

Implementation of Low Impact Development (LID) Systems: The Use of Filtrexx® FilterCell™ Technology for Nutrient Management

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Introduction

The Filtrexx FilterCell™ filtration system is a temporary or permanent water or stormwater filtration system used to remove sediment and/or soluble pollutants. This portable Land Improvement System (LIS) uses organic FilterMedia™ and native vegetation to remove pollutants from water and stormwater before it is discharged into collection ponds, wetlands, infiltration basins, fields, or receiving waters.

This innovative filtration system utilizes a mesh-like “sock” and an all-organic fill material in conjunction with native vegetation and proprietary flocculants to filter point and non-point runoff sources. Flocculants are prescribed on a site-specific basis to remove target pollutants from contaminated water and stormwater flows. Filtrexx® FilterCell™ technology used in conjunction with proprietary flocculants, have demonstrated the following pollutant removal levels¹:

Target Pollutant	Percent (%) Removal
Petroleum Products	99%
Bacteria	99%
Phosphorous	92%
Nitrogen	25-33%
Heavy Metals	47-73%

The FilterCell™ technology can be utilized in temporary applications during land disturbing/construction activities or for permanent applications where native vegetation can be established to create a permanent organic vegetative filter designed into the existing landscape².

Typical applications include sediment and soluble pollutant control of stormwater and agricultural runoff. In addition, vegetated FilterCells™ reduce runoff velocity and pollutant levels flowing into surface waters, therefore decreasing soil erosion and increasing pollutant removal through trapping, sediment deposition, and biological plant uptake.

REFERENCES

- ¹Faucette, L. B., K. A. Sefton, A. M. Sadeghi, R. A. Rowland. 2008. Sediment and phosphorus removal from simulated storm runoff with compost filter socks and silt fence. *Journal of Soil and Water Conservation*. 63:4:257-264.
- ²Faucette, B. R. Tyler, A. Marks, A. Vick, K. Kerchner, and Gretchen Gigley. 2007. Filtrexx International Standard Specification and Design Manual for Erosion, Sediment, Pollution Control and Storm Water Management Practices Ed. 7.0. Filtrexx International, LLC.
- ³ Faucette, L.B. 2005. Removal and Degradation of Petroleum Hydrocarbons from Storm Water with Compost. Filtrexx Tech Link #3307.
- ⁴ Faucette, B., Sadeghi, A., and K. Sefton. 2006. USDA ARS - Evaluation of Compost Filter Socks and Silt Fence in Sediment and Nutrient Reduction from Runoff. Filtrexx Tech Link #3308.
- ⁵ Fifield, J. 2001. Designing for Effective Sediment and Erosion Control on Construction Sites. Forester Press, Santa Barbara, CA.

Nutrient Management with Filtrexx® FilterCell™ Technology

Application

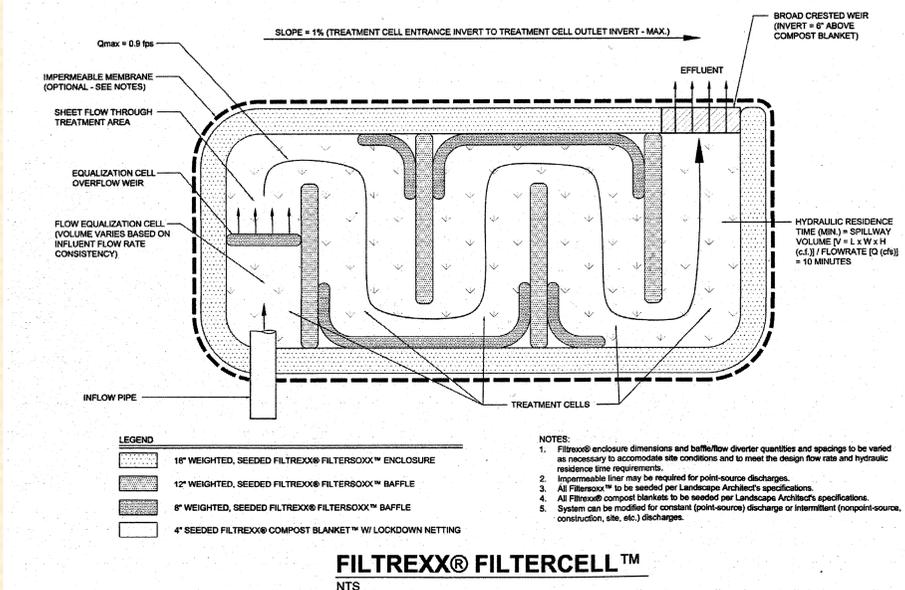
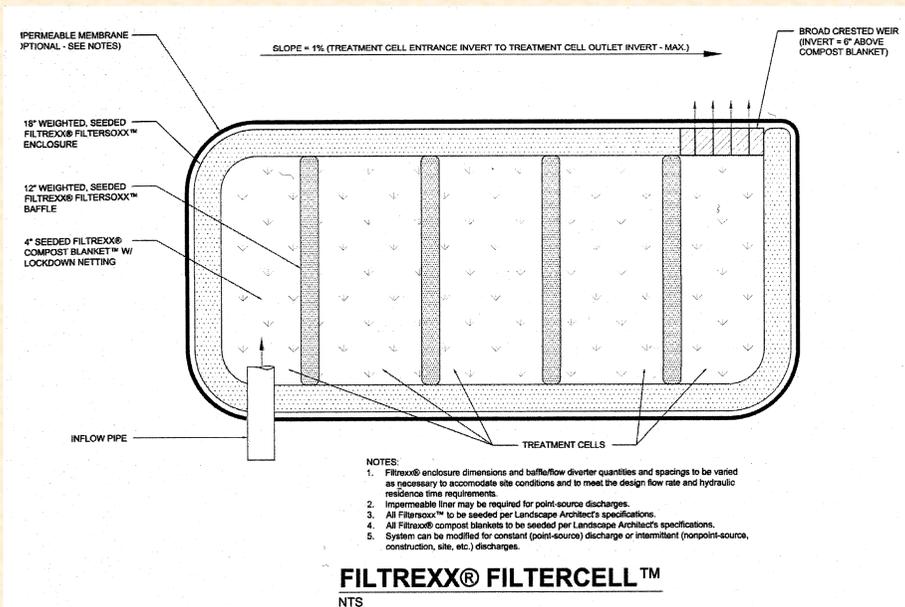
The Filtrexx FilterCell™ system can be used for temporary applications during land disturbing or construction activities or for permanent applications where vegetation can be established to create a permanent organic vegetative filter that is designed into the landscape. Typical applications include:

- Pretreatment for temporary sediment detention ponds
- Post-treatment for temporary sediment detention pond discharge or emergency storm overflow
- Pretreatment for permanent storm water collection ponds
- Sediment and soluble pollutant control of storm runoff
- Sediment and soluble pollution filtration from contaminated effluent

Vegetated FilterCells™ can also be used to reduce runoff velocity flowing into surface waters. Reducing runoff velocity will decrease soil erosion and increase pollutant removal through trapping, sediment deposition, and plant uptake.

Advantages

- FilterCells™ are easily installed and can establish vegetation in difficult areas
- FilterCells™ can be easily designed and incorporated as one treatment in a treatment train approach to stormwater management
- FilterCells™ can be used to filter pollutants and infiltrate stormwater entering or leaving areas where stormwater may pass, collect, drain, or be stored
- FilterCells™ have the ability to bind and absorb soluble nutrients, metal, and hydrocarbons that may be in stormwater runoff, thereby reducing loading to nearby receiving waters
- FilterCells™ can remove pathogens and pesticides from storm runoff preventing pollution of receiving water bodies
- FilterCells™ can be customized to remove target pollutants from contaminated water, such as phosphorus and suspended solids
- FilterCells™ can be customized to handle a variety of water pollutant concentrations, pollutant loads, and water volumes



FilterCell™ Real World Applications



Base Installation of FilterCell™



Treatment of Field Drainage Area Runoff



Example of FilterCell™ for Pollutant Filtration



Fully Vegetated FilterCell™

Conclusion

The primary function of the FilterCell™ filtration system is to remove sediment and soluble pollutants, such as nutrients, heavy metals, petroleum hydrocarbons, and pesticides from stormwater runoff or contaminated effluent water. By using organic matter and humus rich materials, the FilterCell™ system is able to chemically absorb pollutants rendering them less toxic and less available to animals and humans^{3, 4}.

Filter Baffles™ can be injected with flocculants to allow for custom design to target specific pollutants in water and stormwater, thereby reducing their concentration and load exiting the system. The organic humus rich system is also designed to absorb large volumes of water thereby reducing mass loading of pollutants exiting the system. Flow diverters and filtration baffles also increase the flow path and reduce flow velocities which allows for increased settling of suspended solids, reduction of turbidity, and increased reaction time to absorb soluble pollutants. The result is systematic reduction of pollutants leaving the filtration system and ultimately migrating to sensitive receiving waters and wetlands.

The vegetated FilterCell™ system is effective at filtering pollutants from water and stormwater due to flow velocity reduction and physical trapping of pollutants by the vegetation⁵. Vegetation can increase surface roughness which can reduce flow velocity. Large particles are typically removed in greater efficiencies than suspended particles through reducing flow velocity and constructing/maintaining vegetated filters. Many plants have the ability take up excess nutrients and other pollutants trapped in the vegetation, while microorganisms can decompose and/or incorporate these pollutants into their biomass, making them less toxic to aquatic ecosystems. Organic matter supplied in GrowingMedia™ increases the diversity and population of microorganisms that can decompose and incorporate captured pollutants.

Maintenance is a key consideration, as sediment build-up will significantly reduce the ability of a vegetated FilterCell™ to remove pollutants from effluent or runoff water; however, unless sediment accumulation is extreme, FilterCell™ vegetation will continue to grow in and through deposited sediment.

