Engineering Technical Report

Sunnyslope County Water District

Subject: **2018 Annual Engineering Technical Report**

Prepared For: Regional Water Quality Control Board

Prepared by: Donald G. Ridenhour, District Engineer, PE 51790 (Expires 6/30/2020) (SSCWD)

Reviewed by: James Filice, Water Superintendent (SSCWD)
Rob Hillebrecht, P.E., Associate Engineer (SSCWD)

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The purpose of this Technical Memorandum (TM) is to meet the Annual Engineering Report requirements of the Regional Water Quality Control Board (RWQCB) Waste Discharge Requirement (WDR) Order No. R3-2004-0065 (December 3, 2004).

Annual Engineering Reports must be submitted by January 30th every year commencing in 2006. The report will evaluate the performance and capacity of the wastewater treatment and disposal system. The report shall contain a hydraulic balance analysis of facility inputs and outputs including influent flow, precipitation, infiltration/percolation, and evaporation for both facilities and shall quantify disposal capacity of the facility based on actual operating data. The reports shall be prepared and certified by, or under the supervision/review of a registered professional engineer registered in California and possessing applicable experience in wastewater engineering and planning.

1 Introduction

As identified in Section E, paragraph 7, of WDR R3-2004-0065 for the Sunnyslope County Water District (SSCWD), an annual engineering technical report shall be submitted to the Regional Water Quality Control Board (RWQCB) to evaluate the performance and capacity of the wastewater treatment and disposal system for the Ridgemark I (RM I) wastewater facility. The main aspect of these annual reports is a water balance analysis. The following sections of this document summarize the information required by the RWQCB for the annual reports.

2 Recent Maintenance Activities

Recent maintenance activities are summarized in Table 2-1. In 2011 Pond 3 at RM I was retired in order to prepare for the construction of the Ridgemark wastewater sequential batch reactors, which have been installed in the area previously used for a portion of Pond 3. At the end of 2012, Pond 2 at RM I was retired from treatment service and the newly constructed Sequential Batch Reactor began treatment. At the end of 2012, Pond 1 at RM I was retired from wastewater treatment service and placed into service as a sludge storage/treatment pond until such time that the remainder of the new wastewater sludge treatment and drying facilities at RM I were completed. In 2013 the Sludge treatment tank and drying beds were completed and Pond 1 at RM I was retired from sludge treatment. Pond 1 at RM I will remain for backup emergency sludge disposal. In 2013, Ridgemark II treatment ponds 1 and 2 were decommissioned as part of the consolidation of RM I and RM II at RM I.

Table 2-1: Ridgemark I Maintenance Activities

Date	Item
2005	RM I, Ponds 3 & 4 drained, dried and solids removed
1/4/06 – 1/12/06	Pumping from Pond 4 at RM II to Pond 4 at RM I
July-Aug 2006	Bypass pumping from Pond 2 at RM I to Pond 4
10/30/06 – 12/3/06	Pumping from Pond 4 at RM II to Pond 4 at RM I
November 2006	Sludge removed from bottom of Pond 5 at RM I. Pond bottom ripped
November 2007	Ponds 3 & 4 at Ridgemark I. Pond bottoms ripped.
Jan-Dec 2007	Pumping effluent from Pond 4 at RM II to Pond 4 at RM I
August 2008	Ponds 3 & 4 at Ridgemark I. Pond bottoms ripped.
August 2009	Pond 4 Ridgemark I. Pond bottoms ripped.
August 2010	Ponds 4 & 5 at Ridgemark I. Pond bottoms ripped
September 2013	Ponds 4 and 6 were ripped to maintain percolation rates
June 2014	Pond 5 at Ridgemark I. Pond bottom ripped
July 2015	Ponds 3 & 4 at Ridgemark I. Pond bottoms ripped.
October 2015	Pond 5 at Ridgemark I. Pond bottom ripped.
October 2016	Ponds 3 & 4 at Ridgemark I. Pond bottoms ripped.
August 2017	Pond 5 at Ridgemark I. Pond bottom ripped.
December 2017	Pond 4 at Ridgemark I. Pond bottom ripped.
November 2018	Pond 3 at Ridgemark I. Pond bottom ripped.

3 Hydraulic Balance Analysis

The hydraulic balance analysis is performed for the period spanning January 2018 through December 2018. The following sections describe the data used in the water balance and summarize the results.

3.1 Influent Flows

Influent flows are based on flow meter data for the analyzed period. RM I uses a magnetic flow meter. Total annual flow to RM I in 2018 was 169.95 AF.

Table 3-1: Facility Influent Flows (Monthly Average) to SBR

Month	RM I SBR Influent (gpd)	RM I SBR Influent (gallons)
Jan-18	156,065	4,838,000
Feb-18	151,286	4,236,000
Mar-18	151,839	4,707,000
Apr-18	150,200	4,506,000
May-18	148,903	4,616,000
Jun-18	151,800	4,554,000
Jul-18	151,677	4,702,000
Aug-18	148,452	4,602,000
Sep-18	149,067	4,472,000
Oct-18	147,677	4,578,000
Nov-18	154,567	4,637,000
Dec-18	158,935	4,927,000
Annual Total (Gallons)		**55,375,000**
Annual Total (Acre Feet)		**169.95**
Annual Average(gpd)	**151,706**	

Note: Influent flow rate is the average daily value over each month.

3.2 Precipitation

Precipitation data for the water balance is based on the California Irrigation Management Information System (CIMIS) station #126 located at the San Benito County Water District (SBCWD) offices (approximately 3-miles from the Ridgemark wastewater treatment facilities). The monthly precipitation for 2018 is shown in table 3-2.

Table 3-2: 2018 Precipitation Data

Month	Precipitation (in)
January 2018	2.39
February 2018	0.81
March 2018	2.74
April 2018	1.33
May 2018	2.64
June 2018	0.14
July 2018	0.00
August 2018	0.03
September 2018	0.00
October 2018	1.66
November 2018	3.24
December 2018	1.48
Total	**16.46**

3.3 Percolation

The primary means of wastewater disposal for the Ridgemark facilities is through percolation of the treated wastewater via disposal ponds. The RM I facility has 4 disposal ponds while the RM II facility has 2 disposal ponds. The RM I ponds are operated on a rotation schedule in which only one pond is used at a time to allow for ripping and other maintenance to be done on the others. During 2018, at RM I disposal ponds 4 and 5 were used for the disposal of 169.95 acre-feet of treated wastewater, while ponds 3 and 6 at RM I and ponds 3 and 4 at RM II were not used for disposal. The size of these ponds is summarized in 3-3.

Table 3-3: Ridgemark Disposal Pond Maximum Surface Area

Pond	Area (acres)
RM I Pond 3	0.4
RM I Pond 4	0.8
RM I Pond 5	1.2
RM I Pond 6	2.1
RM II Pond 3 (not used)	1.1
RM II Pond 4 (not used)	1.1

Prior to the 2005 maintenance that was performed on RM I Ponds 3 and 4, it was estimated that Ponds 3, 4, and 5 at RM I had a percolation capacity of approximately 0.34 inches/day (SSCWD *Long-Term Wastewater Management Plan*, RMC 2006). After the 2005 maintenance was performed on RM I Ponds 3 and 4, Pond 4 was observed to have a percolation rate of 5.97 in/day in August 2006. Ponds 3 and 5 were estimated to have percolation rate of 3 in/day. While the Pond 6 percolation rate was originally estimated to be the maximum observed percolation rate of 3.82 in/day based on the Water Balance in the *Long-Term Wastewater Management Plan*, subsequent percolation monitoring in Pond 6 was performed that indicated a percolation rate range between 1.0 in/day and 3.0 in/day depending on level in the pond. An average

Pond 6 percolation rate of 1.75 in/day (SSCWD *Long-term Wastewater Management Plan*) was assumed for the capacity analysis. RM II Ponds 3 and 4 have an estimated percolation capacity of 1.37 in/day (SSCWD *Long-Term Wastewater Management Plan*).

The improved quality of the treated wastewater with the operation of the Sequential Batch Reactor treatment plant and the continued maintenance of RM I ponds 4 and 5 have significantly improved the percolation rates of these ponds. The following analysis is to better estimate the current percolation rates of RM I Ponds 4 and 5.

Pond 5 operated as the single disposal pond from January through May of 2018 and achieved a point of equilibrium in which the water level in the pond neither rose nor fell significantly. At this point, it is assumed percolation rate is equal to the average inflow minus evaporation. The approximate surface water surface area was estimated to be 0.65 ac. The annual average daily flow for 2018 was 151,706 gallons and the average daily evaporation was 0.06in as calculated in Section 3.4. Thus the calculated percolation rate for Pond 5 is 8.54 in/day.

$$\frac{151{,}706\ gal}{1\ day}\ X\ \frac{1\ CF}{7.48\ gal}\ X\ \frac{1\ ac}{43{,}560\ SF}\ X\ \frac{1}{0.65\ ac}\ X\ \frac{12\ in}{1\ ft} = 8.60\frac{in}{day}$$

$$8.60\frac{in}{day} - 0.06\frac{in}{day} = 8.54\frac{in}{day}$$

Pond 4 operated as the single disposal pond from May through December of 2018 and also achieved a point of equilibrium in which the water level in the pond neither rose nor fell significantly. The approximate surface water surface area was estimated 0.25 ac. With annual average daily flow for 2018 still 151,706 gallons and the average daily evaporation 0.06in the calculated percolation rate for Pond 4 is 22.29 in/day.

$$\frac{151{,}706\ gal}{1\ day}\ X\ \frac{1\ CF}{7.48\ gal}\ X\ \frac{1\ ac}{43{,}560\ SF}\ X\ \frac{1}{0.25\ ac}\ X\ \frac{12\ in}{1\ ft} = 22.35\frac{in}{day}$$

$$22.35\frac{in}{day} - 0.06\frac{in}{day} = 22.29\frac{in}{day}$$

Table 3-3 summarizes the maximum surface areas, percolation rates, and annual maximum percolation capacities for each disposal pond.

Table 3-3: Ridgemark Disposal Pond Maximum Surface Area

Pond	Max Surface Area (acres)	Percolation Rate (in/day)	Annual Max Capacity (AFY)
RM I Pond 3	0.4	3.00 *	36.50
RM I Pond 4	0.8	22.29	542.39
RM I Pond 5	1.2	8.54	311.71
RM I Pond 6	2.1	1.75 *	111.78
RM II Pond 3 (not used)	1.1	1.37	45.83
RM II Pond 4 (not used)	1.1	1.37	45.83

* Percolation Rates for RM I Ponds 3 and 6 have not been recalculated since the RM I sequential batch reactor treatment plant upgrade and continued pond maintenance so may be significantly higher than shown

By adding the annual maximum capacity of RM I Ponds 3, 4, 5, and 6, the cumulative maximum percolation capacity for the Ridgemark Wastewater Treatment Plant is approximately 1002 ac-ft. per year. RM II Ponds 3 and 4 are no longer in active operation and therefore are not considered in the cumulative annual maximum percolation capacity.

3.4 Evaporation

Table 3-4 presents average monthly pan evaporation data from DWR Bulletin 73-79 for the Hollister Costa Station from 1962 to 1966. These were the only pan evaporation data that were found for the region. Pond evaporation rates are assumed to be 75% of pan evaporation rates. Pond evaporation is thus calculated at 38.83 inches per year. With precipitation during 2018 being 16.46 inches, the net pond evaporation was 38.83 – 16.46 = 22.37 inches this year and an average daily evaporation of 0.06 inches. Ridgemark I Ponds 3, 4, 5 and 6 have a total maximum combined area of 4.5 acres. However ponds 3 and 6 was not utilized in 2018 due to the pond rotation schedule. Pond 5 was operated at partial capacity with a water surface area of 0.65 acres from January through May, and Pond 4 was operated at partial capacity with a water surface area of 0.25 acres from June through December. Ridgemark I active ponds have total evaporation of 0.78 acre feet in 2018 as calculated below while Ridgemark II was not used.

$$22.37\ in\ X\ \frac{1\ ft}{12\ in}\ X\ \left(0.65\ ac\ X\ \frac{5\ months}{12} + 0.25\ ac\ X\ \frac{7\ months}{12}\right) = 0.78\ ac\ ft$$

Table 3-4: Pan and Pond Evaporation Data

Month	Pan Evaporation (in)*	Pond Evaporation (in)
January 2005	2.05	1.54
February 2005	2.17	1.62
March 2005	3.19	2.39
April 2005	4.84	3.63
May 2005	5.91	4.43
June 2005	6.26	4.69
July 2005	7.32	5.49
August 2005	6.02	4.52
September 2005	5.00	3.75
October 2005	4.37	3.28
November 2005	2.76	2.07
December 2005	1.89	1.42
Total	**51.77**	**38.83**

*Source: DWR Bulletin 73-79 for the Hollister Costa Station

3.5 Water Balance Summary

The purpose of the water balance analysis was to identify the 2018 disposal balance and assess the disposal capacity of the facilities. Table 3-5 summarizes the actual influent and disposal quantities for RM I in 2018.

Table 3-5: 2015 Water Balance Summary

WWTF	Total Influent Raw WW Flow (AF)	Net Evaporation (AF)	Treated WW Effluent Pond Percolation (AF)
RM I	169.95	-0.78	169.17
RM II	0	N/A	0

Using the pond information from Table 3-3, the total disposal capacity at RM I was 1002 AF per year. The District will continue to measure and observe percolation rates in 2019 to further refine the estimated percolation rates. The District has observed and experienced improved percolation rates in Ponds 4 and 5 since the completion of the Sequential Batch Reactor Treatment Plant and with annual maintenance on the ponds, which has likely also significantly increased percolation rates in Ponds 3 and 6.

In the third quarter 2013, the RM II facility was decommissioned from a wastewater treatment and disposal facility in conjunction with Long-Term Wastewater Management Plan improvements. The total disposal capacity for the RM II facility is calculated at 98.8 AFY based on the RM II Pond 3 and 4 percolation rate of 1.37 in/day and 38.83 inches of evaporation. Treatment Pond 1 at the Ridgemark II facility was converted to a Ridgemark II lift station emergency overflow holding pond.

4 Treatment Process Performance

Table 4-1 summarizes the average influent and effluent water quality at the RM I facility and summarizes WDR water quality regulations that are in effect since 2010. RM I treatment processes are meeting all requirements with the exception of Chlorides as it has now come into compliance for both TDS and Sodium.

Table 4-1: 2018 Average Influent and Effluent Water Quality

Existing Water Quality	RM I SBR Influent	RM I SBR Effluent	RM I % Removal	2010 Permit Requirement
TDS (mg/L)	762	729	4.33%	1,200
Sodium (mg/L)	196	199	-1.53%	200
Chloride (mg/L)	315	290	7.94%	200
Nitrate as N (mg/L)	NA	0.41		5
Ammonia as Nitrogen (mg/L)	NA	0.68		5
Total Nitrogen (mg/L)	58	2.44	95.79%	
BOD_5 (mg/L)	208	5	97.60%	30
TSS (mg/L)	177	8.43	95.24%	30
pH	7.71	7.10	7.91%	6.5-8.4

Data consists of 12 monthly sampling events from Jan/2018 through Dec/2018. All values shown are monthly averages.

The Ridgemark Wastewater Treatment Plant's SBR treatment process has consistently treated the wastewater effluent to within regulation standards for Nitrate, Ammonia, Total Nitrogen, BOD_5, TSS, and pH since it began operation at the end of 2012.

In 2018, treated wastewater effluent met the regulatory limit for Sodium of 200mg/l with an annual average Sodium concentration of 199mg/l. This is a significant accomplishment as Sodium concentrations were as much as 400mg/l in 2014 and have decreased by over 50% to meet the regulation. Sodium concentrations in the effluent have been on a consistent downward trend correlating to the District's salinity management efforts.

The District achieved compliance with TDS regulations in 2015 and has continued to remain under the limit through 2018. The effluent TDS has been drastically reduced from previous concentrations that were consistently above 1,600mg/L in 2014, to a current annual average concentration of less than 730mg/L showing a 54% decrease.

Along with the Sodium and TDS levels, the effluent Chloride concentration has been steadily declining from 580mg/L in 2014 to 290mg/L in 2018. This represents a decrease of 50% and shows significant progress toward achieving compliance. Based on the current trend from 2014 until now under this salinity management strategy, it is expected that the effluent quality will be in full compliance with the Chloride regulation by 2021.

The substantial reductions in multiple effluent salinity parameters from 2014 to 2018 is primarily attributed to the District's salinity management strategy. This strategy is based on providing the improved drinking water quality to the District's sewer customers by transitioning the primary water source from groundwater to treated surface water. The treated surface water has much less salinity and hardness, reducing customers' need for salt discharging water softeners. Paired with this, the District has an aggressive campaign to encourage customers to eliminate water softeners as described in Section 5.

5 Past and Future Steps

The *Long-Term Wastewater Management Plan* identified several improvements and modifications that could be implemented to provide an enhanced level of treatment to meet the future requirements, many of which have been effectively implemented. The District has also worked with the City of Hollister, San Benito County Water District, San Benito County, and other stakeholders to develop agreement on the preferred projects and strategies to meet the water quality objectives for the whole region. In 2008, SSCWD joined the Governance Committee of the Hollister Area Urban Water and Wastewater Management Plan in order to become an integral part of this regional effort to improve potable water and wastewater quality.

In June 2013, Sunnyslope County Water District, the City of Hollister, and San Benito County Water District entered into a Water Supply and Treatment Agreement to implement the entire Hollister Urban Area Water and Wastewater Master Plan and Coordinated Water Supply and Treatment Plan. The three major water supply and treatment components for the Coordinated Water Supply and Treatment Plan were to upgrade the Lessalt Surface Water Treatment Plant, to construct a new West Hills Surface Water Treatment Plant, to construct the Crosstown Pipeline, and to build a North (San Benito) County Groundwater Bank to supply these two surface water treatment plants in time of drought. A schedule showing the completion or anticipated completion dates for all elements of the Coordinated Water Supply and Treatment Plan is shown below.

In order to reduce the Ammonia, BOD_5, and TSS levels in the treated wastewater at the Ridgemark I and II wastewater treatment plants, a new SBR treatment plant designed and built. The construction contract to build the wastewater treatment project at Ridgemark I was awarded in May 2011 and construction was completed in 2013 although the Sequential Batch Reactors were operational by the end of 2012. Ridgemark

II influent flow was routed to Ridgemark I for treatment in the third quarter of 2013 to consolidate the wastewater treatment to only the Ridgemark I site.

The Upgrade to the Lessalt Water Treatment Plant and a potable water pipeline and pump station connecting the Lessalt surface water treatment plant to the Ridgemark Pressure Zone was completed in December 2014. These facilities now allow the Ridgemark Pressure Zone (which includes all the Ridgemark I wastewater treatment plant customers) to receive high quality drinking water. The District in cooperation with the Water Resources Association of San Benito County (WRA) has been conducting a significant educational campaign through door hanger distribution, website posts, direct outreach at community events, and in the annual Drinking Water Quality Report.

These efforts to educate and urge customers to discontinue the use of salt based water softeners, which contribute to higher sodium, chloride, and TDS levels in wastewater effluent, are showing much success. Rebates of $250-$300 for customers who remove their brine discharging water softeners have been applied to 30 sewer customers in 2018. At least 216 Sunnyslope sewer customers, representing approximately 17.5% of total sewer customers, have removed their water softeners through the program since the Lessalt WTP Upgrade in 2014. Additionally, in February 2015 the District adopted new codes prohibiting the replacement and/or installation of brine discharging water softeners. The water softener education and rebate plan will continue in 2019 and future years. Looking at the current trend, these efforts are expected to bring the District into compliance with the wastewater effluent requirements for Chloride in 2021.

COORDINATED WATER SUPPLY AND TREATMENT PLAN SCHEDULE

Lessalt Water Treatment Plant Upgrade
- Completed and operational December 2014.
- High quality drinking water is being delivered to the District's wastewater customers.

West Hills Water Treatment Plant
- EIR completed and certified April 2014.
- Design and Specifications complete December 2014.
- Construction began September 2015.
- Project completed September 2017.
- High quality drinking water is being delivered to City of Hollister water system. This allows additional high quality water from Lessalt to be directed to the District's water and wastewater customers.

Crosstown Pipeline
- Design and Specifications to be completed May 2018.
- Construction began July 2018
- Project to be completed June 2018.
- This will allow water from West Hills to be delivered to the District' water and wastewater customers

North County Groundwater Bank
- Feasibility study to evaluate potential engineering, cost, financing, environmental, and political options to be started in 2020.

References

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