



November 2018

PILOT USE LEVEL DESIGNATION FOR BASIC AND OIL TREATMENT

For

Torrent Resources, Inc. – Maxwell® Plus Drainage System

Ecology's Decision:

Based on Torrent Resources application submissions, Ecology hereby issues the following use level designations for the Maxwell® Plus Drainage System:

1. A Pilot Use Level Designation (PULD) for Basic (TSS) and Oils (TPH) Treatment.
 - Using Torrent's dual-chambered Maxwell® Plus Drainage System incorporating hydrocarbon adsorbent pillows and the PureFlo® Debris Shield.
 - Sized at a hydraulic loading rate of no greater than 0.25 cubic feet per second (cfs) per system. Flow is limited by the orifice located in a 4-inch pipe connecting the two structures.
 - Primary Settling Chamber
 - Standard chamber dimensions provide 11 feet of effective settling capacity.
 - Standard chambers are a minimum of 1,000 gallons.
 - Main Well structure
 - The Main Well structure provides a minimum of 10 feet of effective settling capacity.
 - The Main Well structure is approximately 930 gallons.
 - Aggregate specification: Recommendations for washed backfill aggregate used for the gravelpack surrounding the drainage pipe and screen in the lower excavation:
 - In granular soil conditions, the material used may consist of a range of particles sized between 1-1/2" and 3/8".
 - When the soils encountered are fine grained, the use of a consistently smaller particle topsize is preferred.
2. Ecology approves the Maxwell® Plus Drainage System for treatment at the above flow rate. The designer shall calculate the water quality design flow rates 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 2.2.5 of the 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 Use Level Designation expires on December 15, 2021 unless extended by Ecology, and is subject to the conditions specified below.

Ecology’s Conditions of Use:

The Maxwell® Plus Drainage System shall comply with these conditions:

1. Design, assemble, install, operate, and maintain the systems in accordance with Torrent Resources applicable manuals and documents and the Ecology Decision.
2. Design, siting, installation, and operation shall follow the requirements of the most recent versions of the following:
 - Applicable stormwater infiltration facility sections in Ecology’s Stormwater Management Manual for Western Washington (August 2012, Publication No. 12-10-030)
 - Applicable stormwater infiltration facility sections in Ecology’s Stormwater Management Manual for Eastern Washington (September 2004, Publication No. 04-10-076)
 - Washington State Wellhead Protection Program Guidance Document, Department of Health, June 2010 (protection of drinking water supplies).
 - Washington Administrative Code: WAC 173-218 – Underground Injection Control Program
 - Guidance for UIC Wells that Manage Stormwater, December 2006. Publication No. 05-10-067, Department of Ecology.
3. The applicant shall conduct an individual well percolation test rate (using a constant head percolation test) for each installation to determine that the system can achieve the design hydraulic loading rate.
4. Installations shall meet or exceed the separation from groundwater, per guidelines in Publication No. 05-10-067.
5. Torrent Resources commits to submitting a QAPP for BER review and Ecology approval by November 15, 2019 that meets the TAPE requirements for attaining a GULD for Basic and

Oil Treatment. Ecology must review and approve any QAPPs for each additional field site in Washington State. The sites chosen should reflect the product's treatment intent.

6. Torrent Resources shall complete all required testing and submit a TER for Ecology review by January 15, 2021.
7. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon 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.
 - Maxwell® Plus Drainage System maintenance includes inspection at least annually and after significant rainfall events, followed by cleaning when sediment and debris occupies 15% or more of the original PSC chamber volume.
 - A truck-mounted hydrovactor is generally employed for this service, using high pressure water and air to dislodge and evacuate the build-up inside both chambers.
 - If so equipped, replace the filter fabric on the bottom of the chambers and the floating absorbent pillows in both chambers.
 - The cleaning service will include a structural assessment and recommendations will follow for any needed repairs.
 - The operator should keep a written log of periodic inspection and maintenance practices for the past five years on the site
 - Indications of the need for maintenance include:
 - Generally, the most obvious indication that service is needed is ponded water standing on the surface or inside the chamber long after the end of the rain event.
 - Note that the entire allowable 24-hour draw-down time frame will expire before the presence of water on the surface or in the chambers is considered problematic.
 - During dry-weather inspection, owners should consider evidence of staining on the drainage way as an indication of slow disposal.
 - A thorough maintenance inspection should follow.
 - If you find more than 15% of the original chamber volume occupied by silt, you should schedule sediment and debris cleaning.
8. Inspections: At a minimum, owners /operators must inspect Maxwell® Plus Drainage System for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. 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 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. You must conduct more frequent inspections if recommended by the manufacturer.

- Conduct inspections by 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.

When inspections are performed, the following findings typically serve as maintenance triggers:

- The most obvious symptom indicating that cleaning is required is standing water on the surface over the grated inlet.
- Each customer will receive a Maintenance Data and Warranty Information Card at the conclusion of system installation. This document contains information that will enable the customer to determine whether or not the system needs cleaning.
- Feed the end of a metal tape into the grated opening and advanced downward until you encounter resistance. You should compare this measurement to the dimensions on the Warranty Card, and you can quickly determine if the amount in the chamber exceeds the recommendation for service.

9. Local jurisdictions must file a “Pilot Level Technologies Notice of Intent” form with the Department of Ecology prior to authorizing Maxwell® Plus Drainage System for any pilot use level installation.
10. Torrent Resources may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.
11. Discharges from Maxwell® Plus Drainage System shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Torrent Resources Incorporated

Applicant’s Address: 1509 East Elwood Street
Phoenix, AZ 85040

Application Documents:

- Torrent Resources TAPE Package: BMP Description, Design, and Installation Features. The MaxWell® Plus Drainage System. June 20, 2013.
- Advances in Stormwater Drainage: A Case Study in Phoenix Arizona, Utilizing the MaxWell® Plus Drywell. HydroSystems, Inc. 2011.

Applicant’s Use Level Request:

- Conditional or Pilot Use Level Designation as a Basic, Enhanced, Phosphorus, and Oil stormwater treatment device in accordance with Ecology’s 2012 *Stormwater Management Manual for Western Washington*.

Applicant's Performance Claims:

- The MaxWell® Plus Drainage System will provide pretreatment removal of suspended solids and floating hydrocarbons. This process take place initially in the Primary Settling Chamber, and is then repeated in the Secondary Settling Chamber prior to discharge.
- The deep sump settling basins provide many vertical feet of storage for the gravity separation of particulate matter that may be present in the inflow.
- The system also incorporates unique debris shields to cover the overflow intakes, which cause water to enter the inlets in the chambers from far below the surface. These shielded intakes function to contain and isolate any floating petroleum constituents inside the chambers, where they are effectively wicked from the surface by the two absorbent pillows in each chamber. The pads are filled with polymer Imbiber Beads, and each pillow is capable of absorbing up to 128 ounces of active liquid organic compounds.
- Testing will confirm that the design will qualify for the following types of TAPE treatment technologies: Pretreatment, Oil Treatment, and Basic Treatment.
- The removal efficiency at all levels will be significantly enhanced when the benefits of Soil Aquifer Treatment are applied. This includes the enhanced removal of dissolved metals and phosphorus.

Ecology's Recommendations:

- Ecology should provide Torrent Resources with the opportunity to demonstrate, through field testing that follows an approved QAPP, whether the MaxWell® Plus Drainage System can attain Ecology's Basic and Oil treatment performance levels.

Findings of Fact:

- Torrent Resources monitored a MaxWell® Plus Drainage System treating runoff from 18 acres of commercial development in Chandler, Arizona.
 - The drainage basin contained rooftop, asphalt parking lots, and grass-covered flood control basins, and landscaping.
 - The MaxWell® Plus Drainage System had been in operation for three years prior to the study.
 - The system received runoff (approximately 3.8 million gallons) from 7.47 inches of rainfall during the study period of seven months. Six runoff events were sampled.
 - Samples were collected:
 - At the inlet to the collector vault (first flush and during storm events)
 - At the bottom of the drainage pipe in the second chamber
 - Within the vadose zone (via monitoring well)
 - Within the aquifer below the drywell (via monitoring well)

- Monitoring results from the above study showed the following pollutant removal levels:
 - Average influent TSS was 68 mg/L (influent first flush sample averaged 274 mg/L). Average effluent TSS (measured at the monitoring well) was 12 mg/L.
 - First-flush total hydrocarbons averaged 6.1 mg/L and influent vault samples averaged 1.4 mg/L. Concentrations at the secondary chamber drain averaged 1.5 mg/L. Total hydrocarbons in the adjacent monitoring well ranged from non-detect up to 0.68 mg/L.
 - A total of 118 analytical parameters were tested during the study; however, not all are included here.
 - Note: the above removal rates are based on “effluent” treated samples collected within the vadose zone via a separate monitoring well, approximately 10 ft. from the secondary chamber of the MaxWell system. See “Issues to be Addressed By the Company” below for further discussion.

Issues to be Addressed By the Company:

1. The MaxWell® Plus Drainage System must show that it can reliably attain the minimum percent removal criteria for Basic and Oil treatment for runoff found from local highways, parking lots, and other high-use areas at the design-operating rate in accordance with the Ecology TAPE protocols. Torrent Resource should test a variety of operating rates to establish conservative design rates.
2. Test the system under normal operating conditions, such that pollutants partially fill the system. Results obtained for “clean” systems may represent typical performance.
3. You shall calculate treatment efficiency in accordance with the 2011 Revision of the *Guidance for Evaluating Emerging Stormwater Treatment Technologies: Technology Assessment Protocol – Ecology (TAPE)*.
4. Conduct field-testing at sites that are indicative of the treatment goals.
5. Conduct testing to obtain information about maintenance requirements in order to come up with a maintenance cycle.
6. Conduct loading tests on the system to determine maximum treatment life of the system.
7. Torrent Resources should develop easy-to-implement methods of determining when a MaxWell® Plus Drainage System requires maintenance (cleaning, replacement of oil adsorbents, and replacement of gravel media in Main Well).
8. Torrent Resources shall address the following additional points during the development of a monitoring QAPP for GULD approval:
 - Develop a field monitoring approach that can collect treated Main Well water prior to entering the vadose zone.

- Ecology will base any TAPE approval on the washed aggregate size used in the field test(s). If you use different aggregate sizes in other installations (to best complement native soil conditions), you should collect samples prior to entering the aggregate zone. The QAPP should describe how you would assess this.
- Include monitoring/assessment and discussion of use and maintenance of the Imbiber Beads.
- In addition to sampling the influent and treated “effluent” Torrent Resources must also (in the QAPP) sample in between the Primary Settling Chamber and the Main Well to determine removal performance of each component.
- Torrent Resources, shall at a minimum, determine the individual well percolation test rate (using a constant head percolation test) after installation of the system (before the start of monitoring), and at the end of the monitoring period.

Technology Description:

The MaxWell Plus is a stormwater drywell system that infiltrates stormwater into the ground above the water table. It is designed to remove trash, sediment, and hydrocarbons from the stormwater prior to infiltration.

The MaxWell Plus is a dual-chambered drywell. The first chamber is sealed and serves as the primary settling chamber for sediment and sinkable material. An absorbent sponge to collect available hydrocarbons is left free to float in this chamber. The first chamber is connected to the second chamber by a 4-inch diameter pipe set near the top of both chambers. When stormwater runoff in the first chamber rises to the level of the pipe, the runoff flows through the pipe and into the second chamber, leaving the settled material behind. Once the runoff flows into the second chamber, it infiltrates into the subsurface through perforations at the bottom of the chamber. When flows exceed the infiltration rate through the perforations, the water level in the second chamber will rise and overflow into a 6- inch diameter screened drainage pipe that terminates in gravel fill placed in the bottom of the borehole.

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Revision History

Date	Revision
September 2013	Original use-level-designation document (PULD for Basic and Oil Treatment)
March 2014	Revise QAPP, TER, and Expiration dates
December 2014	Revise QAPP, TER, and Expiration dates
February 2018	Revise QAPP, TER, and Expiration dates
November 2018	Revise QAPP, TER, and Expiration dates