WASHINGTON STATE DEPARTMENT OF ECOLOGY

January 2023

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) AND PHOSPHORUS TREATMENT

For

Advanced Drainage Systems Inc.
EcoPure BioFilter™ 2-Cell

Ecology's Decision

Based on the Advanced Drainage Systems Inc. (ADS) application submission for the EcoPure BioFilter™ 2-Cell (EcoPure 2-Cell), Ecology hereby issues the following use level designation:

1) General Use Level Designation (CULD) for Basic and Phosphorus Treatment:
   - Sized at a hydraulic loading rate of 1.0 gallon per minute (gpm) per square foot (sq ft) of exit manifold area (in the second cell).
2) Ecology approves the EcoPure 2-Cell at the hydraulic loading rate listed above, to achieve the maximum water quality design flow rate. The water quality design flow rates are calculated using the following procedures:
   - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology- approved continuous runoff model.
   - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.7.6 of the 2019 Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
   - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.
3) The GULD has no expiration date but may be amended or revoked by Ecology and is subject to the conditions specified below.

Ecology's Conditions of Use

The EcoPure 2-Cell shall comply with these conditions:

1) Applicants shall design, assemble, install, operate, and maintain the EcoPure 2-Cell in accordance with ADS applicable manuals and the Ecology Decision.
2) EcoPure 2-Cell media shall conform to the specifications submitted to and approved by Ecology.
3) Maintenance: The required inspection/maintenance interval for stormwater treatment devices is often dependent on the efficiency of the device and the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.
    - ADS designed their product for a target maintenance interval of 12 months, depending on site conditions. Typical maintenance includes visual inspection of the plant surface area, structure inlet, settling cell, and clean-out ports.
    - An EcoPure 2-cell tested at Lake Union Ship Canal Test Facility in Seattle, WA was on average able to treat 8.9% of a water year before needing maintenance. Monitoring personnel observed similar maintenance issues with other systems evaluated at the Test Facility. The runoff from the Test Facility may not be indicative of maintenance requirements for all sites.
    - Owners/operators must inspect EcoPure 2-Cell systems for a minimum of twelve months from the start of post-construction operation to determine site-specific inspection/maintenance schedules and requirements. Owners/operators must conduct inspections monthly during the wet season, and every other month during the dry season (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to the SWMMEW, the wet season in eastern Washington is October 1 to June 30.) After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.
    - Conduct inspections by a qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flow rate and/or a decrease in pollutant removal ability.
4) Install the EcoPure 2-Cell in such a manner that the system bypasses flows exceeding the maximum operating rate and does not resuspend captured sediment.
5) Discharges from the EcoPure 2-Cell shall not cause or contribute to water quality standard violations in receiving waters.

Applicant:	Advanced Drainage Systems Inc.
Applicant's Address:	4640 Trueman Blvd Hilliard, OH 43065

Application Documents:

Technology Evaluation Report EcoPure BioFilter™ System Performance Verification Project, Prepared for Advanced Drainage Systems, Inc., Prepared by Herrera Environmental Consultants, Inc., January 2023

Application for Conditional Use Level Designation, EcoPure BioFilter™ System Performance Verification Project, Prepared for Advanced Drainage Systems, Inc., Prepared by Herrera Environmental Consultants, Inc., April 2022

EcoPure BioFilter™ Metals Removal Version, Emerging Stormwater Treatment Technologies, Initial Application for Certification, Advanced Drainage Systems, Inc., July 2020

NJCAT Technology Verification, EcoPure BioFilter™, Advanced Drainage Systems, Inc., June 2020

Draft Report: NJCAT Technology Verification, EcoPure BioFilter™ 3-Cell, Advanced Drainage Systems, Inc., July 2020

WADOE Application EcoPure Supplemental Information, BaySaver Technologies, July 2020

Applicant's Use Level Request:

- General Use Level Designation as a Basic and Phosphorus Treatment device in accordance with Ecology's *Stormwater Management Manual for Western Washington*

Applicant's Performance Claims:

- Based on field and laboratory testing at a hydraulic loading rate of 1.0 gpm/sq ft the EcoPure BioFilter™ 2-Cell is able to meet TAPE performance goals for TSS and phosphorus.

Ecology's Recommendations:

Ecology finds that:

- ADS has shown Ecology, through laboratory and field testing, that the EcoPure BioFilter™ 2-cell is capable of attaining Ecology's Basic and Total Phosphorus treatment goals.

Findings of Fact:

Field Testing (2-Cell System)

- Herrera Environmental Consultants, Inc. conducted monitoring of the EcoPure 2-Cell at the Lake Union Ship Canal Test Facility in Seattle Washington between December 2020 and April 2022. Herrera collected flow-weighted composite samples during 22 separate storm events. The system was sized at a hydraulic loading rate 1.0 gpm/sq ft.
    - The average D50 of the influent PSD was 43 microns.
    - Influent TSS concentrations met the TAPE range for 17 of the storm events. For these events concentrations ranged from 21 mg/L to 75 mg/L with a mean concentration of 47 mg/L. The bootstrap estimate of the upper 95 percent confidence limit (UCL95) of the mean TSS effluent concentration was 7.6 mg/L.
    - Total phosphorus from 10 storm events met the TAPE influent concentration range and sample requirements. An additional 8 samples had influent concentrations below the TAPE range, but were included as allowed by the TAPE guidelines. The influent concentrations from these 18 events ranged from 0.064 mg/L to 0.209 mg/L with a mean concentration of 0.120 mg/L. The bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 68.9 percent.
    - Dissolved copper influent concentrations from the 18 storm events met the TAPE range and sample requirements. For these events influent concentrations ranged from 7.36 µg/L to 16.5 µg/L with a mean concentration of 10.41 µg/L. The bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean dissolved copper reduction was 26.7 percent.
    - Dissolved zinc influent concentrations from the 19 storm events met the TAPE range and sample requirements. For these events influent concentrations ranged from 21.8 µg/L to 48.7 µg/L with a mean concentration of 29.8 µg/L. The bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean dissolved zinc reduction was 61.4 percent.
    - The system experienced rapid sediment loading and needed to be maintained 5 times during the monitoring period: after 19.6 percent of a water year, 5.0 percent of a water year, 2.5 percent of a water year, 17.3 percent of a water year, and 4.5 percent of a water year.. Monitoring personnel observed similar sediment loading issues with other systems evaluated at the Test Facility. The runoff from the Test Facility may not be indicative of maintenance requirements for all sites.

Laboratory Testing (2-Cell System)

- ADS conducted laboratory testing on an EcoPure BioFilter™ 2-Cell system in December 2019 and January 2020 at their laboratory in Mount Airy, Maryland. The testing was done following the New Jersey Department of Environmental Protection Laboratory Protocol for Filtration MTDs. Since ADS carried out the testing in-house, ADS contracted with Boggs Environmental Consultants to provide third party oversight.
- The testing evaluated the TSS removal capability of a full-scale, commercially available 4'x8' EcoPure BioFilter™ 2-cell system. The 2-cells include a Pretreatment Gravitational and Trash-removal Cell followed by a Biofiltration cell. The Biofiltration Cell of a 4'x8' system contains 60 square feet of effective filtration treatment area and

has a hydraulic loading rate of 1 gpm per square foot, resulting in a 60 gpm design flow rate.
- The test sediment used was a custom blend of commercially available silica sands and had an average d50 of 61 µm.
- ADS evaluated TSS removal efficiency over 26 events. The influent concentration ranged from 187 to 214 mg/L with a mean concentration of 200.7 mg/L and a mean removal efficiency of 88.0%.

Other EcoPure BioFilter™ 2-Cell Related Issues to be Addressed by the Company:

1. Conduct hydraulic testing to obtain information about maintenance requirements on a site with runoff that is more typical of the Pacific Northwest.

Technology Description: https://www.adspipe.com/water-management-solutions/water-quality/greeninfrastructure/ecopure-biofilter

Contact Information:

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Ecology web link: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

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Revision History

Date	Revision
September 2020	PULD Granted
May 2022	CULD Granted
January 2023	GULD Granted