



Moskito Island Eco-Machine®



The Moskito Island Eco-Machine makes best use of slope with a terraced water garden design

Background & Design

Moskito Island is a 120-acre private island located within the British Virgin Island's North Sound. In 2007, Sir Richard Branson of Virgin Group purchased the island and made plans to develop it into an 'eco-resort' that would serve as a model for sustainable tourism in the Caribbean. In 2010, a master plan of the island was completed, which included provisions for transportation, renewable energy and sustainable water infrastructure to serve 20 villas and communal event spaces.

On the dry tropical islands of the Caribbean, freshwater is a precious commodity. The design team, led by Ultraway Holdings and KAO Design Inc., selected an Eco-Machine designed by John Todd Ecological Design for onsite wastewater treatment. The Eco-Machine treats all domestic sewage generated on the island to a level where it can be reused for site irrigation.

The Moskito Island Eco-Machine not only provides a solution for sustainable water infrastructure, it protects the waters of the North Sound and serves as an aesthetic amenity to the island and its visitors. This Eco-Machine is designed as a unique terraced water garden that is pleasing to visitors and provides habitat for native iguanas, dragonflies and migrating birds. Work was completed on the

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|------------------------|---------------------|
| Waste Stream | Domestic Wastewater |
| Treated Flow | 29,000 GPD |
| HRT (hours) | 3 days |
| Treatment Level | Tertiary |
| Foot Print | 1,320 sq ft |
| Year Built | 2015 |



Moskito Island Eco-Machine in 2015.

The Moskito Island Eco-Machine was designed to successfully handle periods of low flow and abrupt periods of heavy use. The system's custom design takes advantage of the steeply sloped marginal lands and provides treatment in a narrow, multi-levelled system.

Treatment Process

The Moskito Island Eco-Machine uses a series of deep aerated wetland cells, horizontal flow wetlands and open aquatic chambers to treat up to 29,000 gallons per day of domestic wastewater.

Wastewater flows first through a series of underground septic storage tanks, which provide primary treatment and removal of settle-able solids. From the septic storage tanks, effluent is dosed into a deep aerated wetland chamber, followed by vertical and horizontal flow wetlands. In the wetlands nutrient rich wastewater is consumed by root-associated microorganisms and is then converted into humic matter. Zones of aeration and mixing, followed by anoxic areas, allow for the removal of nitrogen. From the lowest wetland, gravity continues to move water into a series of six deep aquatic cells. The ecology of these cells mimic that of a small pond. In these cells nutrient-rich water forms the basis of a food web that includes an abundance of organisms from all five kingdoms of life. Microscopic algae, fungi, bacteria, protozoa, snails, fishes and zooplankton all thrive in this diverse aerobic environment. In these cells any remaining nutrients are consumed and any contaminants, cleaning products and pharmaceuticals are converted into benign biomass and clean water. A series of cartridge filters and ultra violet disinfection provide final polishing of treated effluent. Treated water is then discharged into a holding tank for irrigation.



Wetland cells under construction



Moskito Island villas

(photo courtesy of Jim Dobson)