

MARTIN

ecosystems

Water Treatment

*innovative, cost-effective
and natural solutions for:*

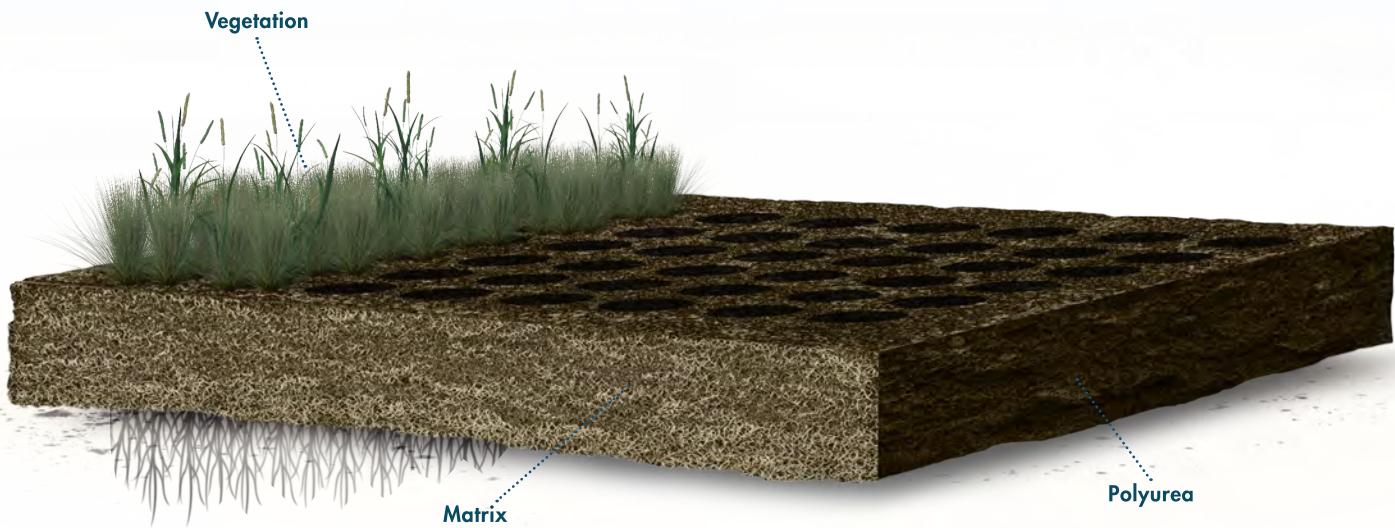
- ◆ wastewater treatment
- ◆ stormwater treatment



Technology *Powered by Water*

Martin Ecosystems is an environmental technology company that manufactures products designed to protect coastal marine environments, treat stormwater and wastewater while beautifying

waterscapes. Reinforced by the Matrix's high tensile and tear strength and open cell design, our products are lightweight, sustainable and cost-effective.



Standard MATRIX Properties

Properties	Value*
Thickness	43 mm
Weight	43 oz/yd ²
Tensile & Tear Strength	40 lbs./in.
Volumetric Displacement	1015 ml/cubic ft.
Surface Area	124 ft ² /ft ³ of Matrix

*Based on one standard layer of Matrix



Plastic Makes Perfect

Martin Ecosystems' Floating Treatment Wetlands (FTWs) are manufactured using 100% recycled PET plastic. The PET fibers are bonded together forming a nontoxic, nonwoven fibrous Matrix. This creates the advantage of having an open structure while retaining high tensile and tear strength.

The Polyurea Difference

FTWs are coated with a marine and food-safe polyurea which increases the tensile and tear strength of the Matrix while providing UV protection.

How Do Our Floating Treatment Wetlands (FTWs) Work?

Floating Treatment Wetlands (FTW) use three well known scientific principals to treat water bodies. "FTWs provide a foundation for vegetation to grow hydroponically (1). The Matrix is open and porous, allowing the plant roots to spread throughout, creating a vast surface area for pollutant eating microbes and bacteria to attach and take on their role of bioremediation (2)- the use of microorganisms to remove pollutants. Microbes and bacteria attach to the plant roots and the Matrix, where they secrete a sticky biofilm. Treatment occurs when Total Suspended Solids (TSS) are either trapped by the biofilm or settle to the water bottom and bioremediation takes place when unwanted organic matter and nutrients, including Biochemical Oxygen Demand (BOD), nitrogen and phosphorus are digested by the microbes and bacteria. The plants themselves also digest the unwanted nutrients through phytoremediation (3). What makes Martin Ecosystems' FTWs unique is the vast amount of surface area created by the matrix in addition to the plant roots for microbes and bacteria to survive in the water column.



Biological treatment takes place below the water where hanging root systems grow.

1 *Hydroponics*

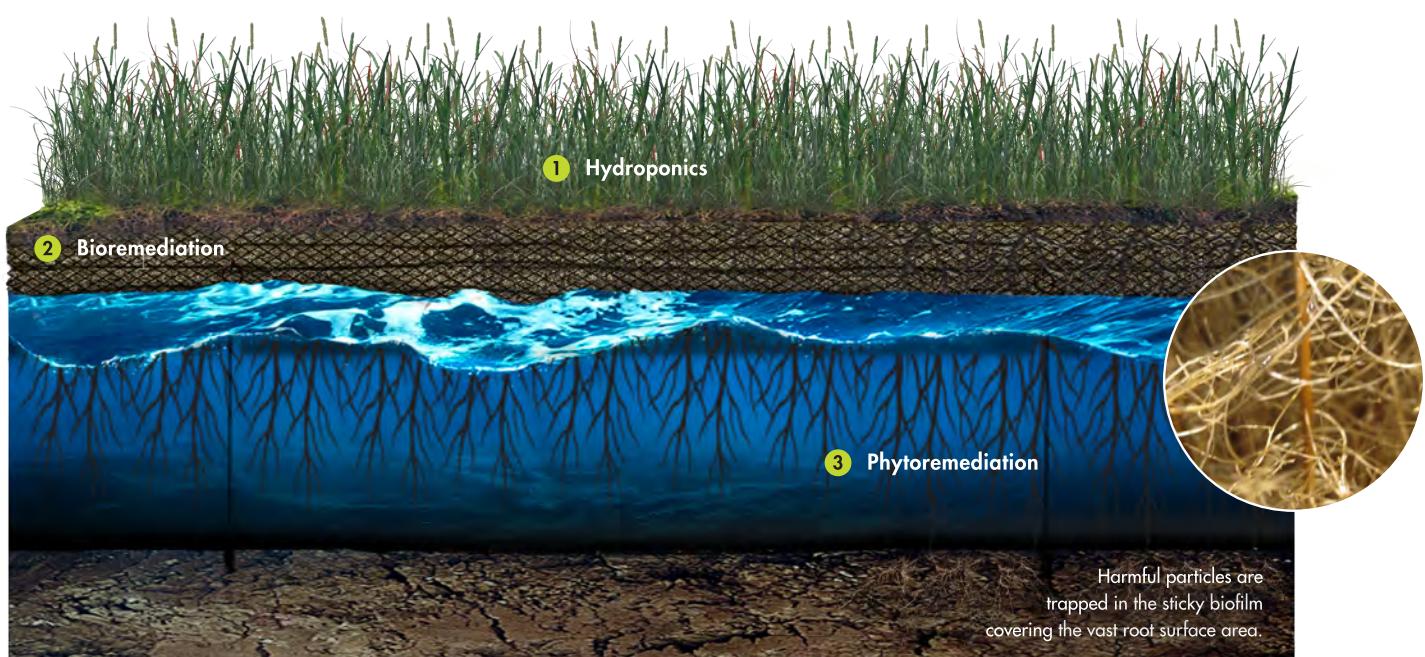
The Matrix allows for vegetative growth without soil.

2 *Bioremediation*

The open cell design of the Matrix allows for microbes to live and consume pollutants.

3 *Phytoremediation*

A network of hanging roots uptakes harmful nutrients and pollutants.



Biological Wastewater Treatment

FTWs have proven to be a cost-effective solution for wastewater treatment. They can be retrofitted into existing water treatment lagoons or designed into newly constructed facilities with very low capital cost.

There are three key elements for FTW Wastewater Systems to operate efficiently:

1. Surface Area
2. Flow Control
3. Hydraulic Retention Time

Our FTW Wastewater Systems are custom designed to incorporate all three key elements, allowing them to have a remarkable effect on:

- Anaerobic Digestion
- Odor Mitigation
- Nitrification Processes
- Removal of Total Suspended Solids (TSS)
- Biochemical Oxygen Demand (BOD)
- De-Nitrification Pond Polishing
- Reduction in Fecal Coliforms
- Reduction in Phosphorus

“ We've been very happy with our FTWs. Our total phosphorus has dropped by 41% and our total nitrogen has dropped by 31%. ”

— Dusty Davidson,
City of Dresden



**Floating Treatment Wetland
Wastewater System**



This wastewater treatment system is independently tested with performance data as follows:

Pollutant	Influent mg/l	Effluent mg/l	Removal Rates
Biochemical Oxygen Demand (BOD)	128.6	20.5	>84%
Total Suspended Solids (TSS)	48.4	21.4	>55%
Total Nitrogen (TN)	26.5	12	>54%
Total Phosphorus	3.5	2.08	>40%

Biological Stormwater Treatment

In Stormwater applications, the installation of Floating Treatment Wetlands into inlet zones or detention ponds greatly enhances the stormwater cleaning process by removing:

- Total Suspended Solids (TSS)
- Total Nitrogen (TN)
- Total Phosphorus (TP)
- Heavy Metals
- Fine Colloidal and Particulates

This wastewater treatment system is independently tested with performance data as follows:

Pollutant	Average Removal
Total Suspended Solids (TSS)	26 lb./year/ft ²
Total Nitrogen (TN)	1.7 lb./year/ft ²
Total Phosphorus (TP)	0.5 lb./year/ft ²



"The pond alone removed nitrogen and phosphorus but the [FTWs] were found to enhance that removal capacity by decreasing suspended algal growth and increasing denitrification. The combined effect of the [FTWs] on the ponds has been a decrease in organic nitrogen and nitrate nitrogen in the pond outflow."

— CH2MHill

Product Treatment & Application



Stormwater Floating Treatment Wetland

- ◆ Total Suspended Solids (TSS)
- ◆ Total Nitrogen
- ◆ Total Phosphorus
- ◆ Heavy Metals Treatment
- ◆ Fine Colloidal and Particulates

Applications

- ◆ Stormwater Treatment Ponds
- ◆ Land and Pond Restoration
- ◆ Lagoon Augmentation
- ◆ Reservoir Treatment
- ◆ Algal Bloom Prevention
- ◆ Beautification and Landscaping



Wastewater Floating Treatment Wetland

- ◆ Anaerobic Digestion
- ◆ Odor Mitigation
- ◆ Nitrification Processes
- ◆ Removal of Total Suspended Solids (TSS)
- ◆ Biochemical Oxygen Demand (BOD)
- ◆ Denitrification Pond Polishing
- ◆ Reduction in Fecal Coliforms
- ◆ Reduction in Phosphorus

Applications

- ◆ Tertiary Wastewater Lagoons
- ◆ Industrial Wastewater

Best Management Practice (BMP) Recognition for the Chesapeake Bay Watershed

In June of 2016, the Chesapeake Stormwater Network and Chesapeake Research Consortium officially recognized FTW as a BMP for stormwater wet ponds and wastewater lagoon retrofits.* This includes the states of Delaware, Maryland, New York,

Pennsylvania, Virginia, and West Virginia whose runoff contribute to the Chesapeake Bay watershed. The FTW retrofits can be installed into existing ponds to earn Total Suspended Solids (TSS), Total Nitrogen (TN), and Total Phosphorus (TP) credits.



Benefits

Martin Ecosystems' FTWs create a vast active surface area for microbes and bacteria to digest pollutants. This breakthrough technology offers a variety of benefits.

- ◆ Modular Flexibility
- ◆ Minimal Environmental Impact
- ◆ Cost-effective
- ◆ Beautification

Modular Flexibility

FTWs can be designed to adapt to your water body.

- ◆ Manufactured to fit into any existing water body
- ◆ Operates effectively in many climates and environmental conditions
- ◆ Optional curtain attachment maximizes retention time for treatment optimization
- ◆ Modular design allows for phased installation which can accommodate financial budget constraints
- ◆ Operates in fluctuating water levels

Minimal Environmental Impact

FTWs use recycled waste plastic to bioremediate waste.

- ◆ No energy used in operation process
- ◆ Reduces need for chemical dosing
- ◆ Reduces need for high impact concrete & steel construction

Beautification

FTWs have an added bonus of being visually appealing.

- ◆ Enhance natural environment
- ◆ Provide a habitat for land and marine wildlife and waterfowl
- ◆ Landscaped feature in residential projects

Cost Effective

FTWs can be retrofitted into existing water bodies as a low cost alternative.

- ◆ No need for additional ponds or constructed wetlands
- ◆ No need for additional land purchase
- ◆ Does not require energy to operate

Maintenance

Maintenance of FTWs requires routine anchor or tether checks and trimming of vegetation 3-4 times per year as needed.

Anchoring & Tethering

FTWs are secured in place by either anchoring or tethering depending on site and water conditions. Techniques include securing to embankments, concrete sinkers, or screw anchors.





MARTINEcosystems.COM

Innovation is in our nature.

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