1,274	155	2,254	274	4,693	571
67	CAKE	0.00	1	54,200	766	180,000	2,545	124,200	1,756	1,274	18	9,292	131	4,693	66
71	GBT Return Stream	0.02	16	176	35	526	104	402	79	36	7	76	15	261	51
73	Centrate	0.02	13	408	62	886	134	612	92	908	137	947	143	3,343	505
75	Sum Return Flows	0.04	29	277	96	682	238	493	172	414	144	454	158	1,599	556

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-12. Detailed Breakdown of the 2040 Peak Wet Weather Flows per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	5.64	3,917												
4	Primary Clar Feed	5.64	3,917												
5	Primary Clar Effl	5.63	3,909												
9	Primary Efffl	5.64	3,917												
12	TF Feed	5.67	3,939												
13	TF By-Pass	0.00	0												
14	Solids Contact and Aeration (w/out RAS)	5.67	3,939												
22	Solids Contact and Aeration (w/RAS)	8.48	5,891												
24	Secondary Clar Feed	8.48	5,891												
28	Secondary Clar Underdrain	2.84	1,969												
29	RAS	2.81	1,952												
30	Secondary Clar Effl/Disinfection Feed	5.65	3,921												
40	Discharge	5.65	3,921												
52	WAS	0.03	17												
53	WAS Thickener Feed	0.03	17												
55	TWAS	0.01	5												
56	Primary Solids	0.01	8												
57	Digesters Feed	0.02	13												
61	Digested Solids	0.02	13												
63	Dewatering Feed	0.02	13												
67	CAKE	0.00	1												
71	GBT Return Stream	0.02	14												
73	Centrate	0.02	16												
75	Sum Return Flows	0.04	30												

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-13. Detailed Breakdown of the Buildout Average Annual Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	6.09	4,229	239	12,130	220	11,190	194	9,851	25	1,270	35	1,778	230	11,680
4	Primary Clar Feed	6.09	4,229	239	12,130	220	11,190	194	9,851	25	1,270	35	1,778	230	11,680
5	Primary Clar Effl	6.07	4,217	183	9,248	91	4,590	80	4,039	25	1,266	29	1,474	230	11,650
9	Primary Efffl	6.09	4,229	239	12,130	220	11,190	194	9,851	25	1,270	35	1,778	230	11,680
12	TF Feed	6.13	4,254	185	9,425	98	5,031	85	4,360	30	1,556	35	1,790	249	12,730
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	6.13	4,254	83	4,262	100	5,119	81	4,123	26	1,309	34	1,721	240	12,250
22	Solids Contact and Aeration (w/RAS)	9.16	6,363	1,316	100,600	5,489	419,400	4,231	323,300	26	2,008	449	34,340	240	18,320
24	Secondary Clar Feed	9.16	6,363	1,287	98,340	5,474	418,300	4,218	322,300	28	2,110	449	34,340	240	18,320
28	Secondary Clar Underdrain	3.06	2,127	3,803	97,150	16,360	417,900	12,610	322,000	28	705	1,288	32,900	240	6,125
29	RAS	3.04	2,109	3,803	96,310	16,360	414,300	12,610	319,200	28	699	1,288	32,620	240	6,072
30	Secondary Clar Effl/Disinfection Feed	6.10	4,236	23	1,191	9	432	7	333	28	1,404	28	1,438	240	12,200
40	Discharge	6.10	4,236	23	1,191	9	432	7	333	28	1,404	28	1,438	254	12,910
52	WAS	0.03	18	3,803	836	16,360	3,598	12,610	2,772	28	6	1,288	283	240	53
53	WAS Thickener Feed	0.03	18	5,332	1,173	16,110	3,542	12,350	2,717	53	12	1,288	283	330	73
55	TWAS	0.01	8	10,820	1,011	36,000	3,365	27,610	2,581	53	5	2,814	263	330	31
56	Primary Solids	0.02	12	19,890	2,886	45,520	6,605	40,060	5,812	25	4	2,090	303	230	33
57	Digesters Feed	0.03	20	16,330	3,897	41,790	9,970	35,180	8,393	36	9	2,374	566	269	64
61	Digested Solids	0.03	20	7,232	1,725	22,440	5,354	15,830	3,777	1,322	315	2,374	566	4,860	1,159
63	Dewatering Feed	0.03	20	7,137	1,703	22,120	5,278	15,510	3,701	1,343	320	2,374	566	4,935	1,177
67	CAKE	0.00	2	54,200	1,510	180,000	5,014	126,200	3,516	1,343	37	9,731	271	4,935	138
71	GBT Return Stream	0.02	12	375	56	1,193	177	915	136	45	7	137	20	281	42
73	Centrate	0.04	25	410	121	892	264	625	185	956	283	998	295	3,514	1,040
75	Sum Return Flows	0.05	37	398	177	993	441	722	321	652	290	710	316	2,434	1,081

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-14. Detailed Breakdown of the Buildout Maximum Month Annual Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	6.70	4,653	304	16,980	240	13,430	212	11,820	25	1,397	35	1,956	230	12,850
4	Primary Clar Feed	6.70	4,653	304	16,980	240	13,430	212	11,820	25	1,397	35	1,956	230	12,850
5	Primary Clar Effl	6.68	4,638	232	12,940	99	5,505	87	4,845	25	1,393	29	1,622	230	12,810
9	Primary Efffl	6.70	4,653	304	16,980	240	13,430	212	11,820	25	1,397	35	1,956	230	12,850
12	TF Feed	6.74	4,679	234	13,170	108	6,082	94	5,264	31	1,748	36	2,011	252	14,130
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	6.74	4,679	107	5,997	121	6,788	98	5,523	25	1,386	34	1,938	242	13,620
22	Solids Contact and Aeration (w/RAS)	10.08	7,000	1,773	149,100	7,383	620,700	5,707	479,800	25	2,139	596	50,120	242	20,380
24	Secondary Clar Feed	10.08	7,000	1,737	146,000	7,366	619,300	5,691	478,400	27	2,272	596	50,120	242	20,380
28	Secondary Clar Underdrain	3.37	2,340	5,134	144,200	22,020	618,800	17,010	478,100	27	760	1,728	48,570	242	6,812
29	RAS	3.34	2,321	5,134	143,100	22,020	613,900	17,010	474,200	27	753	1,728	48,180	242	6,758
30	Secondary Clar Effl/Disinfection Feed	6.71	4,661	31	1,758	9	476	7	368	27	1,513	28	1,550	242	13,570
40	Discharge	6.71	4,661	31	1,758	9	476	7	368	27	1,513	28	1,550	256	14,350
52	WAS	0.03	19	5,134	1,153	22,020	4,947	17,010	3,822	27	6	1,728	388	242	54
53	WAS Thickener Feed	0.03	19	7,005	1,573	21,680	4,871	16,670	3,745	61	14	1,728	388	364	82
55	TWAS	0.02	11	10,820	1,391	36,000	4,627	27,680	3,558	61	8	2,829	364	364	47
56	Primary Solids	0.02	14	23,220	4,041	45,520	7,922	40,060	6,972	25	4	1,919	334	230	40
57	Digesters Feed	0.04	25	17,950	5,431	41,480	12,550	34,800	10,530	40	12	2,306	698	287	87
61	Digested Solids	0.04	25	7,201	2,179	22,340	6,758	15,660	4,738	1,286	389	2,306	698	4,735	1,433
63	Dewatering Feed	0.04	25	7,107	2,150	22,020	6,663	15,350	4,643	1,307	395	2,306	698	4,808	1,455
67	CAKE	0.00	3	54,200	1,906	180,000	6,330	125,400	4,411	1,307	46	9,473	333	4,808	169
71	GBT Return Stream	0.01	10	632	75	2,054	244	1,579	187	49	6	207	25	295	35
73	Centrate	0.05	31	409	153	887	333	618	232	931	349	971	365	3,424	1,286
75	Sum Return Flows	0.06	41	462	228	1,167	577	849	419	719	355	788	389	2,673	1,321

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-15. Detailed Breakdown of the Buildout Maximum Day Annual Flows and Loads per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	7.92	5,500	331	21,850	254	16,800	224	14,780	25	1,651	35	2,312	230	15,190
4	Primary Clar Feed	7.92	5,500	331	21,850	254	16,800	224	14,780	25	1,651	35	2,312	230	15,190
5	Primary Clar Effl	7.89	5,482	253	16,650	105	6,887	92	6,060	25	1,646	29	1,917	230	15,140
9	Primary Efffl	7.92	5,500	331	21,850	254	16,800	224	14,780	25	1,651	35	2,312	230	15,190
12	TF Feed	7.96	5,528	255	16,940	115	7,613	99	6,589	31	2,080	36	2,393	252	16,750
13	TF By-Pass	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Solids Contact and Aeration (w/out RAS)	7.96	5,528	120	7,975	128	8,487	104	6,905	24	1,618	35	2,308	243	16,160
22	Solids Contact and Aeration (w/RAS)	11.91	8,274	2,226	221,100	9,279	922,000	7,179	713,400	25	2,502	743	73,840	243	24,180
24	Secondary Clar Feed	11.91	8,274	2,186	217,200	9,263	920,400	7,163	711,700	27	2,665	743	73,840	243	24,180
28	Secondary Clar Underdrain	3.98	2,764	6,465	214,600	27,710	919,800	21,430	711,300	27	890	2,169	72,020	243	8,079
29	RAS	3.95	2,745	6,465	213,200	27,710	913,500	21,430	706,400	27	884	2,169	71,530	243	8,024
30	Secondary Clar Effl/Disinfection Feed	7.93	5,510	39	2,597	9	562	7	435	27	1,775	27	1,818	243	16,100
40	Discharge	7.93	5,510	39	2,597	9	562	7	435	27	1,775	27	1,818	257	17,030
52	WAS	0.03	19	6,465	1,460	27,710	6,256	21,430	4,838	27	6	2,169	490	243	55
53	WAS Thickener Feed	0.03	19	8,684	1,961	27,280	6,159	21,000	4,741	70	16	2,169	490	396	89
55	TWAS	0.02	14	10,820	1,759	36,000	5,851	27,710	4,504	70	11	2,841	462	396	64
56	Primary Solids	0.03	18	23,880	5,199	45,520	9,910	40,060	8,721	25	5	1,815	395	230	50
57	Digesters Feed	0.05	32	18,300	6,958	41,450	15,760	34,780	13,230	44	17	2,253	857	301	115
61	Digested Solids	0.05	32	7,197	2,737	22,320	8,488	15,650	5,951	1,259	479	2,253	857	4,639	1,764
63	Dewatering Feed	0.05	32	7,103	2,701	22,010	8,368	15,340	5,832	1,279	486	2,253	857	4,710	1,791
67	CAKE	0.01	4	54,200	2,394	180,000	7,950	125,400	5,540	1,279	56	9,248	408	4,710	208
71	GBT Return Stream	0.01	7	1,091	94	3,588	308	2,762	237	51	4	328	28	292	25
73	Centrate	0.06	39	409	193	887	418	618	292	911	430	950	448	3,355	1,583
75	Sum Return Flows	0.07	46	514	286	1,302	726	948	529	779	434	854	477	2,883	1,608

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Table C-16. Detailed Breakdown of the Buildout Peak Wet Weather Flows per Unit Process

Line	Name	Flow		BOD		TSS		VSS		NH4		TKN		Alk	
		mgd	gpm	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d	mg/L	lb/d
1	Influent	18.27	12,690												
4	Primary Clar Feed	18.27	12,690												
5	Primary Clar Effl	18.23	12,660												
9	Primary Efffl	18.27	12,690												
12	TF Feed	18.31	12,720												
13	TF By-Pass	0.00	0												
14	Solids Contact and Aeration (w/out RAS)	18.31	12,720												
22	Solids Contact and Aeration (w/RAS)	27.44	19,060												
24	Secondary Clar Feed	27.44	19,060												
28	Secondary Clar Underdrain	9.16	6,358												
29	RAS	9.13	6,341												
30	Secondary Clar Effl/Disinfection Feed	18.29	12,700												
40	Discharge	18.29	12,700												
52	WAS	0.02	17												
53	WAS Thickener Feed	0.02	17												
55	TWAS	0.02	13												
56	Primary Solids	0.04	26												
57	Digesters Feed	0.06	39												
61	Digested Solids	0.06	39												
63	Dewatering Feed	0.06	39												
67	CAKE	0.01	5												
71	GBT Return Stream	0.01	6												
73	Centrate	0.07	48												
75	Sum Return Flows	0.08	53												

Mass Balance Notes

The flow and loadings above are daily average values.

For solids streams, the actual flows may be different if the unit performance does not meet the concentration limits. Bracket flows based on mass loading with accomodation for lower/higher concentrations. Instantaneous flow for solids streams is often intermittent and higher to match minimum pipe velocities and actual operating conditions. Adjust to match mass loading.

Appendix D

Cost Estimates

MGSD
Minden Gardnerville Sanitation District

HDR

Subject:	**Influent Pump No. 4**	Computed:	**AS**
Project:	**Minden Gardnerville Sanitation District - Wastewater Master Plan**	Date:	**3/25/22**
Task:	**Preliminary Construction Cost Estimate**	Reviewed:	**CAO**
Job No:	**00125-151595-028**	Date:	**3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$8,000		$8,000
				SUBTOTAL		**$8,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$20,000		$20,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$16,000		$16,000
				SUBTOTAL		**$36,000**
DIVISION 2 - SITE WORK						
	General Site Work	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 3 - CONCRETE						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 4 - MASONRY						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 5 - METALS						
	Pipe Supports	2	EA	$27,000		$54,000
	Misc Fabrications	1	LS	$7,500		$7,500
				SUBTOTAL		**$61,500**
DIVISION 6 - WOOD AND PLASTICS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$3,750		$3,750
				SUBTOTAL		**$3,750**
DIVISION 11 - EQUIPMENT						
	Influent Pump (5 mgd)	1	EA	$120,000	$30,000	$150,000
				SUBTOTAL		**$150,000**
DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$17,000		$17,000
				SUBTOTAL		**$17,000**

DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	18-inch RS Pipe	11	LF	$450		$4,950
	18-inch Fittings	2	EA	$3,000		$6,000
	18-inch Valves	1	EA	$22,500		$22,500
	16-inch RS Pipe	8	LF	$405		$3,240
	16-inch Fittings	3	EA	$2,700		$8,100
	16-inch Valves	2	EA	$20,250		$40,500
	12-inch RS Pipe	2	LF	$300		$600
	Connections to Existing Piping	1	EA	$7,500		$7,500
	Miscellaneous Piping	1	LS	$15,000		$15,000
				SUBTOTAL		**$108,390**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$51,000		$51,000
				SUBTOTAL		**$51,000**

Division Subtotal	(Rounded)	**$451,000**
Contractors Markup	8.5%	$38,000
Division Subtotal, including Markup		**$489,000**
Estimating and Bidding Contingencies at	30.0%	$147,000
Estimated Bid Construction Cost		**$636,000**
Construction Contingency at	5.0%	$32,000
District Design and Construction Period Costs at	2.5%	$16,000
Design Services Including Geotechnical and Surveying at	12.0%	$76,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$76,000
Other District Materials and Services at	2.0%	$13,000
Project Contingency at	5.0%	$32,000
Permitting at	0.5%	$3,000
TOTAL ESTIMATED PROJECT COST		**$884,000**

Subject:	**Primary Clarifier No. 4**
Project:	**Minden Gardnerville Sanitation District - Wastewater Master Plan**
Task:	**Preliminary Construction Cost Estimate**
Job No:	**00125-151595-028**

Computed:	**AS**
Date:	**3/25/22**
Reviewed:	**CAO**
Date:	**3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$55,000		$55,000
				SUBTOTAL		**$55,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$137,000		$137,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$110,000		$110,000
				SUBTOTAL		**$247,000**
DIVISION 2 - SITE WORK						
	Excavation	3,000	CY	$27		$81,000
	Backfill	700	CY	$39		$27,300
	Crushed Rock	50	CY	$53		$2,625
	Sheeting/Shoring	1,750	SF	$105		$183,750
	Site Dewatering	1	LS	$225,000		$225,000
	General Site Work	1	LS	$15,000		$15,000
				SUBTOTAL		**$534,675**
DIVISION 3 - CONCRETE						
	Clarifier Slab on Grade	120	CY	$1,350		$162,000
	Clarifier Wall	79	CY	$1,500		$118,500
	Launder Bottom	13	CY	$2,250		$29,250
	Launder Wall	9	CY	$2,250		$20,250
	Scum Box	1	LS	$75,000		$75,000
	Miscellaneous Concrete	1	LS	$15,000		$15,000
				SUBTOTAL		**$420,000**
DIVISION 4 - MASONRY						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 5 - METALS						
	Aluminum Cover	2,000	SF	$225		$450,000
	Misc Fabrications	1	LS	$15,000		$15,000
				SUBTOTAL		**$465,000**
DIVISION 6 - WOOD AND PLASTICS						
	Weirs and Scum Baffles	160	LF	$45		$7,200
				SUBTOTAL		**$7,200**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Access Hatches	35	EA	$7,500		$262,500
				SUBTOTAL		**$262,500**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$18,000		$18,000
				SUBTOTAL		**$18,000**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$4,500		$4,500
				SUBTOTAL		**$4,500**
DIVISION 11 - EQUIPMENT						
	Clarifier Mechanism	100	LF	$2,100		$210,000
	Sludge Pump	1	EA	$75,000	$18,750	$93,750
				SUBTOTAL		**$303,750**

DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$114,000		$114,000
				SUBTOTAL		**$114,000**
DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	6-inch PS Pipe (in Pumping Station)	55	LF	$105		$5,775
	6-inch Fittings	6	EA	$540		$3,240
	6-inch Valves	3	EA	$6,600	$1,650	$24,750
	6-inch PS Pipe (to Pumping Station)	50	LF	$105		$5,250
	6-inch SCM Pipe (to Pumping Station)	30	LF	$105		$3,150
	6-inch Fittings	2	EA	$540		$1,080
	16-inch FA Pipe	75	LF	$285		$21,375
	16-inch Fittings	5	EA	$2,700		$13,500
	18-inch RS Pipe (From Grit Removal)	110	LF	$315		$34,650
	18-inch Fittings	6	EA	$3,000		$18,000
	24-inch PE Pipe	75	LF	$435		$32,625
	24-inch Fittings	1	EA	$4,950		$4,950
	Pressure Relief Valves	4	EA	$9,000	$2,250	$45,000
	Connections to Existing Piping	5	EA	$7,500		$37,500
	Miscellaneous Piping	1	LS	$18,000		$18,000
				SUBTOTAL		**$268,845**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$343,000		$343,000
				SUBTOTAL		**$343,000**

Division Subtotal	(Rounded)	**$3,043,000**
Contractors Markup	8.5%	$259,000
Division Subtotal, including Markup		**$3,302,000**
Estimating and Bidding Contingencies at	30.0%	$991,000
Estimated Bid Construction Cost		**$4,293,000**
Construction Contingency at	5.0%	$215,000
District Design and Construction Period Costs at	2.5%	$107,000
Design Services Including Geotechnical and Surveying at	12.0%	$515,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$515,000
Other District Materials and Services at	2.0%	$86,000
Project Contingency at	5.0%	$215,000
Permitting at	0.5%	$21,000
TOTAL ESTIMATED PROJECT COST		**$5,967,000**

MGSD Minden Gardnerville Sanitation District

HDR

Subject:	**Solids Contact and Aeration Basin No. 4 and 5**	Computed:	**AS**
Project:	**Minden Gardnerville Sanitation District - Wastewater Master Plan**	Date:	**3/25/22**
Task:	**Preliminary Construction Cost Estimate**	Reviewed:	**CAO**
Job No:	**00125-151595-028**	Date:	**3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$7,000		$7,000
				SUBTOTAL		**$7,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$17,000		$17,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$14,000		$14,000
				SUBTOTAL		**$31,000**
DIVISION 2 - SITE WORK						
	General Site Work	1	LS	$9,000		$9,000
				SUBTOTAL		**$9,000**
DIVISION 3 - CONCRETE						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 4 - MASONRY						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 5 - METALS						
	Pipe Supports	12	EA	$3,300		$39,600
	Misc Fabrications	1	LS	$7,500		$7,500
				SUBTOTAL		**$47,100**
DIVISION 6 - WOOD AND PLASTICS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$3,750		$3,750
				SUBTOTAL		**$3,750**
DIVISION 11 - EQUIPMENT						
	Coarse Bubble Diffuser System	2	EA	$20,250	$5,063	$50,625
	Blowers	1	EA	$90,000	$22,500	$112,500
				SUBTOTAL		**$163,125**

DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$14,000		$14,000
				SUBTOTAL		**$14,000**
DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	6-inch Stainless Steel Air Pipe	32	LF	$150		$4,800
	6-inch Fittings	4	EA	$750		$3,000
	Connections to Existing Piping	2	EA	$7,500		$15,000
	Miscellaneous Piping	1	LS	$7,500		$7,500
	Stop Gates	4	EA	$4,500	$1,125	$22,500
				SUBTOTAL		**$52,800**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$42,000		$42,000
				SUBTOTAL		**$42,000**

Division Subtotal	(Rounded)	**$377,000**
Contractors Markup	8.5%	$32,000
Division Subtotal, including Markup		**$409,000**
Estimating and Bidding Contingencies at	30.0%	$123,000
Estimated Bid Construction Cost		**$532,000**
Construction Contingency at	5.0%	$27,000
District Design and Construction Period Costs at	2.5%	$13,000
Design Services Including Geotechnical and Surveying at	12.0%	$64,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$64,000
Other District Materials and Services at	2.0%	$11,000
Project Contingency at	5.0%	$27,000
Permitting at	0.5%	$3,000
TOTAL ESTIMATED PROJECT COST		**$741,000**

MGSD Minden Gardnerville Sanitation District

Subject:	**Solids Contact and Aeration Basin No. 6 through 9**	Computed:	**AS**
Project:	**Minden Gardnerville Sanitation District - Wastewater Master Plan**	Date:	**3/25/22**
Task:	**Preliminary Construction Cost Estimate**	Reviewed:	**CAO**
Job No:	**00125-151595-028**	Date:	**3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$42,000		$42,000
				SUBTOTAL		**$42,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$104,000		$104,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$83,000		$83,000
				SUBTOTAL		**$187,000**
DIVISION 2 - SITE WORK						
	Excavation	2,240	CY	$27		$60,480
	Backfill	1,120	CY	$39		$43,680
	Crushed Rock	80	CY	$53		$4,200
	Sheeting/Shoring	1,280	SF	$105		$134,400
	Site Dewatering	1	LS	$225,000		$225,000
	Cut Out Concrete	2	LS	$7,500		$15,000
	Remove Blowers	2	LS	$12,000		$24,000
	General Site Work	1	LS	$15,000		$15,000
				SUBTOTAL		**$521,760**
DIVISION 3 - CONCRETE						
	Slab on Grade	107	CY	$1,200		$128,640
	Walls	220	CY	$1,500		$330,000
	Baffle Walls	9	CY	$1,500		$13,500
	Cantilevered Walkway	20	CY	$1,500		$30,000
	Miscellaneous Concrete	1	LS	$15,000		$15,000
				SUBTOTAL		**$517,140**
DIVISION 4 - MASONRY						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 5 - METALS						
	Pipe Supports	24	EA	$3,300		$79,200
	Aluminum Guardrails	170	LF	$135		$22,950
	Checker Plate	308	SF	$60		$18,480
	Misc Fabrications	1	LS	$22,500		$22,500
				SUBTOTAL		**$143,130**
DIVISION 6 - WOOD AND PLASTICS						
	Influent Weirs	12	LF	$150		$1,800
				SUBTOTAL		**$1,800**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$22,500		$22,500
	Seal Concrete	1	LS	$15,000		$15,000
				SUBTOTAL		**$37,500**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 11 - EQUIPMENT						
	Coarse Bubble Diffuser System	4	EA	$20,250	$5,063	$101,250
	Blowers	2	EA	$90,000	$22,500	$225,000
				SUBTOTAL		**$326,250**

DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$87,000		$87,000
				SUBTOTAL		**$87,000**
DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	10-inch LPA	35	LF	$180		$6,300
	10-inch Fittings	5	EA	$1,170		$5,850
	6-inch Stainless Steel Air Pipe	126	LF	$150		$18,900
	6-inch Fittings	16	EA	$750		$12,000
	6-inch Air Control Valves	4	EA	$6,600	$1,650	$33,000
	Connections to Existing Piping	1	EA	$7,500		$7,500
	Miscellaneous Piping	1	LS	$7,500		$7,500
	Stop Gates	16	EA	$4,500	$1,125	$90,000
				SUBTOTAL		**$181,050**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$260,000		$260,000
				SUBTOTAL		**$260,000**

Division Subtotal	(Rounded)	**$2,312,000**
Contractors Markup	8.5%	$197,000
Division Subtotal, including Markup		**$2,509,000**
Estimating and Bidding Contingencies at	30.0%	$753,000
Estimated Bid Construction Cost		**$3,262,000**
Construction Contingency at	5.0%	$163,000
District Design and Construction Period Costs at	2.5%	$82,000
Design Services Including Geotechnical and Surveying at	12.0%	$391,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$391,000
Other District Materials and Services at	2.0%	$65,000
Project Contingency at	5.0%	$163,000
Permitting at	0.5%	$16,000
TOTAL ESTIMATED PROJECT COST		**$4,533,000**

MGSD Minden Gardnerville Sanitation District

HDR

Subject:	**Secondary Clarifier No. 4**	Computed:	**AS**
Project:	**Minden Gardnerville Sanitation District - Wastewater Master Plan**	Date:	**3/25/22**
Task:	**Preliminary Construction Cost Estimate**	Reviewed:	**CAO**
Job No:	**00125-151595-028**	Date:	**3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$59,000		$59,000
				SUBTOTAL		**$59,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$148,000		$148,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$118,000		$118,000
				SUBTOTAL		**$266,000**
DIVISION 2 - SITE WORK						
	Excavation	6,000	CY	$27		$162,000
	Backfill	1,500	CY	$39		$58,500
	Crushed Rock	150	CY	$53		$7,875
	Sheeting/Shoring	3,500	SF	$105		$367,500
	Site Dewatering	1	LS	$225,000		$225,000
	General Site Work	1	LS	$22,500		$22,500
				SUBTOTAL		**$843,375**
DIVISION 3 - CONCRETE						
	Clarifier Slab on Grade	250	CY	$1,350		$337,500
	Clarifier Wall	210	CY	$1,500		$315,000
	Launder Bottom	25	CY	$2,250		$56,250
	Launder Wall	10	CY	$2,250		$22,500
	Scum Box	1	LS	$75,000		$75,000
	Miscellaneous Concrete	1	LS	$30,000		$30,000
				SUBTOTAL		**$836,250**
DIVISION 4 - MASONRY						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 5 - METALS						
	Aluminum Guardrail - Bridge	125	LF	$135		$16,875
	Aluminum Guardrail - Clarifier	245	LF	$135		$33,075
	Aluminum Grating	12	SF	$60		$720
	Bridge	305	SF	$60		$18,300
	Misc Fabrications	1	LS	$15,000		$15,000
				SUBTOTAL		**$83,970**
DIVISION 6 - WOOD AND PLASTICS						
	Weirs and Scum Baffles	245	LF	$45		$11,025
				SUBTOTAL		**$11,025**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$37,500		$37,500
				SUBTOTAL		**$37,500**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$4,500		$4,500
				SUBTOTAL		**$4,500**
DIVISION 11 - EQUIPMENT						
	Clarifier Mechanism	156	LF	$2,250		$351,000
				SUBTOTAL		**$351,000**

DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$123,000		$123,000
				SUBTOTAL		**$123,000**
DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	3-inch NPW Pipe	140	LF	$53		$7,350
	3-inch Fittings	3	EA	$338		$1,013
	3-inch Valves	2	EA	$1,950	$488	$4,875
	8-inch CD Pipe	80	LF	$150		$12,000
	10-inch RAS Pipe	45	LF	$180		$8,100
	24-inch SCI Pipe (from Flow Split Structure)	130	LF	$435		$56,550
	24-inch Fittings	3	EA	$4,950		$14,850
	24-inch SCE Pipe (to Chlorine Contact Basin)	105	LF	$435		$45,675
	24-inch Fittings	1	EA	$4,950		$4,950
	Pressure Relief Valves	8	EA	$9,000	$2,250	$90,000
	Connections to Existing Piping	4	EA	$7,500		$30,000
	Miscellaneous Piping	1	LS	$22,500		$22,500
				SUBTOTAL		**$297,863**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$370,000		$370,000
				SUBTOTAL		**$370,000**

Division Subtotal	(Rounded)	**$3,283,000**
Contractors Markup	8.5%	$279,000
Division Subtotal, including Markup		**$3,562,000**
Estimating and Bidding Contingencies at	30.0%	$1,069,000
Estimated Bid Construction Cost		**$4,631,000**
Construction Contingency at	5.0%	$232,000
District Design and Construction Period Costs at	2.5%	$116,000
Design Services Including Geotechnical and Surveying at	12.0%	$556,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$556,000
Other District Materials and Services at	2.0%	$93,000
Project Contingency at	5.0%	$232,000
Permitting at	0.5%	$23,000
TOTAL ESTIMATED PROJECT COST		**$6,439,000**

MGSD Minden Gardnerville Sanitation District

HDR

Subject:	**RAS Pumping**	Computed:	**AS**
Project:	**Minden Gardnerville Sanitation District - Wastewater Master Plan**	Date:	**3/25/22**
Task:	**Preliminary Construction Cost Estimate**	Reviewed:	**CAO**
Job No:	**00125-151595-028**	Date:	**3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$14,000		$14,000
				SUBTOTAL		**$14,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$35,000		$35,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$28,000		$28,000
				SUBTOTAL		**$63,000**
DIVISION 2 - SITE WORK						
	Remove Existing Pumps	2	EA	$12,000		$24,000
	General Site Work	1	LS	$7,500		$7,500
				SUBTOTAL		**$31,500**
DIVISION 3 - CONCRETE						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 4 - MASONRY						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 5 - METALS						
	Misc Fabrications	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 6 - WOOD AND PLASTICS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$3,750		$3,750
				SUBTOTAL		**$3,750**
DIVISION 11 - EQUIPMENT						
	RAS Pump (640 gpm)	1	EA	$195,000	$48,750	$243,750
	RAS Pump (240 gpm)	2	EA	$105,000	$26,250	$262,500
				SUBTOTAL		**$506,250**
DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$30,000		$30,000
				SUBTOTAL		**$30,000**

DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	6-inch Pipe	6	LF	$105		$630
	6-inch Fittings	2	EA	$540		$1,080
	6-inch Valves	3	EA	$6,600	$1,650	$24,750
	Miscellaneous Piping	1	LS	$7,500		$7,500
				SUBTOTAL		**$33,960**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$89,000		$89,000
				SUBTOTAL		**$89,000**

Division Subtotal	(Rounded)	**$786,000**
Contractors Markup	8.5%	$67,000
Division Subtotal, including Markup		**$853,000**
Estimating and Bidding Contingencies at	30.0%	$256,000
Estimated Bid Construction Cost		**$1,109,000**
Construction Contingency at	5.0%	$55,000
District Design and Construction Period Costs at	2.5%	$28,000
Design Services Including Geotechnical and Surveying at	12.0%	$133,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$133,000
Other District Materials and Services at	2.0%	$22,000
Project Contingency at	5.0%	$55,000
Permitting at	0.5%	$6,000
TOTAL ESTIMATED PROJECT COST		**$1,541,000**

Subject: **Sludge Thickening**
Project: **Minden Gardnerville Sanitation District - Wastewater Master Plan**
Task: **Preliminary Construction Cost Estimate**
Job No: **00125-151595-028**

Computed: **AS**
Date: **3/25/22**
Reviewed: **CAO**
Date: **3/28/22**

SPEC SECTION AND DESCRIPTION		QUANTITY	UNITS	UNIT COST	INSTALL	TOTAL COST
DIVISION 0 - BIDDING REQUIREMENTS, ETC.						
	Bonds and Insurance (2.0% of Divs 2 thru 16)	1	LS	$25,000		$25,000
				SUBTOTAL		**$25,000**
DIVISION 1 - GENERAL REQUIREMENTS						
	Job Overhead and Standby Equipment (5.0% of Divs 2 thru 16)	1	LS	$62,000		$62,000
	Supervision (4.0% of Divs 2 thru 16)	1	LS	$49,000		$49,000
				SUBTOTAL		**$111,000**
DIVISION 2 - SITE WORK						
	Excavation	100	CY	$27		$2,700
	Backfill	50	CY	$39		$1,950
	Crushed Rock	22	CY	$53		$1,155
	Site Dewatering	1	LS	$75,000		$75,000
	General Site Work	1	LS	$15,000		$15,000
				SUBTOTAL		**$95,805**
DIVISION 3 - CONCRETE						
	Slab on Grade	25	CY	$1,350		$33,750
	Equipment Pad	8	CY	$1,350		$10,800
	Miscellaneous Concrete	1	LS	$7,500		$7,500
				SUBTOTAL		**$52,050**
DIVISION 4 - MASONRY						
	Masonry Building	600	SF	$450		$270,000
				SUBTOTAL		**$270,000**
DIVISION 5 - METALS						
	Aluminum Grating	220	SF	$60		$13,200
	Misc Fabrications	1	LS	$15,000		$15,000
				SUBTOTAL		**$28,200**
DIVISION 6 - WOOD AND PLASTICS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 7 - THERMAL & MOISTURE PROTECTION						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 8 - DOORS & WINDOWS						
	Roll Up Door	1	EA	$8,700		$8,700
	Single Door	1	EA	$3,000		$3,000
				SUBTOTAL		**$11,700**
DIVISION 9 - FINISHES						
	Coatings	1	LS	$18,000		$18,000
				SUBTOTAL		**$18,000**
DIVISION 10 - SPECIALTIES						
	Miscellaneous Signage	1	LS	$7,500		$7,500
				SUBTOTAL		**$7,500**
DIVISION 11 - EQUIPMENT						
	Gravity Belt Thickener	1	EA	$300,000	$75,000	$375,000
	Sludge Pump	1	EA	$75,000	$18,750	$93,750
				SUBTOTAL		**$468,750**
DIVISION 12 - FURNISHINGS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**

DIVISION 13 - SPECIAL CONSTRUCTION						
	Instrumentation and Controls @ 5%	1	LS	$51,000		$51,000
				SUBTOTAL		**$51,000**
DIVISION 14 - CONVEYING SYSTEMS						
	Not Used		-	$0		$0
				SUBTOTAL		**$0**
DIVISION 15 - MECHANICAL						
	6-inch RAS Pipe (to GBT)	170	LF	$105		$17,850
	6-inch Fittings	7	EA	$540		$3,780
	6-inch TWAS (to Digester Control Bldg)	16	LF	$105		$1,680
	6-inch Fittings	2	EA	$540		$1,080
	6-inch Valves	2	EA	$6,600	$1,650	$16,500
	Connections to Existing Piping	2	EA	$7,500		$15,000
	Miscellaneous Piping	1	LS	$18,000		$18,000
				SUBTOTAL		**$73,890**
DIVISION 16 - ELECTRICAL						
	Allowance for electrical @ 15%	1	LS	$154,000		$154,000
				SUBTOTAL		**$154,000**

Division Subtotal	(Rounded)	**$1,367,000**
Contractors Markup	8.5%	$116,000
Division Subtotal, including Markup		**$1,483,000**
Estimating and Bidding Contingencies at	30.0%	$445,000
Estimated Bid Construction Cost		**$1,928,000**
Construction Contingency at	5.0%	$96,000
District Design and Construction Period Costs at	2.5%	$48,000
Design Services Including Geotechnical and Surveying at	12.0%	$231,000
Construction Management and Maintenance Manuals and Drawings at	12.0%	$231,000
Other District Materials and Services at	2.0%	$39,000
Project Contingency at	5.0%	$96,000
Permitting at	0.5%	$10,000
TOTAL ESTIMATED PROJECT COST		**$2,679,000**

Appendix E

Condition Assessment Report

Minden-Gardnerville Sanitation District

Condition Assessment Report

June 14, 2022

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1.0 General

1.1 Objective

Minden Gardnerville Sanitation District (MGSD or "District") retained the services of HDR Engineering, Inc. (HDR) to complete a condition assessment of the aging infrastructure at the wastewater treatment plant located at 790 US-395, Minden, NV 89423. The objective of the condition assessment is to describe and document the condition of existing process equipment and infrastructure at the treatment plant based on visual inspections and interviews held with operations and maintenance (O&M) staff during HDR's site visits. This effort also includes estimates of schedules and "opinion of probable construction costs" (OPCC) for the rehabilitation or replacement of the relevant infrastructure.

1.2 Terminology Related to Replacement Schedule

This report includes discussion on recommended replacement schedules. The replacement schedules of the infrastructure is organized into four different groups. Assets identified to be replaced in the "immediate-term" or "immediately" should be considered for replacement within the next five years, those labeled "near-term" in 5 to 10 years, those labeled "long-term" in 10 to 15 years, and those labeled "future" after 20 years.

1.3 Approach

Equipment and infrastructure at the treatment plant was evaluated during site visits conducted on July 29 and November 1, 2021. The HDR team met with staff at the treatment plant to discuss equipment history, condition, age, maintenance practices and issues as well as equipment preferences for future upgrades. The following sections begin with a description of the treatment process and its importance, followed by the condition of the process equipment and infrastructure. The report primarily, although not solely, focuses on obsolescent process equipment and infrastructure that require rehabilitation or replacement within the next 10 to 15 years. The recommended improvements and timeframes are summarized in Table 1 of Section 16.

2.0 Influent Screening and Pumping Station

Raw sewage (RS) from the collection system flows by gravity to the front-end of the wastewater treatment plant (WWTP). The RS flows through various manholes, within the WWTP fence line, prior to entering the influent screening and pumping station building. This building houses two bar screens, an odor scrubber, washer compactors, and influent pumps along with related electrical and control equipment. The two 0.5-inch bar screens remove screenings from the raw sewage stream. Screenings from the bar screens are directly conveyed to the washer compactors, which wash and compress the screenings in preparation for disposal at the local landfill. After screenings removal, the process stream is pumped to the grit removal treatment stage via three influent pumps (two duty and one standby).

Overall, the equipment in the influent screening and pumping station was found to be, with a few exceptions, in fair condition and with only moderate corrosion. The bar screens and washer-compactors are about 25 years old and are approaching the end of their useful life (and should be replaced in the near-term). The plant staff have proactively maintained and replaced major parts, such as bearings and sprockets, to maintain optimal functionality. However, on the bar screen, the bars and rakes require frequent repairs due to damage sustained from large debris in the RS stream and may require a complete replacement or retrofit in the near-term. The washer-compactors are not reliable and occasionally break down. The following issues related to the washer-compactors require frequent attention according to plant staff:

1. The washer-compactor does not always start on time, causing unit process malfunction. The washer-compactor's programmable logic controller (PLC) will require further troubleshooting to identify the root cause of this issue. This may ultimately be resolved with the replacement of the equipment.
2. Screenings fall out of the washing compartment because of its limited volume capacity.
3. The "washed" screenings look brown, instead of grayish, indicating the presence of fecal matter due to ineffective washing.

The washer-compactors should be replaced in the immediate future. It is common industry practice to replace the screens and washer-compactors at the same time to avoid challenges related to incompatibility between the two, often packaged pieces of equipment.

In general, the influent pumping room is in good condition. The equipment in this room, which includes an overhead crane, three centrifugal pumps, and related electrical equipment are all in good working condition. However, the air relief valves (ARVs) currently in use at the pumps are not designed for sewage; therefore, they occasionally clog and malfunction. All three ARVs should be replaced in the immediate-term. The ISCO automatic raw sewage sampler's refrigeration unit is no longer functional and needs to be replaced in the immediate-term.

Some of the underground concrete manholes, upstream of the influent screening and pumping station building, show signs of moderate to significant deterioration, such as exposed aggregate, due to presence of highly concentrated H_2S gas generated from the RS stream. These structures require protective coatings such as plastic liners or polyurethane coatings to prevent further deterioration in the near-term.

Overall, the exposed/visible portions of the building appear to be in good condition. There are visible hairline cracks in the floor that should be sealed. The hollow metal doors and the locking mechanisms show signs of moderate deterioration and distress, because the latch sets do not completely latch, and the deadbolts do not engage the strikers without the use of unusual pressure. It is recommended that the hollow metal doors and related hardware be reconditioned or replaced in the near-term. The buried, submerged, and operational portions of the structure, such as RS channels and wet wells, were not accessible, and therefore, not inspected. The overall HVAC and odor control system appeared to be in good condition.

3.0 Electrical Building

This electrical building is located on the southwest side of the influent screening and pumping station. This building houses the main electrical service switchboard and 600 kw diesel powered standby generator which provides power to the rest of the plant and the influent screening and pumping. The standby generator automatically provides power to the plant in the event of a utility power outage. The following major electrical equipment is housed in the Electrical Building:

1. Main Service Switchboard, SWBD-1.
2. Motor Control Center, MCC-1.

3. Three Variable Frequency Drives (VFD), for raw sewage pumps, with space for a fourth VFD.
   a. RSP-1 VFD.
   b. RSP-2 VFD.
   c. RSP-4 VFD.
4. Panel Board, PB-2
5. Remote Terminal Unit, RTU-1

The standby generator was installed in 1997, is in good working condition, and has only 313 hours of run time. Although standby generators, such as this one, are satisfactory for up to at least 10,000 hours of run time, they typically seldom exceed 1,000 hours of run time and are typically replaced for obsolescence rather than significant run time. Therefore, staff should plan to replace the standby generator in the long-term. The plant staff recently replaced a defective louver in the generator room to maintain all appurtenances in good working condition. The plant staff mentioned that the RSP VFDs do not restart automatically after a power outage and this should be correctable in the near term by readjusting the configuration settings in the VFDs. The rest of the electrical equipment in the Electrical Building should not need replacement until the future term unless loads increase dramatically.

4.0 Grit Removal and Dewatering Building

4.1 Grit Removal Facility

After screenings removal is performed in the influent screening and pumping station, the RS stream is pumped into the grit removal facility. This facility removes grit from the RS stream via a mechanically induced "forced vortex" system. This facility utilizes two Pista Grit Chamber forced vortex units (FVU) manufactured by Smith & Loveless, Inc., which are designed to operate in a one duty, one standby arrangement. The grit is collected in a sump and pumped to the grit dewatering building. Currently, there are two operational grit pumps, with space for a future third pump, located at the bottom (underground) level of the grit structure. Generally, one pump is sufficient for grit pumping. The pumps are in good condition.

One of the FVUs was installed in 2002, while the other was installed by plant staff in 2021. Due to the abrasive nature of grit present in the RS stream, the 19-year-old FVU is fast approaching the end of its useful life. It is recommended that a comprehensive retrofit or replacement be considered in the immediate future to maintain redundancy. Furthermore, given the plant staff's reliance on the newer FVU, a third grit pump should be installed in the near-term for redundancy as originally planned. When utilizing the new FVU, due to existing piping arrangement limitations, the RS only supplies the grit to one grit pump. Therefore, the third grit pump would provide redundancy when utilizing the new FVU and improve the resilience of the overall grit removal process.

In general, the exposed/visible section of the concrete structure appears to be in good condition with only minor defects. The concrete wall of the underground grit pump room structure has developed cracks, therefore, when the groundwater level is high there is visible seepage into the room. Concrete crack repair is recommended in the near-term to address this nuisance seepage. In addition, the hollow metal door and the locking mechanism show signs of moderate deterioration and distress and because the latch set does not completely latch, the deadbolt does not engage the strike without the use of unusual pressure. It is recommended that the hollow metal door and related hardware be reconditioned or replaced in the near-term. The buried, submerged, and operational portions of the structure, such as RS channels and wet wells, were not accessible, and therefore, not inspected. It is recommended that the staff conduct an inspection of these items when the process unit is brought offline.

4.2 Grit Dewatering Building

The grit stream generated by the grit removal facility is pumped to the grit dewatering building, where a TeaCup®, manufactured by Eutek, is used for washing and dewatering the grit. The washed and dewatered grit stream is then discharged into a portable decanter bin for further dewatering. The de-gritted stream is conveyed back to the influent side of the grit removal system.

Despite being almost 30 years old, the TeaCup®, with stainless steel construction, appears to be in good working condition. It is an all-hydraulic system, free vortex design, which requires minimal mechanical or electrical systems for effectiveness. However, because the equipment was operational during our in-field assessment, the inside of the TeaCup® was not inspected.

It is recommended that plant staff monitor the condition of this equipment and consider replacement in the long-term. More importantly, the decanter bin displays significant deterioration, mainly from long-term exposure to corrosive liquids and gases. Staff should consider its replacement in the immediate-term. Furthermore, due to the presence of corrosive gases in this building, there is visible corrosion on other miscellaneous mechanical and electrical components. The corrosion is occurring in spite of the operational odor control system, which is intended to provide regular air exchanges to dilute and minimize the concentration of corrosive gases in the building. It is recommended that the performance of the odor control system be evaluated in the immediate-term. Based on the evaluation, potential necessary adjustments, such as air balancing, air distribution, or increased airflow should be implemented to optimize the performance of the odor control system.

5.0 Primary Clarifiers and Primary Sludge Pumping Stations

5.1 Primary Clarifiers No. 1, 2, and 3

The de-gritted RS stream is gravity fed to primary clarifiers (PC) No. 1, 2, and 3 through an outlet box, which is also known as the “primary flow splitter structure,” on the effluent side of the grit removal facility. The PCs remove settleable and floatable materials, which are heavier or lighter than water, from the raw sewage stream. The settleable material is called primary sludge, while the floatable material is called primary scum. The primary sludge and scum are collected by clarifier mechanisms.

The primary clarifier mechanisms for PC No. 1 and No. 3 were supplied by WesTech in 2002; while the third mechanism, for PC No. 2, was supplied by Eimco (now Ovivo) in 1987. The mechanisms for PC No. 1 and No. 3 are in good working condition, but the coatings on the steel show moderate deterioration. It is recommended that mechanism’s protective coatings for PC No. 1 and PC No. 3 be reconditioned in the near-term to extend their useful life.

Although fully submerged and operational during the time of inspection, the PC No. 2 mechanism displayed significant deterioration on the visible portions of the coated steel mechanism. Furthermore, the mechanism utilizes an outdated Ovivo unitized right angle drive and motor. When failure occurs for this drive, spare parts or replacement of this type of drive have been difficult, if not impossible to source and will cause delays in getting the equipment back in operation. Therefore, a full replacement of the PC No. 2 mechanism should be considered in the near-term. Additionally, although not critical, the high pressure sodium (HPS) lighting at PC No. 3, could be converted to LED for higher efficiency as convenient.

There is visible concrete degradation in parts of the concrete structures of PC No. 1, PC No. 2, and the related flow splitter box. Although PC No. 1 and No. 2 were operational during the time of the inspection the "launder" covers were opened and exposed aggregate was visible on the back wall of the concrete launders. It is hypothesized that the concrete degradation is limited to the "covered" launder because of the presence and accumulation of high concentrations of corrosive H_2S gas. It is recommended that the concrete launders be rehabilitated in the near term with grouting and protective paint coating at the same time as the reconditioning of the PC mechanisms. The concrete in PC No. 3 is coated and appears to be in good condition.

5.2 Primary Sludge Pumping Stations No. 1 and 2

Primary sludge and scum are pumped by the primary sludge pumping stations (PSPS) No. 1 and No. 2 to the Digester Control building. PSPS No. 1 serves PCs No. 1 and No. 2, while PSPS No. 2 serves PC No. 3. Both pumping stations house progressive cavity pumps for sludge and scum pumping. The pumps are connected to common headers that are configured with manual valves to provide backup pumping capability if a pump is down for maintenance. In addition to primary sludge pumping equipment, both PSPSs also house motor control centers.

Plant staff mentioned that all the pumps in PSPS No.1 have been recently replaced and are in good working condition. All valves are regularly maintained and are also in good working condition. The HVAC equipment in the pumping station was replaced approximately two years ago and is in good working condition. The sump pumps are the original pumps and appear to be in good working condition. Therefore, it is recommended that the plant staff continue regular maintenance on all the pumps and related appurtenances and replace as required in the future.

PSPS No. 2 houses one sludge and one progressive cavity scum pump, which are approximately 18 years old. Both have exceeded the end of their useful life (typically estimated to be 8 to 16 years), therefore it is recommended that they be replaced in the near-term. There is space for a redundant sludge pump, which, if installed, as desired by the plant staff, would provide redundancy to improve operational resiliency.

In general, as far as electrical items in PSPS No. 1 are concerned, they are old but in good working condition. Some conduits have rust showing, but nothing unserviceable. Lighting could be upgraded to LED as convenient, but the existing fixtures are serviceable and not critical to operation. The emergency lighting should be checked for proper operation and replaced if necessary. The Klockner-Moeller motor control center (MCC) is in good operating condition but should be upgraded to a more modern MCC in the short-term. As far as electrical equipment in PSPS No. 2, the Cutler Hammer Freedom Series 2100 MCC is in very good condition and can be considered for replacement in the long-term.

6.0 Odor Control Bed (Biofilter)

Foul air is collected from the "headspaces" of some preliminary and most primary treatment stages, which are high in H_2S concentration, and is conveyed, via a network of FRP ductwork, to the odor control bed. The odor control bed, also referred to as the "Biofilter" or "compost" bed removes odor causing compounds present in the foul air via an adsorption process. The foul air is injected at the bottom of the 42-inch bed and flows up through the adsorption media bed. As the foul air flows up, the odor causing compounds adsorb onto the media, thereby transferring the unwanted compounds from the air to the solid media. Over time, estimated to be five to six years at MGSD, this media becomes saturated and ineffective and requires replacement.

In general, the visible/exposed portions of the odor control bed appear to be in excellent condition. Per plant staff, the media has not been replaced in five or six years; therefore, it is recommended that the media be replaced in the immediate-term or as needed to maintain effective foul air treatment. The foul air supply fan appeared to be in working order; however, the 21-year-old fan has exceeded the end of its useful life, commonly estimated to be 15 to 20 years. Staff should prepare to replace it in the near-term. The FRP ductwork, at least the portions that are exposed/above-ground, appear to be in good condition. Given that the FRP rapidly deteriorates when exposed to sunlight, it is recommended that the protective FRP coatings be reconditioned in the near-term to maintain effective UV protection.

As previously mentioned, the odor control bed treats foul air from some preliminary and most primary treatment processes. Because of the expansive nature of the collection network, it is critical that the collection points be precisely “air-balanced” via dampers to effectively “pull” the requisite amount of foul air from a given headspace without causing uneven or unbalanced airflow collection.

If the dampers are adjusted without engaging an expert air-balancing vendor, this may render the collection system somewhat ineffective. Some of the process areas, such as the grit dewatering building, currently experience higher H_2S levels, potentially because of the system being un-balanced and the foul air collection system not pulling enough foul air out of this building. This may be the case in several other processes. Therefore, it is recommended that the District engage an air-balancing and testing vendor to optimize foul air collection in the near-term or at least in the immediate-term, to optimize balanced foul air collection and reduce corrosion and odors.

7.0 Trickling Filters and Trickling Filter Pump Station Building

Primary clarifier effluent stream is pumped from trickling filter pump station (TFPS) No. 2, which houses three 45 horsepower (HP), constant speed, submersible pumps, up to trickling filters No. 1 and No. 2, where it is distributed onto the filter media. TFPS No. 2 is also used to recirculate the trickling filter effluent, as necessary. TFPS No. 1 has been decommissioned and is no longer in-use. The trickling filters provide biological treatment of primary clarifier effluent to reduce BOD_5 concentrations and other biodegradable compounds. The filters provide an optimal environment for the growth of a select, but diverse, microbial population on the plastic media. Soluble, oxidizable material removed in the trickling filters is converted to particulate settable matter, which is mostly comprised of microbes. Typically, the trickling filter effluent stream contains a large amount of biomass, which sloughs from the media.

Overall, both trickling filters are in good working condition. It is not known when trickling filter No. 1 was commissioned, but trickling filter No. 2 was commissioned in 1997. Over time, the plant staff modified the water jets on the arms so that the water is now propelled hydraulically, and the electrical drives were decomissioned, which saves energy costs. By all plant staff accounts, this conversion has proven to be very effective and virtually problem-free and has eliminated the need to replace the rotary mechanism drives.

The trickling filter media was not visible; however, it may be approaching the end of its useful life, which is estimated to be between 20 to 25 years. Therefore, it is recommended that the trickling filter media be replaced in the near-term. Additionally, the plant staff discussed, at length, the issues stemming from accumulation of snails in the plant infrastructure. The snail problem should be further evaluated and addressed in the near-term.

The overall structure and process equipment for TFPS No. 2, which was built in 2008, are in good condition. The existing constant speed submersible pumps should be set up in the near-term to operate from variable frequency drives (VFDs). The existing modulating valve could be left wide open and the pump speed could be modulated with the VFDs to control recirculation flow. This modification would make the recirculation system operate more efficiently and would save electrical energy, not to mention simplify the overall recirculation arrangement. The pump manufacturer should be consulted to make sure the motors are suitable for VFD operation. The valve vault, situated next to the TFPS No. 2 wet well, needs a means to remove stormwater, such as sump pumps or some other method. This upgrade should be implemented in the near-to-long term. TFPS No. 2 wet well requires a method of agitating the process liquids in the wet well. Without agitation the wet well collects floatable biomass on top of the liquid which must be manually removed by plant staff. This upgrade should be implemented in the near-term.

TFPS No.1 houses three old vertical turbine pumps that are no longer in-use because they have been replaced by TFPS No. 2. This building houses a critical 18-inch motor operated butterfly valve (MOV), which controls the trickling filter return flow. The plant staff has had to temporarily shut down the trickling filter process to service this valve, which adversely impacts the treatment plant effluent quality. Therefore, it is recommended that the piping arrangement around the MOV be modified in the near-term to allow bypassing. This would eliminate the need for a system shutdown during periodic maintenance.

8.0 Solids Contact Aeration Basin and Blower Building

The trickling filter effluent (TFE) is conveyed by gravity flow to the solids contact aeration basins. At the influent of the aeration basin, TFE is mixed with return activated sludge (RAS) from the secondary clarifiers. The primary objective of the solids contact process is to enhance BOD removal of the trickling filter effluent and improve the settling characteristics of the solids. The diffusers in the aeration basin, fed by one of the two 30 HP positive displacement blowers in the blower building, provide oxygen and mixing for the suspended growth of microorganisms. These organisms mix and floc together and form larger conglomerates that have enhanced settling characteristics. The aeration basin consists of five cells; three cells have diffusers, while the other two do not. Under normal flows, the District utilizes two cells, and during high flows, the third cell is activated.

Overall, the aeration basin is in good working condition. However, the aeration basin floors are completely flat; therefore, when the plant staff drains the cells for maintenance it requires significant time to satisfactorily drain the basins. The plant staff would like to add a slight slope to the basin floors in the long-term to minimize the time required for draining the basins. The staff would also like, in the long-term, to install diffusers in the remaining two cells to provide added capacity during high flows.

The blower building is in good condition. The blowers and the electrical equipment located inside are also in good working condition. The Square D Model 6 MCC is in excellent condition and should be considered for replacement in the future. Light fixtures should be considered for conversion to LED type as convenient. This building houses the old Sierra Control 600 ampere plant switchboard and MCC which are both in serviceable condition, but should be scheduled for replacement in the long-term.

9.0 Secondary Clarifiers No. 1, 2, and 3 and RAS/WAS Pumping Station

9.1 Secondary Clarifiers No. 1, 2, and 3

Depending on the mode of operation, secondary clarifiers (SC; also referred to as "secondaries") receive either TFE or solids contact mixed liquor (SCML). Like primary clarifiers, the secondaries separate the solids, scum, and any remaining settleable or floatable solids from the secondary process stream to produce secondary effluent (SE). Solids removed in the SCs are returned either to the solids contact aeration basins as RAS, to the sludge holding basins as waste activated sludge (WAS), or to the primary clarifier splitter box for wasting.

In general, the SC mechanisms are in good working condition. The clarifier mechanism for SC No.1 was replaced in 1996, approximately 26 years ago. SC No. 2 was commissioned in 1990, approximately 32 years ago, and SC No. 3 was commissioned in 2000, approximately 22 years ago.

Although all three are in good working order, mechanisms in SC No. 1 and No. 2 are past their estimated useful life of approximately 25 years. Furthermore, SC No. 2 utilizes the outdated Eimco Ovivo right angle drive. When failure occurs, spare parts for or replacement of this type of drive are difficult, if not impossible to obtain. A full replacement of the SC No. 2 drive mechanism should be considered in the near-term same as for the Eimco primary clarifier drives. All of the coated steel mechanisms show deteriorated protective coatings. It is recommended that the protective coatings on all mechanisms be reconditioned in the near-term. The exposed portions of the SC No.3 mechanisms displayed the most severe coating deterioration, possibly because of substandard coating application when originally commissioned. All three SCs were operational and fully submerged during our assessment; therefore, a complete assessment was not performed. The overall mechanism condition should be monitored and inspected by the District, particularly when a clarifier is offline, to further evaluate the condition of the mechanism. Based on this evaluation, SC No. 3 mechanism may need to be replaced in the near-term.

The electrical systems for the SCs are in good condition, except where some ductbank wiring insulation has failed; however, this wiring is being replaced by the District.

9.2 RAS/WAS Pumping Station

Secondary sludge is collected and pumped from the clarifiers by the RAS pumps located in digester control building No. 1 for SC No. 1 and 2 and from the RAS/WAS pumping station for SC No. 3. Scum is pumped by submersible pumps for Clarifiers No. 1 and 2. Two scum pumps are in the RAS/WAS pumping station for conveying SC No. 3 scum to the digesters or sludge holding basins.

Overall, the RAS/WAS pumping station is in good working condition. There are two each of RAS, WAS, and scum pumps housed in this building. All operate in a one duty, one standby arrangement. All RAS and WAS pumps were recently rebuilt by plant staff and appeared to be in good operational condition. However, the existing RAS pumps are constant speed pumps; therefore, flow rate may only be modulated via "valve throttling" on the discharge side of the pump. This practice is an inefficient use of energy and the sludge degrades the throttling valve. The District should consider installation of VFDs for these pumps in the near-term.

The RAW/WAS pumping station electrical system is in good condition as is the Cutler Hammer 2100 MCC and should be considered for replacement in the future. VFDs should be added for the 2 HP and 7-1/2 HP RAS Pumps in the near-term to optimize RAS operations. There is plenty of room to add these VFDs.

10.0 Sludge Storage Tanks and Sludge Thickening Building

Waste activated sludge (WAS) from the secondary clarifiers is stored in two concrete sludge storage tanks. The WAS is aerated while it is stored to minimize odors. WAS is pumped from the sludge storage tanks to the sludge thickening building by the GBT feed pumps and is thickened before it is introduced into the anaerobic digesters. The sludge thickening building houses a gravity belt thickener (GBT) for the thickening process, two positive displacement blowers for aerating the stored WAS, one thickened sludge, progressive cavity pump, one non-potable water (NPW) centrifugal booster pump, and an electrical equipment room. Sludge thickening prior to digestion decreases the hydraulic loading on the digesters, more "easily" digests, and requires less energy to raise sludge temperatures to the desired digester operating temperature of 95ºF.

The one-meter Komline-Sanderson GBT, commissioned 26 years ago, is in good working condition. The plant staff has replaced many of the original mechanical parts of the GBT to maintain it in good operational condition. However, the plant recently replaced the rollers, which took approximately 8 months to be delivered. This is slightly discomforting to the plant staff since there is only one GBT in the plant. It is conceivable that during an unplanned equipment shutdown, the plant may have to involuntarily operate without a thickening process for long periods of time, which may adversely impact the digestion process.

It is recommended that the District consider installing a redundant GBT or equivalent sludge thickening equipment in the near-to-long term to improve operational resiliency. The air compressor refrigerant type air dryer, which supplies compressed air to the GBT, is not working and should be repaired or replaced in the near-term. This is not a critical item, but would provide higher quality, dryer air if it were working properly.

The polymer blending unit is in good working condition. However, the 7-1/2 HP progressive cavity thickened sludge pump is no longer reliable. Per plant staff, it periodically and inexplicably locks up and stops. This 26-year-old pump is past its useful life and should be considered for replacement in the near-term.

There are three 25 HP positive displacement blowers that supply air to the sludge storage tanks. Two of them are in good working condition, while the third one has been out of service for four or five years. Plant staff indicated that for effective WAS aeration, one blower is sufficient. Although the third blower is out of commission, two blowers are sufficient for the process requirements and provide required redundancy.

There are two centrifugal GBT feed pumps that operate in a duty-standby arrangement. These pumps are located in a dry pit connected to the rectangular sludge storage tank. The plant staff recently replaced the motor for one of the pumps, but the other one requires complete replacement in the near-term. The diffusers in the sludge storage tank were not visible with the tanks in operation; however, plant staff thinks the diffusers in the sludge holding tank are in good working condition.

The Westinghouse Series 2100 MCC-G in the MCC room appears in good operating condition and should be scheduled for replacement in the long-term. There appears to be some wiring deterioration and wiring should be replaced as necessary in conjunction with future work in the building.

11.0 Anaerobic Digestion and Cogeneration

Thickened WAS and primary sludge are pumped into the anaerobic digesters. The anaerobic digestion process includes three digesters, three heat exchangers, three hot water boilers, three sludge recirculation pumps, digested sludge transfer pumps, mixing pumps, and methane gas reuse. The purpose of anaerobic digestion is to decompose putrescible organic sludge to relatively stable or inert organic and inorganic compounds. Other benefits derived from the anaerobic digestion process include:

1. Sources and agents of disease and infection are significantly reduced.
2. Production of digester gas, which is used as the primary fuel for digester heating and cogeneration. The cogeneration system generates sustainable electricity for plant use, reducing the District's electrical demand from the grid.
3. Sludge mass is reduced by approximately 35 percent.
4. Sludge odor is significantly reduced.

Digester temperature is maintained in a range between 95 ºF and 98ºF with a sludge circulation and heat-exchanger system. Sludge in each digester are heated using individual heat exchangers. Hot water boilers are used to supply heated water to the coils of the heat exchangers. The sludge recirculation pumps draw sludge from the digesters, pump it through sludge heat exchangers, and back into the digesters.

Sludge can be transferred between the digesters by gravity or by using sludge transfer pumps. Digester gas is used as the primary source of boiler fuel while natural gas is available to supplement the digester gas. The digester gas is also used to generate electricity by an internal combustion engine-driven cogeneration unit. Excess digester gas is expended by a waste gas burner, also commonly referred to as the "flare". The flare replacement was commissioned in 2021. The hot water produced in the boilers is also used as a heat source for the Administration Building, Influent Pumping Station, Primary Clarifier Control Buildings, Grit Pump Room, and the Grit Dewatering Building.

11.1 Anaerobic Digesters No. 1, 2, and 3

Digester No. 1 was originally built in1974. Its digester cover was replaced in 2008. Although in good working condition, the overall structure is approaching the end of its useful life, which is typically estimated to be 50 years. Per plant staff, the water seal around the digester cover occasionally freezes, rendering it ineffective and contributing to spalling in the surrounding concrete. The function of the water seal is to prevent digester gas from escaping and air from being drawn in to prevent the mixture of these gases, which may create a combustive/explosive condition. Furthermore, the digester has not been cleaned in approximately 10 years.

It is recommended that the digester be cleaned and inspected in the immediate-term to optimize the digestion process and identify potential repair items. The plant staff has also observed the flame arrestor "pop off" more often than the other flame arrestors. Therefore, it is recommended that, during the digester cleaning phase, the flame arrestor be sent to the manufacturer for inspection and repairs.

Digester No. 2 was built in 1990 and Digester No. 3 was built in 2008. Both digesters are in good working condition. In 2020, Digester No.2's cover was replaced, and the inside of the digester was cleaned and reconditioned with protective coatings. In 2018, Digester No. 3's cover was replaced, and the inside of it cleaned and reconditioned with a T-lock PVC liner. There are micro-cracks visible on Digester No.3's concrete lid. It is not readily apparent what caused these cracks, but plant staff is aware and actively monitoring them.

11.2 Digester Control Building No. 1

Overall, Digester Control Building No. 1 is in fair-to-poor condition. This building was originally constructed in 1974 alongside Digester No. 1. Since then, the building has been modified and expanded various times. The infrastructure inside the building is in a progressive state of decline. Some of the old and unused equipment, piping, valving, and other appurtenances have been abandoned-in-place, which creates general obstacles for O&M work. The original construction does not satisfy modern standards for access and egress. The building houses the following major equipment:

1. Two, cast-iron, hot water boilers.
   a. Boiler No. 1 was replaced in 2021.
   b. Boiler No. 2 commissioned in 2002.
      i. Boiler No. 2 was recently inspected by Quality Control Services (QCS) and they observed pitting on the plates. The boiler is in poor condition and is fast approaching the end of its 25-year useful life. It is recommended that this boiler be replaced in the immediate-to-near term to maintain equipment redundancy.
2. Two digester recirculation pumps.
   a. Recirculation pumps were commissioned in 1990 and are past their useful life. These pumps should be replaced in the near-to-long term.
3. Two spiral heat exchangers
   a. These heat exchangers were commissioned in 1990 and are past their useful life. It is recommended that these heat exchangers be considered for replacement in the near-to-long term.
4. WAS and RAS pumps.
   a. The WAS pump is out-of-service because the piping connected to it is plugged with snails, which originate from the trickling filters. The snail problem should be addressed and the WAS piping should be replaced and re-routed in the near-to-long term. The existing WAS piping is concrete encased under the expanded portion of the building and its condition is not known.
   b. Currently, the sludge from SC No.1 and No. 2 is removed by the RAS pumps, also housed in this building. RAS pumps are also past their estimated useful life and should be considered for replacement in the near-to-long term.
5. Belt Filter Sludge feed pump.
   a. This pump is to be replaced in 2022, as part of the dewatering building upgrades.

6. Digester mixing pumps.
    a. These pumps are also past their estimated useful life and should be considered for replacement in the near-term. However, the shaft sleeves and seals require replacement in the immediate-term for continued beneficial use.

The transfer piping between Digesters No. 1 and No. 2 should be replaced in the immediate-term. Plant staff say that the digester gas has seeped into the interface between the pipe wall and the protective cement lining, rendering the protective lining useless. It is theorized that the digester gas is causing corrosion, which has prompted leaks in the piping.

The Sierra Controls MCC is old and in poor condition and MCC should be replaced in the near-term. The Challenger MCC is in satisfactory condition and should be considered for replacement in near-to-long term. The building conduit and wiring appears to be in acceptable condition but can be upgraded when future improvements are made.

11.3 Digester Control Building No. 2

Digester Control Building No. 2 was constructed in 2008 and is in good condition. It houses the cogeneration unit, hot water boiler No. 3, heat exchanger, and transfer water pump, all of which are in good working condition. The digester sludge recirculation pumps are in good working condition; however, these will require new mechanical seals in the near-term. Plant staff would also like to repair the roof leaks in the immediate-term. The roof leaks appear to originate from the roof drain.

This building is in very good condition electrically. The co-generation unit exhaust piping inside the building should be insulated to limit the amount of heat transferred to the building and for safety.

11.4 Fats, Oils, and Grease (FOG) Receiving Facility

The FOG receiving facility was constructed in 2010. A 15,000 gallon storage tank holds grease delivered from off-site facilities, and grease is fed at a steady rate to the digesters. The grease dramatically increases digester gas production which significantly increases the volume of gas available for combustion. Methane gas from the digesters is treated and compressed in a gas polishing system and used for fuel in a 185kW engine-driven co-generation system which produces enough energy to meet more than one-half the plant daily energy demand. The co-generation unit has about 51,000 operating hours, is in very good condition and should be maintained as necessary.

This FOG system is working well. One of the biggest maintenance items are the grease feed and recirculation pumps. Since they were commissioned, they have been re-bult five or six times. The plant staff believes that they are oversized, therefore, periodically “cavitate.”

It is suggested that these pumps be considered for replacement in the near-term. There is some question about the need for the storage tank recirculation pump as the tank must be cleaned out every six months, even with the recirculation pump. Furthermore, the plant staff believes that the FOG storage tank may not have sufficient storage volume. It is recommended that the FOG storage volume be re-evaluated in the immediate-term based on the amount of FOG received at the station to determine if additional storage volume is needed and if pumped mixing is needed.

12.0 Sludge Dewatering Building

The digested sludge stream is pumped to the sludge dewatering building. This building houses a polymer feeder, belt filter press, and a filtrate pumping station. The digested sludge is dewatered in this building to reduce its volume prior to being hauled from the treatment plant. Dewatering is accomplished with the belt filter press (BFP). Once dewatered, the sludge is loaded on trucks to be hauled to land disposal sites or to the landfill. Filtrate from the belt filter press along with building washdown water is drained to a sump and pumped to the plant drain system, which returns to the headworks. The dewatering process is optimized with the use of polymer.

This building was not inspected as a part of this assessment, because the District is in the process of upgrading this building. The District expects to finish construction in 2022. The objective of the project is to:

1. Install a new, redundant, belt filter press with a new control panel and related miscellaneous supporting platforms.
2. Replace the old polymer feeder.
3. Add a davit crane to facilitate filtrate pump removal.
4. Add new valving and ductwork.
5. Add new water piping.

13.0 Disinfection and Non-Potable Water Reuse

After secondary clarification, the secondary effluent flows by gravity to the chlorine contact basins (CCB) for disinfection. The purpose of disinfection is to destroy disease-causing bacteria, viruses, and other pathogens that may be present in the treatment plant effluent. Sodium hypochlorite (NaOCl) is injected and diffused into the secondary effluent stream and conveyed through the CCB to meet adequate contact time. It is necessary that chlorination take place continuously, for adequate destruction of pathogenic organisms. From the chlorine contact basin, final effluent may be conveyed to one of the following locations for reuse:

- Non-Potable Water (NPW) pumping station
- Storage reservoirs
- MGSD irrigation fields
- Off-site reuse irrigation locations (Galeppi, Park, and Bentley)

13.1 Chlorine Contact Basins

Chlorine Contact Basin No. 1 was constructed in 1974 and Chlorine Contact Basin No. 2 was built in 2005. Both structures are built with reinforced concrete and are in good serviceable condition. However, both structures were operational and largely submerged during the walk-through; therefore, only the exposed/unsubmerged portions of the structures were inspected. These surfaces appeared to be in very good condition.

13.2 Hypochlorite Building

The hypochlorite building was constructed in 1996. It houses two peristaltic chemical metering pumps, two 1,000-gallon polyethylene hypochlorite storage tanks, and a vent scrubber tank. Although all equipment is in good serviceable condition, it is recommended that the equipment be considered for replacement in the long-term. The building's electrical system is in serviceable condition.

13.3 NPW Pumping Station

The NPW pumping station supplies chlorinated secondary effluent to the entire plant for process and washdown water.

The NPW pumping station was constructed in 1996. It houses four end-suction centrifugal Paco pumps, a submersible sump pump, self-cleaning strainer, and a 1/4-ton monorail, hoist, and trolley to facilitate equipment removal. The pumps require frequent maintenance and replacement parts for these pumps are becoming increasingly difficult to obtain because of their age. The 26-year-old pumps are nearing the end of their estimated useful of 30 years, so their replacement should be considered in the near-term. The exposed pressurized piping in the pumping station shows signs of leakage; therefore, repair or replacement should be considered in the immediate-term. The building electrical system and the Tesco MCC NPW are in good serviceable condition and the MCC should be considered for replacement in the long-term.

14.0 Effluent Pumping Stations No. 1, 2, and Bently

There are three effluent pumping facilities. Effluent Pumping Station No. 1 lifts the disinfected effluent to an irrigation ditch. The irrigation ditch can be used to irrigate fields within District property, west of the treatment plant, or convey effluent to Effluent Pumping Station No. 2. Effluent Pumping Station No. 2 is located at the northwest corner of the District property. Effluent Pumping Station No. 2 primarily discharges to the MGSD storage ponds located north of Muller Lane. The discharge from Effluent Pumping Station No. 2 may also be routed to irrigate fields on MGSD property north of the treatment plant. Lastly, the Bentley Effluent Pumping Station is located at the northwest corner of the storage ponds. It pumps effluent from the storage ponds to the Bently storage ponds.

14.1 Effluent Pumping Station No. 1

It is not known when this pumping station was constructed, but it is suspected to be more than 30 years old. This is an outdoor, exposed to environment, pump station consisting of a buried reinforced concrete wet well and three vertical turbine pumps. Each pump is 5 HP operating in a one duty and two standby arrangement. Most of the concrete wet well is buried, although the exposed/visible portions of the wet well concrete and coatings appear to be in a severely deteriorated condition. The equipment is in serviceable condition, but it is recommended that the wet well structure be replaced in the immediate-to-near term. The submerged or buried portions of the structure were not inspected, because the pumping station was operational.

The electrical equipment is rack mounted. The equipment is in serviceable condition but is impacted by the weather. The electrical equipment should also be upgraded if future work is performed on the pump station. The liquid tight flexible conduit PVC covering is badly deteriorated by sun exposure and should be replaced with new conduit in the near-term. The life of the flexible conduit PVC coating can be increased by painting the outside of the conduit.

14.2 Effluent Pumping Station No. 2

It is not known when this pumping station was commissioned, but this outdoor pumping station appears to be in good working condition. It operates in a one duty and two standby arrangement.

The plant staff replaced one of the three vertical turbine pumps in 2010. The exposed/visible portions of the slide gates, bar racks, reinforced concrete, and miscellaneous metals appeared to be in serviceable condition. The submerged or buried portions of the structure were not inspected because the pumping station was operational. The electrical equipment should be considered for replacement in the long-term.

14.3 Bently Effluent Pumping Station

This pumping station was constructed in 2004. The pumping equipment and the building appeared to be in good working condition. However, the plant staff said that the pump station experiences substantial hydraulic transients and water hammer. During a power outage or shutdown/startup of pumps and due to the high operating pressure of the pumping station discharge, the staff has witnessed loud water hammering or slamming of pumped flow returning to the pump station. This water hammer effect was substantial enough to dislodge pipe fittings, which the plant staff have restrained by various means. The water hammer is unsettling enough for the plant staff that they usually clear out of the pumping station when water hammer is expected. It is recommended that the District consider a comprehensive transient analysis of this pumping station and upgrade the piping in the immediate-term.

15.0 Overall Electrical

15.1 Underground Ductbank Wiring

The District is experiencing some failures in underground ductbank wiring, based on investigation by plant staff. Most of the underground wiring has thermoplastic insulation which is rated for damp/wet areas. Heat is the major enemy of the thermoplastic insulation, but heat is usually not an issue in underground ductbanks. Most underground ductbanks are wet or damp and this should not impact the thermoplastic insulation too seriously unless some non-moisture rated thermoplastic insulated wire was installed in earlier years.

Currently, thermoplastic insulated wire is typically rated THHN/THWN-2, which is wet area rated. It is possible some of the wire pulls suffered some insulation damage during installation and the damage is now showing up as insulation deterioration/failure. The answer is to replace any failing sections of wiring.

15.2 Plant General Electrical

Plant electrical conduit and wiring can be upgraded as part of other work in particular areas of the plant. Underground duct bank wiring should be replaced as soon as problem areas are identified. Emergency lighting fixtures should all be checked for proper operation periodically and replaced or repaired if not working properly. It would be prudent to label all electrical panels that have voltages of 120 VAC and higher with voltage warning labels and arc flash warning labels. Light fixtures should be considered for conversion to LED type as convenient.

Lighting fixtures should be converted to high efficiency and long life LED fixtures especially in those areas where fixtures are on for more than 30 percent of the time. Consider labelling all electrical panels that have voltages of 120 VAC and higher with voltage warning labels and arc flash warning labels.

16.0 Summary of Recommendations and Opinion of Probable Construction Costs

Based on the observations during the site walk conducted on July 29 and November 1, 2021 and based on discussions with Staff on routine maintenance activities and observed equipment condition and performance, the treatment plant appears to be in fair, serviceable condition. However, in recent years, plant staff's time spent on maintenance has progressively increased due to unscheduled repairs and maintenance. This may be attributed to equipment and infrastructure approaching or past their estimated useful life, degradation in protective measures, such as epoxy coatings, and general wear and tear from the abrasive and corrosive nature of wastewater. Therefore, the table below provides a summary of recommendations for equipment and infrastructure rehabilitation and replacement.

Table 1: Summary of Recommendations

Line Item	Project Description	Immediate	Near-Term	Long-Term
2.0	**Influent Screening and Pumping Station**			
2.1	Replace bar screens and washer-compactors	$500,000		
2.2	Replace influent pump ARVs	$9,000		
2.3	Replace ISCO automatic sampler	$20,000		
2.4	Rehabilitate raw sewage concrete structures	$65,000		
2.5	Rehabilitate or replace hollow metal doors		$10,000	
3.0	**Electrical Building**			
3.1	Replace 600 kW Generator			x
3.2	Assess and repair raw sewage pump VFDs		$60,000	
4.0	**Grit Removal and Dewatering Building**			
4.1	Retrofit or replacement of forced vortex unit	$375,000		
4.2	Install 3rd grit pump for redundancy		$60,000	
4.3	Concrete crack repair in grit room		$35,000	
4.4	Rehabilitate or replace hollow metal doors		$10,000	
4.5	Replace grit dewatering unit (TeaCup)			x
4.6	Replace grit decanter bin	$20,000		
4.7	Odor control testing and air balance	$15,000		
5.0	**Primary Clarifiers and Primary Sludge Pumping Stations**			
5.1	Recondition PC #1, and #3 mechanisms		$250,000	
5.2	Replace PC #2 mechanism		$375,000	
5.3	Rehabilitate concrete in PC #1 and #2	$50,000		
5.4	Repair or replace pumps and MCCs PSPS #1			x
5.5	Replace pumps in PSPS #2		$65,000	
6.0	**Odor Control Bed (Biofilter)**			
6.1	Replace adsorption media	$115,000		
6.2	Replace foul air supply fan		$25,000	
6.3	Recondition coating of FRP ductwork		$20,000	
6.4	Assess and implement testing and air balance of foul air network	$60,000		

Line Item	Project Description	Immediate	Near-Term	Long-Term
7.0	**Trickling Filters and Trickling Filter Pump Station Building**			
7.1	Replace trickling filter media for no. 1 and no. 2		$300,000	
7.2	Replace trickling filter drives to effectively flush		$150,000	
7.3	Install VFDs for the submersible pumps in TFPS no. 2		$50,000	
7.4	Install sump pumps for draining stormwater TFPS no. 2 vault			x
7.5	Install agitation mechanism in TFPS no. 2 wet well		$40,000	
7.6	Install bypass around 18" MOV for trickling filter return flow	$15,000		
8.0	**Solids Contract Aeration Basin and Blower Building**			
8.1	Install grout fill to slope the basin floors for drainage		$45,000	
8.2	Install diffusers in basin #4 and #5 for redundancy		$85,000	
8.3	Convert to LED lighting fixtures in blower building			x
9.0	**Secondary Clarifiers No. 1, 2, 3, and RAS/WAS Pumping Station**			
9.1	Replace SC #2 mechanism	$300,000		
9.2	Recondition SC #1 and #3 mechanism	$250,000		
9.3	Install VFDs for two RAS pumps		$75,000	
10.0	**Sludge Storage Tanks and Sludge Thickening Building**			
10.1	Repair refrigerant type air dryer		$10,000	
10.2	Replace thickened sludge and WAS pump	$110,000		
11.0	**Anaerobic Digestion and Cogeneration**			
11.1	Clean and inspect digester no. 1	$240,000		
11.2	Repair flame arrestor for digester no. 1	$10,000		
11.3	Replace boiler no. 2 in DCB no. 1	$153,000		
11.4	Replace digester recirculation pumps in DCB no. 1		$50,000	
11.5	Replace spiral heat exchangers in DCB no. 1			x
11.6	Replace RAS and WAS pumps and re-route piping in DCB no. 1		$100,000	
11.7	Replace digester mixing pumps in DCB no. 1	$85,000		
11.8	Repair or replace digester sludge transfer piping in DCB no. 1	$10,000		
11.9	Replace Sierra Control MCC in DCB no. 1		$225,000	
11.10	Repair digester sludge recirculation pump in DCB no. 2		$50,000	
11.11	Repair roofing in DCB no. 2	$20,000		
11.12	Replace FOG recirculation and feed pumps		$80,000	

Line Item	Project Description	Immediate	Near-Term	Long-Term
11.13	Assess FOG storage tank volume and add if necessary		$50,000	
13.0	**Disinfection and Non-Potable Water Reuse**			
13.1	Replace chemical metering pumps and storage tanks			x
13.2	Replace NPW pumps		$135,000	
13.3	Repair or replace existing NPW discharge header piping	$10,000		
14.0	**Effluent Pump Stations**			
14.1	Assess and replace concrete wet well of effluent PS no. 1	$650,000		
14.2	Replace electrical equipment of effluent PS no. 1	$75,000		
14.3	Repair pumps in effluent PS no. 2			x
14.4	Perform a transient analysis of Bentley effluent PS	$80,000		
15.0	Replace miscellaneous lighting fixtures with LED fixtures			x
	Subtotal	$3,237,000	$2,580,000	-
	30% Contingency	$971,100	$774,000	-
	Total	$4,208,100	$3,354,000	-

Appendix A

Condition Assessment Pictures

Photo 1: Influent sewer junction structure, upstream of the Headworks structure, with surface aggregate exposure and metallic corrosion.

Photo 2: 20 year-old forced vortex grit removal unit drive pictured. It is currently offline due substantial deterioration from abrasive grit.

Photo 3: Significant visible corrosion on clarifier mechanism, skimmer arm, of Primary Clarifier #2.

Photo 4: Significant mortar deterioration and exposed aggregate in the headspace of the concrete launder wall of Primary Clarifier #2.

Photo 5: Current screenings, processed by the washer-compactors, look brown, instead of grayish, indicating the presence of fecal matter due to ineffective washing.

Photo 6: 25 HP positive displacement blowers, in the sludge thickening building, require periodic repairs, but are in good working condition.

Photo 7: The 26 year old thickened sludge pump, located inside sludge thickening building, is past it's useful life and is no longer reliable. It requires frequent maintenance to maintain beneficial use.

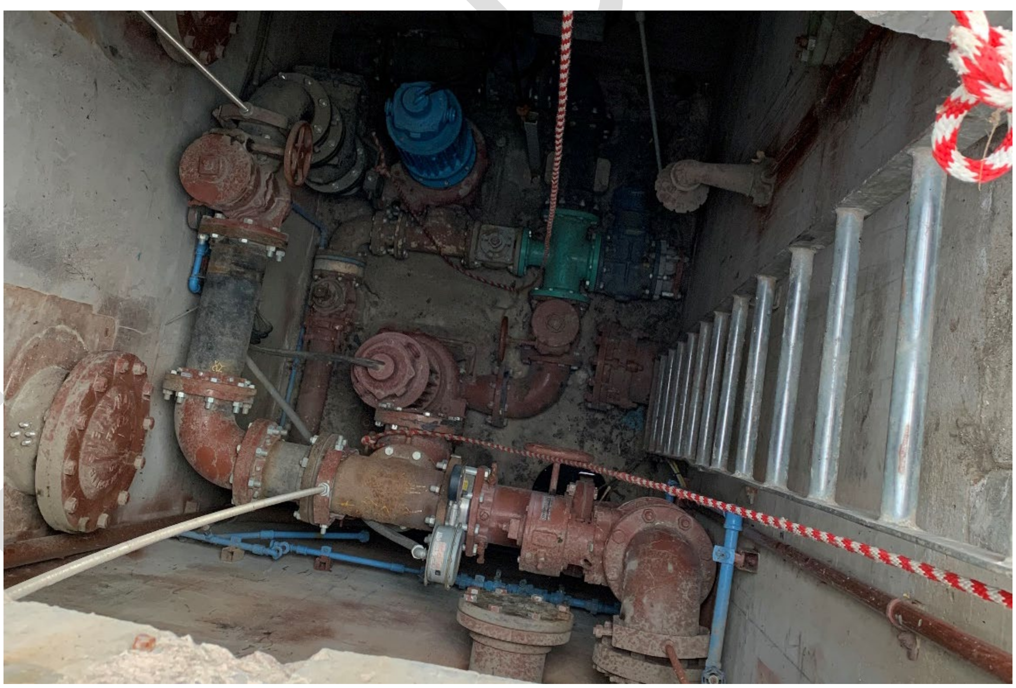

Photo 8: Existing gravity belt thickener feed pumps, approximately 30 years old, which operate in a one duty, one standby arrangement. Plant staff recently replaced the motor (blue colored) for one, while the other one requires a comprehensive rehabilitation or replacement.

Photo 9: 25-year old Boiler #2 recently inspected by QCS, noticed pitting on the plates.

Photo 10: The 26-year old NPW pumps are fast approaching the end of their estimated useful life. The exposed pressurized header leaks periodically.

Photo 11: Operational secondary Clarifier #3, commissioned in 2000, displays corrosion and coating degradation.

Photo 12: Significant concrete deterioration on Effluent Pump Station No.1 wet well.