



Fernald Preserve Alternative Wastewater Treatment On-Site Biotreatment Wetland at the Visitors Center

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The use of constructed wetlands for treatment of domestic wastewater at the Fernald Preserve contributed to the award of Leadership in Energy and Environmental Design platinum certification from the U.S. Green Building Council.

The Fernald Preserve biotreatment wetland includes both surface flow and subsurface flow components. It is designed as a zero discharge system, with the objective of providing tertiary treatment for 100 percent of wastewater generated.



Surface Flow Wetlands

- Resemble natural marshes or wetland areas
- May have pools of standing water
- Are typically less expensive to construct
- Require more land area
- Look more natural
- Attract more wildlife to the area

Subsurface Flow Wetlands

- Treat wastewater in gravel beds below the ground surface
- Typically do not have any freestanding water
- Are better suited to colder climates

Advantages of Biotreatment Wetlands

- Utilize cost-effective technology
- Have lower capital, operation, and maintenance costs
- Are constructed from natural materials
- Do not require chemicals, such as flocculants that generate large amounts of biosolids
- Have no major energy inputs other than sunlight
- Enhance the habitat
- Tend to be more aesthetically pleasing than alternative methods



Septic tanks are set into place.



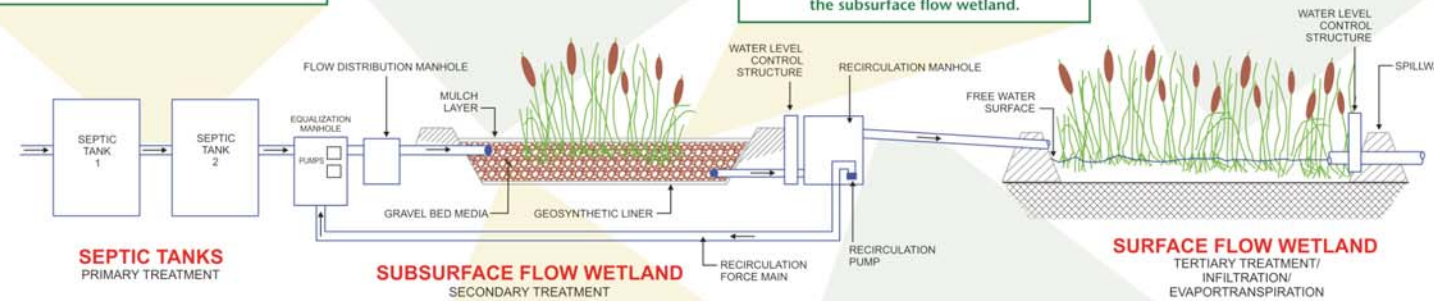
A three-inch mulch layer is applied to the subsurface flow wetland.



New vegetation is kept saturated in the subsurface flow wetland.



Soil amendments are added to the surface flow wetland basin.



Biowetland Area

Fernald Preserve Visitors Center System Description

The biotreatment wetland alternative complements the environmental theme of the Visitors Center. The system comprises the following components:

- Two 7,571-liter (2,000-gallon) septic tanks in series
- A flow equalization manhole with a redundant pumping system
- A flow distribution manhole
- Two parallel subsurface flow wetland cells, each measuring 259 square meters (2,790 square feet)
- A water-level control gate (for the subsurface flow wetland)
- A recirculation manhole with a pump
- A surface flow wetland with an evapotranspiration/infiltration area that measures 0.62 hectare (1.53 acres)
- A water-level control gate (for the surface flow wetland)
- An emergency spillway



Subsurface flow wetland piping and gravel bed are installed.



Outlets to the surface flow wetland basin are installed.

System Startup and Operation

- Startup testing began as soon as construction was complete
 - The septic tanks were opened to receive flow from the Visitors Center
 - The valve between the septic tanks and the flow equalization manhole was locked shut until the system was modified and tested
 - Potable water was added to the flow equalization manhole to test the system
 - Float switches which control the pumps in the flow equalization manhole were positioned based on operating experience with other lift stations at the site
 - The lowest float turns off the pump (or pumps)
 - The second float starts one pump
 - The third float starts the second pump so both are operating at the same time
 - The fourth, and highest, float trips the high-level alarm and light
 - An alternating relay was added to the flow equalization pump control panel to equalize use of the pumps (consistent with operation of other site lift stations)
 - Water was pumped through the flow distribution manhole into the subsurface flow wetland. Tendency of water to flow to the east side of the subsurface flow wetland was determined not to be problematic
 - The plates in the water-level control structure downstream of the subsurface flow wetland were adjusted to maintain the desired depth in the subsurface flow wetland
 - Water flowed into the recirculation manhole and was pumped back to the flow equalization manhole
 - The floats for the recirculation manhole pumps were adjusted to maintain a level in the manhole that will allow water to flow to the surface flow wetland when desired
- After testing was complete, the inlet valve was unlocked and opened, and the system was officially placed in service.

Testing for System Effectiveness

- All operations personnel are trained to use the system
 - Key operating components are checked weekly
 - Vegetation and non-mechanical parts are checked monthly
 - A sample is collected routinely and analyzed for carbonaceous-biochemical-oxygen demand
 - Sampling will continue as long as analytical capability exists at the site
- Only two cycles during the testing process returned detectable results. These tests occurred at a time when the plants in the wetland had not become fully established.

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Legacy Management Goals



Protect human health and the environment through effective and efficient long-term surveillance and maintenance. This goal highlights the Department's responsibility to ensure long-term protection of people, the environment, and the integrity of engineered remedies and monitoring systems.

Preserve, protect, and make accessible legacy records and information.

This goal recognizes Legacy Management's commitment to successfully manage records, information, and archives of legacy sites under its authority.



Support an effective and efficient work force structured to accomplish Departmental missions and assure contractor worker pension and medical benefits.

This goal recognizes the Department's commitment to its contracted work force and the consistent management of pension and health benefits. As sites continue to close, the Department faces the challenges of managing pension plan and health benefits liability.



Manage legacy land and assets, emphasizing protective real and personal property reuse and disposition.

This goal recognizes a Departmental need for local collaborative management of legacy assets, including coordinating land use planning, personal property disposition to community reuse organizations, and protecting heritage resources (natural, cultural, and historical).



Improve program effectiveness through sound management.

This goal recognizes that Legacy Management's goals cannot be attained efficiently unless the federal and contractor work force is motivated to meet requirements and work toward continuous performance improvement.



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