

INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS R5-2013-0010
IRONHOUSE SANITARY DISTRICT
IRONHOUSE WATER RECYCLING FACILITY
CONTRA COSTA COUNTY

Background

Ironhouse Sanitary District (Discharger) owns and operates the Wastewater Treatment and Recycling Facility (WWTRF) located at 450 Walnut Meadows Drive in Oakley. The WWTRF treats residential and commercial domestic wastewater from the City of Oakley, Bethel Island, and some unincorporated areas of Contra Costa County. There are approximately 11,750 residential equivalent dwelling units (EDUs) and 2,500 commercial EDUs connected to the sewer system.

Prior to July 2011, the wastewater treatment plant (WWTP) consisted of a headworks, four aerated treatment ponds, and two effluent storage ponds. The unlined aerated ponds had a surface area of 7.5 acres and provided secondary treatment. Treated wastewater was held in effluent storage ponds prior to being recycled for irrigation of fodder crops. The storage ponds have a capacity of 350 acre-feet and were constructed with a low permeability, continuous, vertical cutoff wall along the centerline of the levees. Wastewater was disinfected with sodium hypochlorite prior to discharge to the mainland or Jersey Island land application area (LAA). Approximately, 166 acres of LAA were located on the mainland adjacent to the treatment plant and 434 acres were located on Jersey Island.

The previous WDRs set an average monthly flow limit of 2.0 MGD and allowed an increase to up to 3.0 MGD upon expansion of the Jersey Island land application area (LAA) and approval by the Executive Officer. Completed expansions of the Jersey Island LAA were approved in September 2003, September 2005, and July 2006. The July 2006 water balance showed a capacity of 2.7 MGD as a monthly average.

Changes in the Facility and Discharge

The Discharger constructed a new WWTP that began operation in July 2011 and became fully operational in October 2011. The new WWTP consists of an updated headworks, advanced tertiary treatment, and ultraviolet disinfection. The new WWTP was designed to meet anticipated growth through year 2025 with a treatment capacity of 4.3 MGD average dry weather flow and 8.6 MGD maximum wet weather flow.

Sludge was removed from the four former aerated ponds, which are being backfilled as material becomes available from a local excavation/construction project. The updated biological treatment system consists of anoxic, aeration, and membrane bioreactor (MBR) basins and achieves tertiary treatment by membrane filtration. The treatment basins are constructed of reinforced concrete. Filtered effluent is UV disinfected prior to being recycled on the land application area (LAA), stored in the North Pond prior to application, or discharged to the San Joaquin River, which is regulated under separate NPDES requirements when discharge to the LAA is not feasible.

The newly constructed WWTP has resulted in improved effluent quality for all constituents except nitrate. However, the increase in nitrate is associated with a significant decrease in TKN, which results in a total nitrogen concentration less than 15 mg/L. The effluent TDS concentration has also decreased but is also dependent on domestic use and source water quality. The Discharger states that water softener usage has decreased since 2007 due to the economic decline and that there are a number of vacant foreclosed homes that have water softeners. When existing and new water softeners come online, the TDS concentration is expected to increase.

The hydraulic capacity of the WWTRF is not limited by the constraints of land disposal and storage because the Discharger is able to discharge to the San Joaquin River year round under the NPDES permit. This Order sets an influent flow limit at the design treatment capacity of 4.3 MGD, which is the same flow limit as the NPDES permit.

The previous Order allowed the Discharger to apply biosolids as soil amendment to the LAA fields and this Order also allows the land application of biosolids. The Discharger states that metal concentrations have increased in the biosolids and decrease in the effluent as a result of changing to membrane filtration, which will make loading of metal constituents to the LAA more controllable.

The Discharger periodically takes water treatment (alum) sludge from three Contra Costa Water District water treatment plants. The sludge is stockpiled on Jersey Island prior to being used for maintaining and reinforcing LAA field berms.

Land Application Area

Tertiary disinfected wastewater is recycled on the Jersey Island LAA to grow fodder crops. Jersey Island is an approximately 3,500 acre subsided island below the flow level of the San Joaquin River. Reclamation District 830 maintains the levees that surround the island and dewater the island using a network of interceptor ditches that drain to the northern pumping station. The ditches and pump station are used continuously to keep the shallow groundwater below the land surface. The acreage of the Jersey Island LAA has decreased to 335 acres because the Discharger has removed some LAA fields due to poor soil conditions. The Discharger proposes to apply biosolids and/or commercial fertilizer to the LAA for soil amendment and supplemental nutrients because the total nitrogen concentration of the treated wastewater is not sufficient to meet crop demand.

The Discharger has ceased use of the mainland LAA for water recycling. The mainland area is approximately 165 acres and will be used to grow crops from natural precipitation. This Order allows certain mainland monitoring wells to be abandoned as requested by the Discharger. This Order does not prohibit future irrigation of the mainland LAA fields with treated wastewater. However, this Order requires the Discharger to submit a *LAA Expansion Workplan*, which requires approval prior to use of recycled water or biosolids on the mainland LAA fields. The workplan requires an evaluation of whether groundwater monitoring wells need to be installed.

Groundwater Considerations

On the mainland, shallow groundwater generally flows northward toward Big Break and the San Joaquin River. Groundwater intercepted by the Discharger's return ditches is pumped to the "I parcel", used for mainland irrigation, or discharged to Big Break. Groundwater on the mainland is typically less than 5 feet below ground surface. The base of the effluent storage ponds is about 1 to 4 feet above groundwater. Based on background groundwater monitoring data, groundwater on the mainland is spatially and temporally variable. Based on studies completed by the Discharger, TDS and chloride degradation shown in downgradient monitoring wells is primarily due to naturally occurring salinity. For nitrate, monitoring data shows that degradation has occurred but the improved quality of the effluent will likely prevent further degradation.

Jersey Island is dewatered to maintain groundwater at a depth approximately 2 to 4-feet below the ground surface. WDRs Order 5-01-237 required that the Discharger monitor surface water in the dewatering ditches in lieu of shallow groundwater. Based on the data monitoring, wastewater recycling on the Jersey Island LAA appears to cause groundwater degradation with respect to TDS. The Discharger states that TDS concentrations generally increase after winter rainfall and irrigation events, which supports a conceptual understanding that higher groundwater elevations leach salt from shallow soil layers. The apparent groundwater salinity may also be associated with evapoconcentration of the recycled effluent during irrigation and naturally occurring salts. However, considering the hardness and salinity of the community water supply, the effluent TDS is not unreasonably elevated and evapoconcentration would still occur if another water supply was used for irrigation. On average, wastewater recycling on the Jersey Island LAA has not degraded groundwater with respect to nitrate and the improved effluent quality and agronomic fertilization rates will continue to prevent degradation.

Basin Plan, Beneficial Uses, and Regulatory Considerations

Local drainage is to the Sacramento San Joaquin Delta but the Discharger maintains all storm water onsite. The beneficial uses of the Sacramento San Joaquin Delta, as stated in the Basin Plan, are municipal and domestic supply; agricultural supply; industrial service supply; industrial process supply; navigation; water contact recreation; non-contact water recreation; warm freshwater habitat; cold freshwater habitat; wildlife habitat; migration of aquatic organisms; and spawning, reproduction, and/or early development.

The Basin Plan designates the beneficial uses of underlying groundwater as municipal and domestic supply, agricultural supply, and industrial supply.

Antidegradation Analysis

The Discharger has been monitoring groundwater quality at the site since 1983 when the original wastewater treatment facility was built. The California Department of Water Resources (DWR) has also maintained a piezometer cluster site (DWR-351) near the northeast corner of the North Effluent Storage Pond since 1968. Based on the data

available, it is not possible to determine pre-1968 groundwater quality. Therefore, determination of compliance with Resolution 68-16 for this facility is based on groundwater monitoring data from the Discharger's monitoring well network and, in the case of mainland groundwater quality, well DWR-351. Data from well DWR-351 suggests that discharges from the former wastewater treatment facility diluted naturally occurring saline groundwater on the mainland.

Constituents of concern that have the potential to degrade groundwater include salts (primarily TDS, sodium, chloride, and sulfate) and nutrients. With respect to nutrients such as nitrate and ammonia, the Discharger has implemented best practicable treatment and controls through abandoning the unlined treatment ponds and replacing them with concrete treatment basins and advanced tertiary treatment. The current treatment system is designed to have a total nitrogen concentration less than 15 mg/L. With respect to total coliform organisms, the Discharger has implemented Best Practicable Treatment and Control by replacing sodium hypochlorite disinfection with membrane filtration and UV disinfection. The current disinfection system is designed to have a total coliform organism concentration less than 2.2 MPN/100mL and will not add salinity to the effluent.

While the new WWTP was not designed to remove salinity, the design does limit evapoconcentration of salts during treatment and reduces the addition of salts resulting from sodium hypochlorite disinfection. This Order requires the Discharger to implement treatment or control measures that are currently the best practicable treatment or control available. Therefore, the discharge complies with the Antidegradation Policy.

Discharge Prohibitions, Specifications, and Provisions

Influent flows to the WWTRF shall not exceed the following limits:

<u>Flow Measurement</u>	<u>Flow Limit</u>
Total Annual Flow ¹	1,570 MG
Average Dry Weather Flow ²	4.3 MGD
<u>Monthly Average Flow ³</u>	8.6 MGD

¹ As determined by the total flow for the calendar year.

² As determined by the total flow for the months of August through October, inclusive, divided by 92 days.

³ As determined by the total flow during the calendar month divided by the number of days in that month.

This Order contains effluent limits for BOD, total nitrogen, and total coliform organisms and contains a mass loading rate limit for BOD and total nitrogen to the LAAs.

With the exception of TDS, chloride, sodium, and sulfate, this Order contains groundwater limits that do not allow groundwater degradation beyond that of Primary and Secondary

MCLs and that of current groundwater quality. Compliance with these limitations will be determined annually based on an intrawell analysis using approved statistical methods.

This Order also sets specifications for water recycling; solids disposal; and biosolids and sludge drying, storage, and land application.

The Provisions require the submittal of technical reports that describe the statistical methods used to determine compliance with groundwater limits, the destruction of abandoned wells on the mainland, and any planned expansion of the Jersey Island LAA or reinstating the Mainland LAA.

The Monitoring and Reporting Program is designed to verify compliance with effluent limitations, groundwater limitations, and operational requirements of the WDRs.