



Project Summary

IslandWood – A School in the Woods, Bainbridge Island, WA

IslandWood is unique multi-use learning center on Bainbridge Island, near Seattle Washington. With no sewer available, all wastewater from its facilities is managed on-site. A Living Machine® system provides wastewater treatment for core facilities and an educational tool.



Due to increases in attendance and changes in the program curriculum, the wastewater loading exceeded capacity of the original treatment system built in 2001.

Aqua Nova Engineering, PLC, worked with IslandWood's facilities Director and Washington Department of Health to develop a low-cost upgrade to the existing system that re-used many of the existing components. Upgrades were completed under a design-build agreement. Aquacare Environment, Inc. was the general contractor and Aqua Nova provided engineering, oversight and commissioning services.

Influent flow equalization of 5,000 gallons allows a smaller treatment system to handle peak flows and with 3,000 gallons of effluent equalization the existing disposal facilities were sufficient.

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The upgraded Living Machine System is based on three-stages of engineered wetlands.

- Stage 1 – reciprocating Tidal Flow Wetland cells remove most of the BOD and TSS.
- Stage 2 – aerated Forced Bed Wetlands remove ammonia by converting to nitrate.
- Stage 3 – vertical flow wetland for polishing to disposal quality
- Filtration and UV disinfection system - high quality effluent for toilet flushing reuse.
- Controlled recycle from Stage 3 to the Primary tank provides nitrogen removal by denitrification.

The Tidal Flow wetland cells were constructed in two 17' diameter glass-lined steel tanks with special aggregate on top on a continuous under-drain. The Stage 1 water volume is pumped back and forth between the two cells with an influent dose into Cell 1 displacing an effluent slug from Cell 2. The filling-and-draining multiple times per day delivers all the air needed for high rate treatment by the microbial biofilms attached to the media. Specially selected pumps move a large volume of water with a minimum amount of energy input.

The system operation is mostly automated through a programmable logic controller with a touch-screen, graphical user interface. The controller can be accessed remotely through an internet connection for adjustment and review of alerts/alarms sent out via email.

Aqua Nova also provided construction oversight and component procurement services. After completion in February 2012, Aqua Nova staff commissioned the system and continues to provide operations support to the IslandWood staff that are operating and maintaining the system. The internet accessible controls system allows Aqua Nova to remotely check system performance and help operations staff make adjustments and assist with troubleshooting.