CITY OF TOPEKA

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MEMORANDUM

Date: October 12, 2021

To: Development Community

From: Braxton Copley, Director of Utilities

Subject: Value Rating for Bio Clean Environmental's Modular Wetlands Biofilter

The City of Topeka has adopted the Mid-America Regional Council and American Public Works Association Manual of Best Management Practices for Stormwater Quality, October 2012 Edition (MARC Manual). The MARC Manual provides guidance for planning, designing and implementing stormwater Best Management Practices (BMP's) to land development activities. The manual addresses the need to control the volume and quality of stormwater discharges from developed sites which are crucial requirements for protecting human life and property, maintaining overall water quality, and for creating more environmentally sensitive site designs. It also provides criteria for evaluating water quality impacts and how to select BMP's most appropriate for mitigating those impacts.

The Modular Wetland System- Linear biofiltration system (MWS-Linear) is a stormwater quality treatment BMP consisting of a pre-treatment chamber with a media pre-filter, a biofiltration chamber, and an outlet control device. The system is housed in a precast concrete vault and can be designed in various configurations. These systems incorporate vegetation, which allows for more complex treatment of stormwater versus traditional filter devices. Some of the functions are similar to bioretention and rain garden BMPs.

Table 4.4 of the MARC Manual establishes Value Ratings (VR) for several common classes of structural stormwater BMP's, broken down by their effectiveness in meeting four factors recommended by the U.S. Environmental Protection Agency (EPA) including: (1) water quality value, (2) volume reduction, (3) temperature reduction, (4) oils, floatables, and sediment reductions. This manual does not however, specifically address proprietary products such as the MWS-Linear. Table 4.5 provides a breakdown for establishment of a VR per the above factors to evaluate products/treatments not specifically addressed by Table 4.4.

Third party laboratory research was conducted for Bio Clean to document an appropriate Value Rating (VR) for this product so that the development community and design consultants have clear documentation of the application going forward. This memo is intended to establish the Value Rating (VR) of the Modular Wetland System- Linear biofiltration system when used in the City of Topeka. The City of Topeka does not endorse the selection of any particular proprietary product brand, but rather acknowledges that products that have undergone device testing to evaluate and measure removal performance may similarly

demonstrate compliance with the requirements of the BMP VR methodology. It is noted that the VR will be dependent on an aggressive maintenance schedule, which should be clearly addressed in the Operation and Maintenance Plan.

A. Water Quality Value Rating System

Third party research provided by Bio Clean Environmental demonstrates that the median effluent sediment concentrations is 9.2 mg/L when using the Modular Wetland System based on a study that followed the Washington State Department of Ecology's Technology Acceptance Protocol-Ecology (TAPE). TAPE is considered the current industry and regulatory standard for stormwater BMP field testing. This falls in line with the "Water Quality Value" rating of 4.0 per Table 4.5 of the MARC Manual. However, "Water Quality Value" column in Table 4.4 of the MARC Manual only gives values of 4 or higher for vegetated surfaced products such as Rain Gardens, Infiltration Basins/Trenches, Extended Detention Wetlands, or sand filter practices. Based on the perceived intent of the MARC Manual in rewarding practices that utilize native vegetation to improve water quality, a VR credit of 4.0 will only be given to MWS-Linear systems that incorporate native vegetation.

WATER QUALTY VALUE RATING = 4.0

B. Volume Reduction Value Rating System

The Modular Wetland System incorporates vegetation in the biofiltration chamber. A vegetated BMP provides evapotranspiration functions between storm events, allowing retained moisture to both transpire to plants and evaporate from the media to the atmosphere. The volume reduction associated with the MWS-Linear is considered moderate infiltration or evaporation, thus a VR credit of 1.0 will be given per the "Volume Reduction" column in Table 4.4 of the MARC Manual.

VOLUME REDUCTION VALUE RATING = 1.0

C. Temperature Reduction Value Rating

The Modular Wetland System's media will be at a lower temperature than heated runoff due to the buffering capacity of being underground and surrounded by cooler native soils. The pre-treatment chamber and wetland biofiltration media chamber will cool runoff prior to discharge. Runoff temperature will decrease in the system, thus a VR credit of 1.0 will be given per the "Temperature Reduction" column of Table 4.4 of the MARC Manual.

TEMPERATURE REDUCTION VALUE RATING = 1.0

D. Oils/Floatables Reduction

The Modular Wetland System removes oils and grease found in typical urban and suburban stormwater environments using the pretreatment and biofiltration medias. The MWS-Linear has also been certified by the California State Water Resources Control Board as a Trash Full Capture System. The MWS-Linear achieves significant capture or reduction of oils and floatables, thus a VR of 2.0 will be given per the "Oils/Floatables/Sediment" column of Table 4.4 of the MARC Manual.

OILS/FLOATABLES/SEDIMENT VALUE RATING = 2.0

Value Rating for Bio Clean's Modular Wetland System-Linear Biofiltration		
A	Water Quality	4.0
B	Volume Reduction	1.0
C	Temperature Reduction	1.0
D	Oils/Floatables/Sediment Reduction	2.0
	Total VR	**8.0***

*Subject to the foregoing conditions described in this memorandum, including the planting of native vegetation in the MWS-Linear and the use of an Operations and Maintenance Plan that utilizes an aggressive maintenance schedule, a Value Rating of 8.0 is established for the Bio Clean MWS-Linear.