



**CASA 2011
Achievement
Award Application**

**Category:
Technological
Innovation and
Achievement
Award**

Ironhouse Sanitary District



CASA GENERAL INFORMATION SHEET

Type of Award

Check One

Technological Innovation and Achievement Award

 X

Public Outreach/Education Award

Organizational Excellence Award

Outstanding Capital Project Award

Name of Agency: **Ironhouse Sanitary District**

Name of Associate Partner (if applicable):

Project/Program Title: **ISD Wastewater Treatment and Water Recycling Facility**

Number of Full Time Employees (FTEs): **34**

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Ironhouse Sanitary District

Technological Innovation and Achievement Award

ISD Wastewater Treatment and Water Recycling Facility

Describe the activity /project.

- a. Acquisition of a new National Pollutant Discharge Elimination System Permit (NPDES) (Central Valley Region – Region 5) in the Western Delta through implementation of advanced treatment technologies.
- b. Construction of a new 4.3 mgd “state of the art” membrane bioreactor (MBR) wastewater treatment plant that produces unrestricted reuse effluent and minimizes environmental impacts.
- c. Abandonment of a dated, and near capacity, aerated pond system with a rated capacity of 2.7 mgd.

2. What was the time frame of the activity/project? How long has it been in operation?

- a. *Please see attachment 1.* Ironhouse Sanitary District (ISD) began planning for expansion and upgrade of its wastewater treatment plant in 1989. In 1994, the Final Environmental Impact Report (FEIR) was adopted. A slowdown in the housing market occurred and the project was placed on hold. Interim improvements occurred in 1996 to temporarily increase treatment capacity. In 2003, just ahead of the housing boom, ISD developed a Wastewater Facilities Expansion Plan Update. In 2005, when the housing market began to pick up, ISD revised the Wastewater Facilities Expansion Plan Update to address a trend of increasingly strict regulatory requirements (water quality). In 2007 an updated (supplemental) FSEIR was adopted. Within the FSEIR, 4 project alternatives (**all addressed at a project level of analysis**) were developed to investigate several modes of addressing water quality and environmental protections, as well as costs and feasibility concerns; and ultimately select the most desirable alternative without further delay/analysis. The alternatives involved regionalization with two separate nearby wastewater agencies as well as a number of disposal options and discharge locations. In the end, ISD determined construction of a new MBR treatment plant, along with continued land disposal (both on ISD owned lands), coupled with a **new** river discharge was the most environmentally sensitive, cost effective, and feasible alternative to implement.

3. What were the goals and objectives of the activity/project:

- a. ISD’s specific objectives for the project were:

- Obtain a new NPDES permit for discharge into the San Joaquin River in the Western Delta to compliment ISD's storage and land application operation (WDR permit).
- Design a facility utilizing advanced treatment technologies to support a new NPDES permit with stringent water quality objectives.
- Design a facility that provides for near term (15 years) growth, and could be easily expanded to accommodate build-out growth, as well as meet ever changing water quality objectives.
- Utilize environmentally sensitive, sustainable and cost-effective modes of wastewater treatment and discharge such as membrane filtration, UV disinfection, land application, storage, and recycling.
- Design a facility that provides a high level of redundancy throughout the treatment and disposal process, and can adapt to possible sea level rise.
- Design the facility **in-house** to reduce costs, allow rapid adaptability, and better control the schedule.

4. **What were the results of the activity/project? Were the goals and objectives met and, if so, how were they measured?**

The results of the activity was: NPDES permit acquired; MBR treatment plant designed, bid and constructed (95% complete at application writing); design accommodates future growth via modular components, and a properly oversized pad site; design accommodates possible future water quality changes via pad site (and some advanced plumbing) to house future Reverse Osmosis (RO) and Class A drying facility for bio-solids (class B bio-solids produced initially); design utilizes UV disinfection at the plant and utilizes a combination of storage (80 million gallons), land application on over 450 acres, river discharge into the San Joaquin River, and lastly, provides for recycling in the future when users become available; design provides for redundancy at all process levels and in the discharge via storage, land and river discharge options; pad site is elevated 2.5 feet above 100 year floodplain and can accommodate future floodwall if further protection from sea level is necessary. The majority of the civil and mechanical design was accomplished in-house via the District Engineer (Jenny Skrel), with the balance of the design needs (geo-tech, structural, HVHC, electrical, Architectural, etc...) coordinated

via the District Engineer (the design, with all costs of design consultants included, *was accomplished for approximately 3.8% of the Engineer's Estimate – saving millions*); the design was completed on time.

5. What was the extent of participation in the activity/project by nominee, and/or employees of the organization?

- a. ISD staff, General Manager and District Engineer, actively managed the following:
 - i. Preparation of the initial Wastewater Facilities Plan prepared in 1991 and the Plan updates.
 - ii. Assistance with preparation of the DSEIR; with staff developing the four alternatives evaluated, to actually writing sections of the document.
 - iii. Obtaining the new NPDES permit issued by the Central Valley Regional Water Quality Control Board. Staff prepared a substantial portion of the Report of Waste Discharge. *Despite eleventh hour opposition from the Executive Officer and concerns expressed from RWQCB Board President, ISD staff collaborated with CVRWQCB staff to fine tune provisions in the NPDES permit and garnered other regulatory agency support. This allowed the NPDES permit to be **unanimously approved** by the RWQCB of directors.*
- b. District Engineer designed new facility in-house **and** provided Engineering Services during Construction.

6. Is the activity/project broadly replicable by others?

- a. All plants and available property are unique; however, concepts and ideas implemented at ISD, and operational lessons learned could be replicated at other WWTPs. For example, 1) utilization of existing facilities such as a storage pond (38 million gallons) used now with the new facility for non-compliant water storage, providing up to 12 days of emergency storage, and using a 76 million gallon storage pond for treated effluent, 2) utilizing primary power (21KV) which will provide a savings on the annual power costs, directly into the electrical building for the new plant (saves on the purchase price for power annually), 3) elevating the pad for the new facility well above the 100 year floodplain utilizing available on-site fill material, 4) utilizing rammed-aggregate-piers for soil stabilization (cost savings over piles and stone columns), and 5) utilizing advanced treatment technologies to decrease the pad footprint, and reduce the amount of concrete and steel for the project by >50%.

7. How does the program/project utilize sustainable practices?

- a. Better quality effluent (nitrified, denitrified, membrane filtered and UV disinfection) will have less impact on groundwater underlying agricultural irrigated fields and meet stringent NPDES requirements.
- b. Multiple disposal options designed to maximize operational flexibility including pond storage, agricultural irrigation where crops (different types of hay) are grown, harvested, and sold by agency personnel, and a river discharge permit allowing for year-round discharge.
- c. WWTP designed to adapt to future regulatory compliance via pre-design for facilities such as reverse osmosis and Class A sludge.
- d. Plant designed to allow retreatment of non-compliant water.
- e. Triple redundancy on power supply via two power feeds from PG&E and two separate on-site standby generators designed to power the entire facility.
- f. WWTP site (approx. 6.5 acres) and miles of discharge pipeline were configured so **no** surrounding wetlands were impacted.
- g. Environmental protections implemented in the design and construction, as well as utilizing UV-disinfection which eliminates use of hazardous chemicals/materials on-site and creation of hazardous by-products. Use of UV disinfection also improves the safety of ISD employees and the neighboring communities.
- h. Elevating the entire “build-out” pad footprint to address flooding and future sea level rise.

8. How does this project/activity meet the criteria of this award?

- a. The ISD plant is the most advanced wastewater treatment plant in Contra Costa County, designed with advance technologies, redundant features, on a small pad; saving millions of dollars on design and construction costs.
- b. Numerous sustainable features

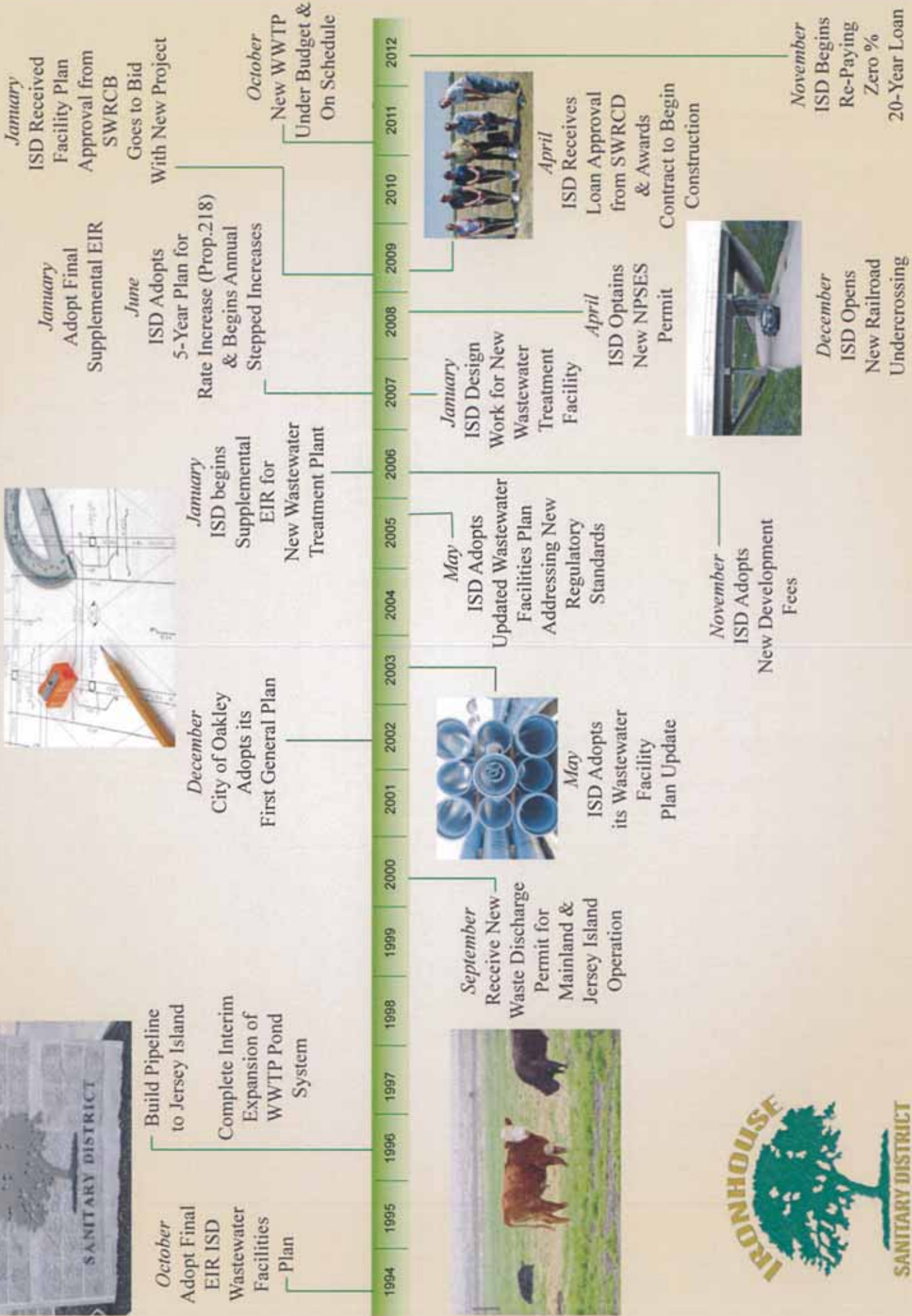
9. Additional information:

- a. Please see attachment 2.



Attachment 1

Ironhouse Sanitary District Timeline





Attachment 2

IRONHOUSE SANITARY DISTRICT WASTEWATER TREATMENT AND RECYCLING FACILITY



Effluent Pump Station



Membrane Reactor Basins



Solids Handling Building



UV Disinfection



Aeration Basin Membrane Diffusers



Headworks - Drum Screens

Additional Information

Innovation is not anything new to Ironhouse Sanitary District (ISD). ISD is a group of “out-of-the-box” thinkers, and has been from the very beginning. Even as the Board of Directors has changed over the years, the innovative culture at ISD has carried on, and has always been complimented by newcomers to the District. ISD continues to be innovative as is briefly described below.

ISD serves a population of approximately 38,000 (approx. 14,200 connections) including the City of Oakley and Unincorporated Areas of Bethel Island, Dutch Slough and Sandmound. The service is approximately 36.6 square miles and the ISD Board consists of 5 elected Directors.

ISD is a small (34 employees) “can do” agency with tremendous in-house resources which can be seen through the following activities:

- i. Has the in-house talent to design its very sophisticated MBR treatment facility, and other engineering projects, in-house. In addition, ISD has the in-house talent to operate and maintain its collection, treatment, and disposal facilities with minimal third party assistance, as well as operate an active 3,500 acre ranch (including a 2,100 head herd of cattle).
- ii. Owns and maintains approximately 4,000 acres of land (including Jersey Island, a 3,500 acre Western Delta Island) used for effluent disposal, hay production, and where approximately 2,100 head of cattle (owned and operated by ISD) graze and are calved twice a year and sold at auction (at the 800 lb. weight) to generate a significant alternate source of revenue for the rate payer.
- iii. Operates and maintains approximately 120 mile of gravity, and 25 miles of forcemain collection system including 34 collection system pump stations (very flat service area) with all maintenance, including confined space entry, done in-house.

- iv. Environmental conscience agency as seen through the involvement of the following:
- a. Since 1983, been recycling 100% of its treated water on lands owned and operated by the District to grow, harvest and sell varieties of hay as part of completing the treatment process. In addition, since the District does not irrigate all of its land, the balance of the land on Jersey Island is grazed with District owned and operated cattle to help control the on-island vegetation. ISD believes this process to be much more environmentally sound (as opposed to purchasing more equipment, burning much more diesel fuel, and hiring additional employees to mechanically maintain the vegetation). Also, a percentage of the hay (about 25%) produced by the ISD irrigation process is sold to the ISD cattle, with the balance being sold to local ranchers as well as feed lots in the central valley. The revenue from hay sales helps offset the cost of treating and disposing of the reclaimed water. In addition to being environmentally friendly, the cattle operation provides a net profit for the rate payer which is also used to help keep rates lower.
 - b. Partnering proposal in place with the Dutch Slough Wetlands Restoration Project (Department of Water Resources) in the Western Delta where ISD proposes to provide up to 600,000 cyds of fill material to enhance DWR's 1,200 acre wetland restoration project as well as develop up to 90 additional acres of tidal wetlands on ISD property. This opportunity, if successful, will be a win, win, win for the environment, for the community, and for the ISD rate payer!
 - c. Involvement with the Delta Science Center (DSC). ISD Board President is also President of the Delta Science Center which has established science and educational opportunities regarding the Delta for over 5,000 east and central Contra Costa County fifth graders. While the DSC is its own non-profit organization, ISD has been an active supporter of this

environmental outreach project/group since 1993, when it included the first concept of the DSC in ISD's initial 1994 EIR for expansion, analyzing the potential environmental impacts of constructing a DSC facility on ISD property. ISD continues to be a supporter of the DSC, and the DSC continues to expand its reach and depth.