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| Engineering Technical Report | |  |
| Sunnyslope County Water District | | |
| **Subject:** | **2019 Annual Engineering Technical Report** | |
| **Prepared For:** | Regional Water Quality Control Board | |
| **Certified by:** | Drew Lander, P.E. 79561 (Expires 9/30/2020), General Manager | |
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| **Date:** | January 21, 2020 | |
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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.

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# 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.

# Capital Project Activities

In 2011 Percolation Pond 3 at Ridgemark I (RM I) was retired in order to prepare for the construction of the Ridgemark Wastewater Treatment Plant sequential batch reactors in a portion of where Percolation Pond 3 had been. Construction of these sequential batch reactors were completed and began wastewater treatment at the end of 2012. Treatment Pond 2 at RM I was then retired from service and construction began on the sludge treatment and drying beds where Treatment Pond 2 had been. At the end of 2012, Treatment Pond 1 was also retired from wastewater treatment service and placed into service as a sludge storage and treatment pond until 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 Treatment Pond 1 was retired from sludge treatment. Treatment Pond 1 remains as emergency overflow sludge disposal.

In 2013, Ridgemark II (RM II) Treatment Ponds 1 & 2 and Percolation Ponds 3 & 4 were decommissioned as part of the consolidation of the two wastewater treatment sites at the Ridgemark Wastewater Treatment Plant (Ridgemark WWTP) on the RM I site.

Rehabilitation activities on percolation ponds from 2005 through 2019 are summarized in Table 2‑1. These activities ensure that adequate percolation rates are maintained to effectively dispose of treated wastewater.

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. |

# Hydraulic Balance Analysis

The hydraulic balance analysis is performed for the period spanning January 2019 through December 2019. The following sections describe the data used in the water balance and summarize the results.

## Influent Flows

Influent flows are based on the magnetic flow meter data at the headworks of the Ridgemark WWTP. The total annual influent flow to the Ridgemark WWTP in 2019 was 168.67 AF.

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

|  |  |  |
| --- | --- | --- |
| **Month** | **RM I SBR Influent (gpd)** | **RM I SBR Influent (gallons)** |
| Jan-19 | 153,419 | 4,756,000 |
| Feb-19 | 150,679 | 4,219,000 |
| Mar-19 | 152,581 | 4,730,000 |
| Apr-19 | 152,233 | 4,567,000 |
| May-19 | 148,839 | 4,614,000 |
| Jun-19 | 153,600 | 4,608,000 |
| Jul-19 | 147,484 | 4,572,000 |
| Aug-19 | 149,097 | 4,622,000 |
| Sep-19 | 149,367 | 4,481,000 |
| Oct-19 | 143,129 | 4,437,000 |
| Nov-19 | 150,133 | 4,504,000 |
| Dec-19 | 156,452 | 4,850,000 |
| **Annual Total (Gallons)** |  | **54,960,000** |
| **Annual Total (Acre Feet)** |  | **168.67** |
| **Annual Average(gpd)** | **150,584** |  |

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

## 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 WWTP). The monthly precipitation for 2019 is shown in table 3-2.

**Table 3‑2: 2019 Precipitation Data**

|  |  |
| --- | --- |
| **Month** | **Precipitation (in)** |
| January 2019 | 2.24 |
| February 2019 | 4.02 |
| March 2019 | 2.55 |
| April 2019 | 0.25 |
| May 2019 | 1.95 |
| June 2019 | 0.20 |
| July 2019 | 0.00 |
| August 2019 | 0.00 |
| September 2019 | 0.00 |
| October 2019 | 0.00 |
| November 2019 | 1.40 |
| December 2019 | 3.69 |
| **Total** | **16.30** |

## Percolation

The primary means of wastewater disposal for the Ridgemark facilities is through percolation of the treated wastewater via disposal ponds. The Ridgemark WWTP facility has 4 disposal ponds while the RM II facility has 2 disposal ponds. The Ridgemark WWTP disposal 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 2019, only Percolation Pond 4 was used for the disposal of 168.67 acre-feet of treated wastewater, while Percolation Ponds 3, 5, and 6 were not used. RM II Percolation Ponds 3 and 4 have not been used since the consolidation of RM I and RM II at the Ridgemark WWTP. The size of each pond 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 Ridgemark WWTP and the continued ripping of Percolation Ponds 3, 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.

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.

The water level in Percolation Pond 4 rose by approximately 10 feet from January to December 2019. This indicates that the percolation rate has temporarily decreased as algae and sediments fill pore spaces in the upper soil and begin to seal the pond. However we anticipate a return to a percolation rate near 22 in/day once it is drained and ripped to reopen those pore spaces.

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)** |
| Pond 3 | 0.4 | 3.00 \* | 36.50 |
| Pond 4 | 0.8 | 22.29 | 542.39 |
| Pond 5 | 1.2 | 8.54 | 311.71 |
| 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 Percolation Ponds 3 and 6 have not been recalculated since the RM I sequential batch reactor treatment plant upgrade and continued pond ripping. Thus the percolation rates may be significantly higher than shown

By adding the annual maximum capacity of Ridgemark WWTP Ponds 3, 4, 5, and 6, the cumulative maximum percolation capacity 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.

## 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 2019 being 16.30 inches, the net pond evaporation was 38.83 – 16.30 = 22.53 inches this year and an average daily evaporation of 0.06 inches. Ridgemark WWTP Ponds 3, 4, 5 and 6 have a total maximum combined area of 4.5 acres. However Ponds 3, 5, and 6 were not utilized in 2019 due to the pond rotation schedule. Pond 4 was operated at partial capacity with a water surface area ranging from approximately 0.25 to 0.6 acres for an average of 0.43 acres. Thus Ridgemark WWTP Pond 4 had a total evaporation of 0.81 acre feet in 2019 as calculated below. RM II was not used.

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

## Water Balance Summary

The purpose of the water balance analysis was to identify the 2019 disposal balance and assess the disposal capacity of the facilities. Table 3‑5 summarizes the actual influent and disposal quantities for Ridgemark WWTP in 2019.

Table 3‑5: 2019 Water Balance Summary

|  |  |  |  |
| --- | --- | --- | --- |
| **Site** | **Total Influent Raw WW Flow (AF)** | **Net Evaporation (AF)** | **Treated WW Effluent Pond Percolation (AF)** |
| Ridgemark WWTP | 168.67 | -0.81 | 167.86 |
| RM II | N/A | N/A | N/A |

Using the pond information from Table 3-3, the total disposal capacity at Ridgemark WWTP was 1002 AF per year. The District will continue to measure and observe percolation rates in 2020 to further refine the estimated percolation rates. The District has observed substantially higher percolation rates in Ponds 4 and 5 since the completion of the Sequential Batch Reactor Treatment Plant and with regular ripping of the ponds. This has likely also significantly increased percolation rates in Ponds 3 and 6, but these ponds have not yet been utilized since the completion of the treatment plant.

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.

# Treatment Process Performance

Table 4-1 summarizes the average influent and effluent water quality at the Ridgemark WWTP facility and summarizes WDR water quality regulations that are in effect since 2010. Ridgemark WWTP treatment process and effluent water quality are meeting all permit requirements with the exception of Chlorides.

Table 4‑1: 2019 Average Influent and Effluent Water Quality

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Existing Water Quality** | **RM I SBR Influent** | **RM I SBR Effluent** | **RM I % Removal** | **2010 Permit Requirement** |
| **Parameter** |
| TDS (mg/L) | 745 | 722 | -1.98% | 1,200 |
| Sodium (mg/L) | 182 | 191 | -4.95% | 200 |
| Chloride (mg/L) | 256 | 269 | -5.08% | 200 |
| Nitrate as N (mg/L) | NA | 0.08 |  | 5 |
| Ammonia as Nitrogen (mg/L) | NA | 0.77 |  | 5 |
| Total Nitrogen (mg/L) | 53.5 | 2.6 | 95.14% |  |
| BOD5 (mg/L) | 214 | 4.2 | 98.04% | 30 |
| TSS (mg/L) | 161 | 6.0 | 96.27% | 30 |
| pH | 7.82 | 7.19 |  | 6.5-8.4 |

Data is average of 12 monthly sampling events from Jan – Dec 2019. The Influent TDS for March was excluded from the average as Staff believes that test result to be inaccurate.

The Ridgemark Wastewater Treatment Plant’s SBR treatment process has consistently treated the wastewater effluent to within regulation standards for Nitrate, Ammonia, Total Nitrogen, BOD5, TSS, and pH since it began operation at the end of 2012.

The District achieved compliance with TDS regulations in 2015 and has continued to remain under the limit through 2019. 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 721 mg/L. This is a decrease of 55% in five years.

In 2018, treated wastewater effluent met the regulatory limit for Sodium of 200mg/l and has continued to meet it in 2019. 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.

Along with the Sodium and TDS levels, the effluent Chloride concentration has been steadily declining from 580mg/L in 2014 to 269mg/L in 2019. This represents a decrease of 54% and shows significant progress toward achieving compliance. Based on the current trend from 2014 through 2019, 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 2019 is primarily attributed to the District’s salinity management strategy as described in Section 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, BOD5, and TSS levels in the treated wastewater at the RM I and II wastewater treatment plants, a new SBR treatment plant designed and built as Ridgemark WWTP. The construction contract was awarded in May 2011 and the Sequential Batch Reactors were operational by the end of 2012. Construction of the sludge treatment and drying beds was completed in 2013. RM II influent flow was rerouted to Ridgemark WWTP for treatment in the third quarter of 2013 to consolidate all wastewater treatment at that site.

The Upgrade to the Lessalt Water Treatment Plant, pump station, and a potable water pipeline 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 WWTP customers) to receive softer, 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 to reduce the use of self-regenerating water softeners. These water softeners are a significant source of TDS, Sodium, and Chloride in the wastewater.

Rebates of $250-$300 for customers who remove their brine discharging water softeners have been applied to 21 sewer customers in 2019. At least 237 customers, representing approximately 20% 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 2020 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 completed May 2018.

* Construction began July 2018
* Project was completed September 2019.
* This infrastructure now allows water from West Hills to be delivered to the District’ water and wastewater customers

**North County Groundwater Bank** - Phase 1 Feasibility study to evaluate the water quality and quantity available and overall benefit from this project began in late 2019.

* It will also consider various engineering, financing, environmental, and political options to solve multiple regional issues.

# References

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