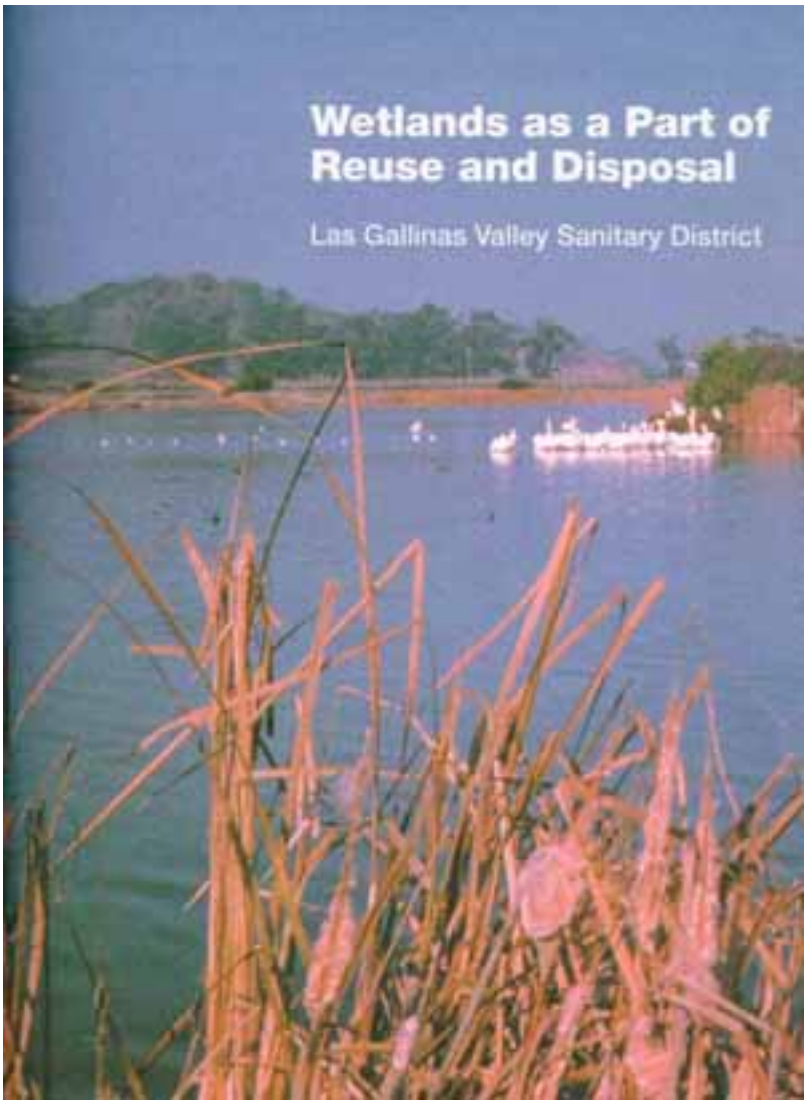
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Marin Co., CA - Wetlands as a Part of Reuse and Disposal: Las Gallinas Valley Sanitary District



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Introduction

Where can you find herons roosting in trees and 31/2 miles of public access trails on the edge of San Pablo Bay? The answer is at Las Gallinas Valley Sanitary District's Wastewater Reclamation Project in Marin County, California. The District has created a multi-faceted reclamation project that includes a freshwater marsh, irrigated pasture, storage ponds, a saltwater marsh and miles of trails for hiking, biking and bird watching.



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History

A regional planning effort for eastern Marin and southern Sonoma counties began in the early 1970's. The goal of the planning was to improve effluent water quality to meet the increased requirements of the Clean Water Act. The best apparent alternative identified in 1977 was to discharge treated effluent to the shallow waters of the Bay, but only on high tides, and to begin reclamation for landscape irrigation.



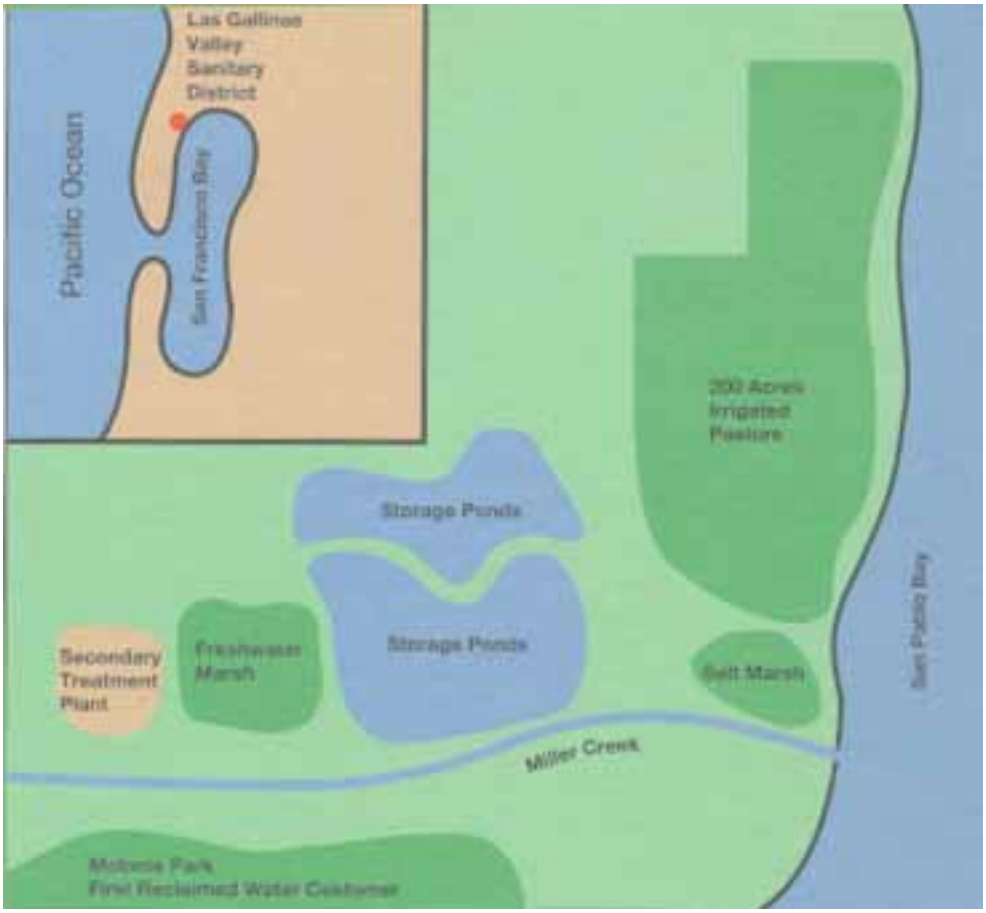
The agencies determined that this did not afford the shallow waters of San Pablo Bay, the northern most portion of San Francisco Bay, enough protection. They decided to require an elimination of any discharge of treated wastewater effluent to the shallow fringes of the Bay and its tributary creeks during the summer months.

The planners were frustrated by the moving target, but they went back to the drawing boards and developed a plan for treatment and disposal that would meet all of the requirements. In order to meet a requirement of no summer discharge the plan needed to include storage capacity and alternative disposal options. So they developed a project that included many forms of reuse and disposal.

Las Gallinas' wastewater reclamation project is a 385 acre complex including 200 acres of irrigated pasture, 40 acres of storage ponds, a 20 acre freshwater wetland, a 10 acre salt marsh, and landscape irrigation. The District has an agreement with the local water agency for reclamation of up to 350 million gallons of treated effluent per year for landscape irrigation.

Las Gallinas Valley Sanitary District was formed in 1954 by residents who were faced with serious

health problems from failing septic tanks and pollution in Gallinas Creek. The District now serves a community of approximately 30,000 people in northern Marin County. The District's influent is predominantly residential including discharges from some commercial and light industry sources. The treatment facility has a design capacity of 2.9 million gallons per day.



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Treatment and Reclamation

The treatment plant was expanded and upgraded in 1984, when the reclamation project was constructed. The project received state and federal Clean Water Grant funds for 87.5% of the costs. The treatment consists of grit removal, clarification, two stage biofiltration, ammonia removal, filtration, chlorination, and dechlorination. The treated effluent goes to a combination of the marsh, the creek, or the storage ponds, depending on the time of year. For nine months out of the year the effluent from the marsh is discharged to Miller Creek and San Pablo Bay. During June, July, and August, the discharge is stored in 40 acres of ponds and used to irrigate the pasture and for the water agency's recycling program.

Las Gallinas Valley Sanitary District Design Criteria

Design Year.....2001

Population.....34,711

Average Dry Weather Flow.....2.69 mgd

Peak Dry Weather Flow.....4.3 mgd

BOD Loading.....5434 lbs/day

TSS Loading.....5738 lbs/day

Irrigated Pasture.....200 acres

Marsh/Pond.....20 acres

Storage Ponds.....40 acres

Irrigated Landscaping.....20 acres

The 200 acres of pasture is subdivided into sections so that it may be irrigated on a rotating schedule. The irrigation must be done in June, July, and August to dispose of the effluent, however depending on the weather and the needs of the pasture, it is usually irrigated through November. The irrigation schedule rotates among the fields with a goal of the disposal of a target number of gallons per month.

Marin County is located on a narrow peninsula north of San Francisco. The County’s drinking water reservoirs have relatively small watersheds and under extreme draught conditions have been nearly emptied. In seeking to develop new sources of water, the water district approached Las Gallinas to discuss the potential for reclamation. The agreement that was developed allows the water district to purchase up to 350 million gallons of Las Gallinas’ effluent per year. The effluent receives further treatment and is then sold for landscape irrigation, helping the limited potable water supply to stretch further.

The 20 acre freshwater marsh/pond was designed to incorporate a number of different wildlife habitat types into a single unit. This is accomplished by varying the depths of the water and the types of vegetation that colonize each area. The central area is the deepest, more than six feet under normal operation. The deep central area is ringed by a two foot deep zone that was designed to become inhabited by emergent vegetation such as tall thin bulrushes. There is an overflow zone that is only inundated during winter rains and when the marsh/pond is needed occasionally to store additional effluent near the end of the summer. The five islands are the final physical component of the marsh.

The most important part of the marsh/pond is not its physical configuration but its biological inhabitants.

The wide variety of plants and animals make the area interesting to the many visitors that walk, jog, or bike around the perimeter. There are many regular bird watchers that keep track of the resident and migratory populations that use the reclamation project. Members of the Marin Audubon Society have observed over 147 species of birds in the reclamation project areas.



There are over 40 species of plants in the marsh/pond ranging from submerged pond weeds to emergent cattails. There are willow trees and acacias on the islands, grasses, and shrubs on the banks. The grasses on the islands produce seeds that are eaten by small rodents and serve as cover for waterfowl nesting. Mallards, coots, and Canada geese nest and raise their young at the marsh/pond. A portion of one of the islands is barren and has a gentle slope up from the water. This area is a favorite resting place for the cormorant.

The island's trees provide roosting habitat for a wide variety of birds including snowy and great egrets, black-crowned night heron and the great blue heron. Occasionally there is even competition for roosting space among the tree branches. A long-eared owl rested not so peacefully in a willow tree one February afternoon when a red-shouldered hawk perched barely 3 feet above its head in the same tree and screeched incessantly, trying unsuccessfully to get the owl to move.

The wading herons and egrets and the diving pelicans and cormorant are probably attracted to the wetland not only for resting but to feed on the plentiful small fish in the pond. The flock of dozens of large white pelicans that frequent the marsh are a favorite of visitors. There are small mosquito fish as well as carp that grow to fourteen inches in length. Many other animals use the marsh/pond including noisy bullfrogs, snakes that shed their old skins intertwined among the tall grasses, raccoon, jack rabbits, deer and muskrat. The muskrats aren't always welcomed by the wetland manager because they tend to dig tunnels in the levees.

The salt marsh restoration project was completed to diversify the types of wildlife habitat. The salt marsh is fed by water from the Bay and does not receive any treated effluent.

Water Quality

The Las Gallinas Valley Sanitary District produces a high quality, advanced secondary effluent. The average flow in 1992 was 2.7 million gallons per day, during the months when the effluent is discharged to Miller Creek and the Bay. The purpose of the treatment plant and reclamation project is to keep as much of the pollutant load from entering the environment as possible. In 1992 the plant removed 95% of the organic material that would enter the creek and bay. These biochemical oxygen demanding substances would use oxygen to complete decomposition. It is this oxygen that is needed by fish and other aquatic organisms for their survival. The concentration of ammonia in the effluent is reduced substantially, to a level that is not harmful to fish in the marsh/pond or the creek.

Las Gallinas Valley Sanitary District
Effluent Water Quality, 1992 Averages

Parameter	Monitoring Frequency	Average Concentration
Biochemical Oxygen Demand	3x/wk	9.9mg/L
Total Suspended Solids	3x/wk	14mg/L
Oil and Grease	1 mo	<5mg/L
Settleable Solids	daily	0.06m/l/L/hr
pH	daily	6.6 units
Ammonia Nitrogen	1/mo	2.3mg/L
Arsenic	1/mo	<2ug/L
Cadmium	1/mo	<1ug/L
Chromium	1/mo	<2ug/L
Copper	1/mo	18ug/L
Cyanide	1/mo	<10ug/L
Lead	1/mo	<2ug/L
Mercury	1/mo	0.3ug/L
Nickel	1/mo	3.5ug/L
Silver	1/mo	2.3ug/L

Zinc	1/mo	75ug/L
Phenols	4x/yr	<50ug/L



Costs and Benefits

The reclamation project was constructed in 1984 for a cost of $6.5 million dollars, including the land acquisition. Approximately 87.5% of the project funding was from state and federal Clean Water Grant funds administered by the Environmental Protection Agency. The project was recognized for Engineering Excellence in a competition sponsored by the Consulting Engineers Association of California and indeed the residents of the District are proud of the treatment system and enjoy the benefits of the reclamation project. Each and every day people can be seen walking dogs, gazing through binoculars at their favorite birds, and jogging around the marshes.



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