



Rhode Island Department of Environmental Management
Office of Water Resources – Stormwater Technology Review Committee
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Alternative Stormwater Technology Certification

Vendor Contact:

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Technology Name:

Aqua-Swirl® Concentrator

Approval Type:

Pretreatment/Retrofits

Certification Dates:

Issued: February 15, 2024

Expires: February 15, 2029

CERTIFICATION:

The Rhode Island Stormwater Technology Review Committee which consists of members from the Department of Environmental Management (DEM), Department of Transportation (DOT) and the Coastal Resources Management Council (CRMC) have reviewed the **Aqua-Swirl® Concentrator** application for certification of its Technology Approval and accepted use for Stormwater Treatment in the State of Rhode Island.

In accordance with Stormwater Rule 250-RICR-150-10-8.9B, **AquaShield™, Inc.** has petitioned the permitting agencies to certify the **Aqua-Swirl® Concentrator** as an acceptable structural stormwater control described in Stormwater Rule 250-RICR-150-10-8.31. They have submitted monitoring results and supporting information developed in accordance with the provisions of the Technology Assessment Protocol (TAP) for Innovative and Emerging Technologies as described in in Stormwater Rule 250-RICR-150-10 Sections 8.39 and 8.40.

The **Aqua-Swirl® Concentrator** is granted reciprocity in Rhode Island as a proprietary stormwater treatment technology, given that it has been issued a General Use Level Designation (GULD) for Pretreatment from the Washington Department of Ecology's Technology Assessment Protocol – Ecology (TAPE) program effective September 2022 as a result of the *NJCAT Technology Verification for Aqua-Swirl® Model AS-5 Stormwater Treatment System, AquaShield™, Inc.* from November 2012. The study was conducted in accordance with the Technology Acceptance Reciprocity Partnership (TARP) Tier II Protocol from 2003 and the New Jersey Tier II Stormwater Test Requirements-Amendments to TARP Tier II Protocol from 2006. This Washington Department of Ecology GULD for pretreatment recognizes the **Aqua-Swirl® Concentrator** as a stormwater treatment technology which provides 50% removal of total suspended solids when operating at the maximum treatment flow rate for each device specified in the attached **Table 1: Aqua-Swirl® Concentrator Sizing Table for 50% TSS Removal**. As per Stormwater Rule 250-RICR-150-10-8.39, both TAPE and TARP approved devices are allowed reciprocity consideration in Rhode Island.

The **Aqua-Swirl® Concentrator** is a pre-treatment or retrofit device that captures TSS from stormwater runoff as described in Stormwater Rule 250-RICR-150-10-8.31. It is a vertically oriented cylindrical structure manufactured from polymer coated steel (PCS) corrugated pipe, designed to remove trash and sediment from stormwater. This product was developed by **AquaShield™, Inc.** The **Aqua-Swirl® Concentrator** is approved for online use only when designed with an internal bypass (i.e., the "BYP" models). The "BYP" models are not required for offline use.

The manufacturer has demonstrated that this product meets the minimum water quality standards for pretreatment as described in Stormwater Rule 250-RICR-150-10-8.31. The **Aqua-Swirl® Concentrator** is approved for **50%** removal of total suspended solids (TSS) when designed using flow rates specified in the attached **Table 1: Aqua-Swirl® Concentrator Sizing Table for 50% TSS Removal**. The **Aqua-Swirl® Concentrator** is NOT recognized for removal of Pathogens, Total Phosphorus or Nitrogen. This device may be used as pretreatment or retrofit device provided that the design, installation, and maintenance are conducted in accordance with the following terms and conditions:

I. GENERAL CERTIFICATION REQUIREMENTS

1. The system's design and installation must adhere to the manufacturer's specification entitled: **"AquaShield™ Stormwater Treatment Solutions: Aqua-Swirl™ Specifications"**.
2. The **Aqua-Swirl® Concentrator** is **certified as a pretreatment** device in accordance with Stormwater Rule 250-RICR-150-10-8.31, provided the device treats the flow of the first inch of runoff from the capture area, unless waived by the state permitting agency. The system's design must utilize flow rates, impervious catchment sizes, and maximum sediment capacities listed in the attached **Table 1: Aqua-Swirl® Concentrator Sizing Table for 50% TSS Removal**.
3. The applicant must provide the RI specific manufacturers design sheet for Departmental review or provide the manufacturer's review approval. All units that capture greater than one acre of impervious cover must be reviewed by the manufacturer.
4. This device is **certified as a retrofit device** in accordance with Stormwater Rule 250-RICR-150-10-8.6A. Retrofits are allowed flexibility with regards to the eleven minimum standards described in Sections 8.6 through 8.17 of Stormwater Rule 250-RICR-150-10, but in general they are considered effective if they capture at least 50% of the catchment and meet the target water quality treatment of at least the first 0.5 inches of the water quality volume.
5. The approved devices shall be located such that they are accessible for maintenance and/or emergency removal of oil or chemical spills.
6. The device cannot be used in series with another Hydrodynamic separator to achieve enhanced removal rates for TSS.
7. The device must be constructed with a tangential inlet in order to induce a swirling flow pattern.
8. If the proposed system is to be located in an area that is subject to HS-25 traffic loading, then a four foot diameter 14" thick reinforced concrete pad must be placed over the riser to support and level the manhole frame (see Aqua-Swirl™ PCS Specification Note #8). The concrete slab must have a minimum compressive strength of 3,000 pounds per square inch and be reinforced with #4 rebar.
9. Bollards or other traffic barriers must be placed around access risers for systems that are not designed to handle HS-25 traffic loading, in order to prevent inadvertent loading by maintenance vehicles or other heavy equipment.

II. MAINTENANCE REQUIREMENTS

1. Standard permitting conditions for inclusion of this technology will, at a minimum include the following:
 - a. Each individual owner must ensure that any and all of their **Aqua-Swirl® Concentrator** devices are maintained in accordance with the manufacturer's Inspection and Maintenance Plan entitled **"AquaShield™ Stormwater Treatment System Inspection and Maintenance Manual for the Aqua-Swirl™"** which can be found at: https://www.aquashieldinc.com/uploads/1/3/6/1/13618853/aqua-swirl_i_m_manual_6-22.pdf
 - b. Each individual owner must ensure that any and all of their proprietary stormwater pre-treatment devices' are maintained in accordance with the requirements stated in Stormwater Rule 250-RICR-150-10-8.31-C, which requires the sump to be inspected a minimum of 2 times per year. Additionally, the device must be cleaned out when either pollutant removal capacity is reduced by 50% or more, or when 50% or more of the device's pollutant storage capacity is filled or displaced.

- c. All material removed from the unit must be properly disposed of and is the responsibility of the owner.
 - d. The applicant must include a copy of the ***AquaShield™ Stormwater Treatment System Inspection and Maintenance Manual for the Aqua-Swirl*** in their project specific long term operation and maintenance plan.
2. The applicant must provide evidence of a maintenance contract which extends for a minimum of two years. The contracted maintenance provider must receive training by **AquaShield™, Inc.** on how to properly maintain **Aqua-Swirl® Concentrator** devices. This requirement excludes maintenance providers recognized by the RIDEM to be qualified in maintenance of **Aqua-Swirl® Concentrator** devices.

III. REPORTING REQUIREMENTS

1. Upon request from the owner of any **Aqua-Swirl® Concentrator** system installed in the State of Rhode Island, the vendor shall provide the owner with a recommended maintenance schedule after the first year of the device's operation. If a recommended maintenance schedule is requested by the owner after the first year of the device's operation, then the owner is responsible for notifying the vendor of any additional pollutant loading sites where contributing drainage areas may be subject to further development (i.e., strip malls).
2. The Vendor shall provide a listing to the RIDEM Office of Water Resources of all systems installed within the State of Rhode Island on an annual basis.
3. The Vendor shall provide an annual listing to the RIDEM Office of Water Resources of all Rhode Island maintenance providers that they trained in **Aqua-Swirl® Concentrator** maintenance.
4. The Vendor shall immediately notify the RIDEM Office of Water Resources if and when any changes are made to the model name or number of any **Aqua-Swirl® Concentrator** device for all models applicable to this certification.
5. The Vendor shall immediately notify the RIDEM Office of Water Resources if and when any revisions are made to the design, installation operation and maintenance manuals for all models applicable to this certification. Revisions deemed by the RIDEM to be substantial, may require re-application to the Alternative Stormwater Technology Program.
6. The Vendor shall notify the RIDEM at least thirty (30) days following any proposed transfer of ownership of the Component technology. Notification shall include the name and address of the new owner and a written agreement between the existing and new owner specifying a date for transfer of ownership, responsibility, and liability for the Component. All provisions of this Certification shall be applicable to any new owners.

IV. RIGHTS OF THE RIDEM AND CRMC

1. The RIDEM may suspend, modify, or revoke this approval for cause, including but not limited to non-compliance with any of the conditions or provisions of this approval, misrepresentation, or failure to fully disclose all relevant data, or receipt of new information indicating that the use of the **Aqua-Swirl® Concentrator** system is contrary to the public interest, public health, or the environment.
2. This approval does not represent an endorsement of the **Aqua-Swirl® Concentrator** system by the RIDEM, RIDOT or CRMC. This letter of approval may be reproduced only in its entirety.

3. The **"AquaShield™ Stormwater Treatment Solutions: Aqua-Swirl™ Specifications"** and **"AquaShield™ Stormwater Treatment System Inspection and Maintenance Manual** for the **Aqua-Swirl™"** referenced herein are approved upon the date of approval of this Certification.
4. The RIDEM reserves the right to suspend or revoke this Certification if updated design, installation, and O&M manuals are not provided to the RIDEM within thirty (30) days of RIDEM request or one hundred and eighty (180) days prior to the expiration date of this Certification. All revisions must be reviewed and approved by the RIDEM prior to re-certification.

Eric A. Beck, P.E.
Administrator of Groundwater and Freshwater Wetlands Protection

Date

ATTACHMENTS:

Table 1: Aqua Swirl® Concentrator Sizing Table for 50% TSS Removal

Model #	Structure Inside Diameter (ft)	Maximum Treatment Flow Rate (cfs)	Maximum Impervious Treatment Area (acres)	50% of Max Sediment Storage Volume (ft³)
AS-2	2.5	0.25	0.232	5
AS-3	3.5	0.64	0.582	11
AS-4	4.5	1.31	1.199	18.5
AS-5	5.5	2.33	2.132	27.5
AS-6	6.5	3.75	3.42	38.5
AS-7	7.5	5.64	5.151	51.5
AS-8	8.5	8.05	7.35	66
AS-9	9.5	11.06	10.098	82.5
AS-10	10.5	14.71	13.435	101
AS-11	11.5	19.06	17.44	121
AS-12	12.5	24.17	22.072	143
AS-13	13.0	27.03	24.685	155

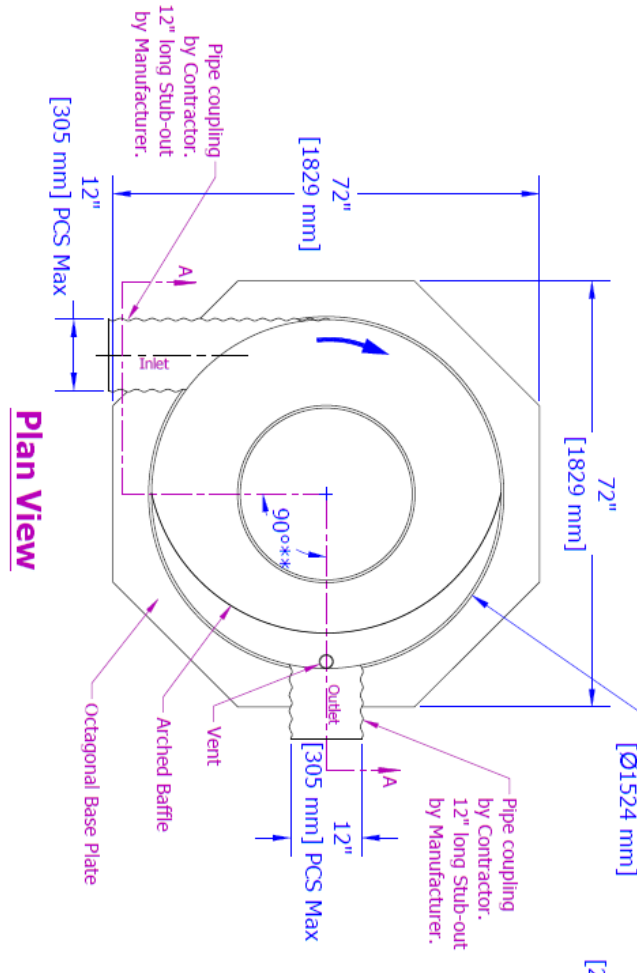
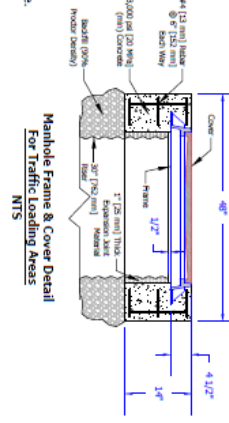
TYPICAL STANDARD DETAIL FOR Aqua-Swirl® Concentrator AS-5 ON NEXT PAGE

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



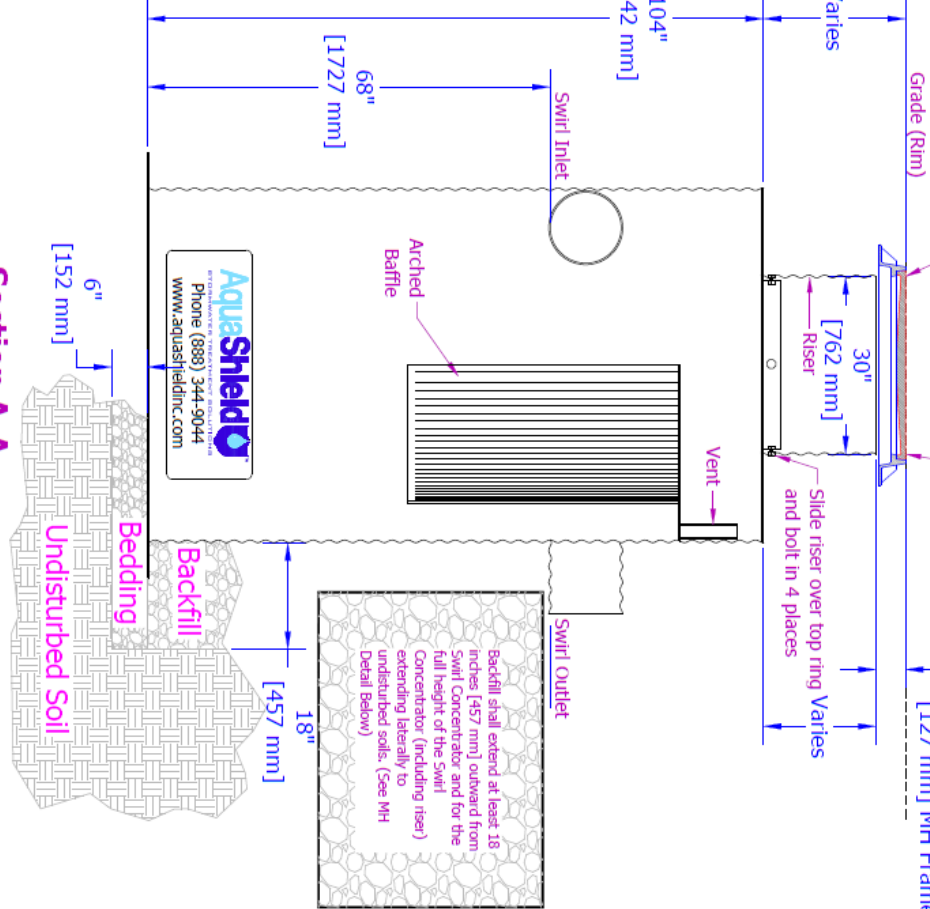
If traffic loading [HS-25] is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete and must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

Manhole Frame and Cover by Manufacturer. (See Details)

Rim elevations to match finished grade.



* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

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Document:	AS-5 PCS STD
Drawn By:	JCW
Scale:	1:20
Date:	02/05/15
U.S. Patent No. 6,524,473 and other Patent Pending	

Aqua-Swirl Concentrator Model AS-5 PCS Standard Detail