Aqua-Swirl® Inspection and Maintenance Guide

Aqua-Swirl Stormwater Treatment System

Aqua-Swirl Stormwater Treatment System (AquaSwirl) is a vortex-type hydrodynamic separator designed and supplied by AquaShield™, Inc. (AquaShield). The AquaSwirl removes pollutants including suspended solids, debris, floatables, and free-floating oil from stormwater runoff. Both treatment and storage are accomplished in the single swirl chamber without the use of multiple or hidden, blind access chambers.

Note: The AquaSwirl Full Trash Capture model(s) meet the California State Water Resources Control Board as a High Flow Capacity Trash Treatment Control Device.



Floatable debris in the AquaSwirl

The long-term performance of any stormwater treatment structure depends on a consistent maintenance plan. With the AquaSwirl, inspection and maintenance functions are simple and performed from the surface without confined space entry.

Inspection and Maintenance Frequency

In most cases, AquaShield recommends in most cases that a quarterly inspection for the first year of operation to develop an appropriate schedule of maintenance. Sites with higher volumes of wind-blown debris, and hydrocarbons, may require increased inspection and maintenance. Based on experience of the system's first year in operation, we recommend that the inspection schedule be revised to reflect the site-specific conditions encountered. Typically, the inspection schedule for subsequent years is reduced to semi-annual inspections.

The table below lists the available AquaSwirl models as well as their inner diameters, oil/debris storage capacities and the sediment storage capacities for systems constructed of polymer coated steel (PCS).

Aqua-Swirl Model	Inner Diameter (ft)	Oil/Floatable Storage Capacity (gal)	Sediment Storage Capacity (ft^3)
AS-2 / AS-2s	2.5	37	10
AS-3 / AS-3s	3.5	132	22
AS-4 / AS-4s	4.5	218	37
AS-5 / AS-5s	5.5	326	55
AS-6 / AS-6s	6.5	455	77
AS-7 / AS-7s	7.5	620	103
AS-8 / AS-8s	8.5	803	132
AS-9 / AS-9s	9.5	1,016	165
AS-10 / AS-10s	10.5	1,241	202
AS-11 / AS-11s	11.5	1,554	242
AS-12 / AS-12s	12.5	1,698	286
AS-13 / AS-13s	13.0	1,986	310

AquaSwirl Inspection Procedure

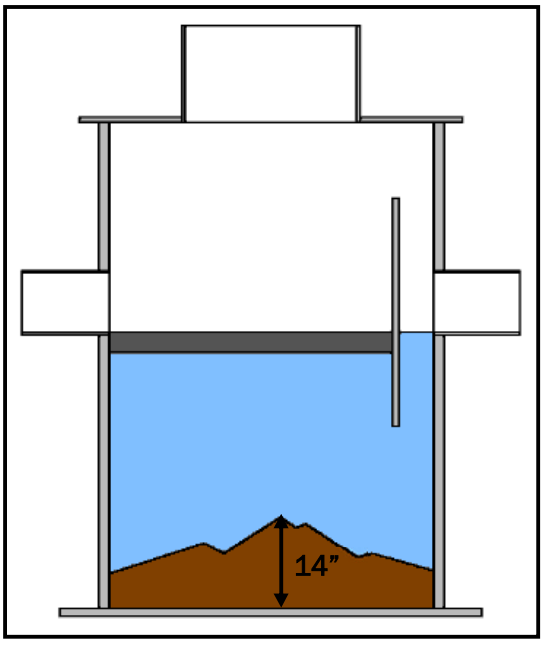
To inspect the AquaSwirl, a hook is typically needed to remove the manhole cover. Most projects include a manhole cover with an AquaShield logo for easy identification. Within the access riser, the inspector will find a metal plate which provides our contact information, the AquaSwirl model size, and serial number.



Sediment inspection using a stadia rod

The only tools needed to inspect the AquaSwirl system are a flashlight and a measuring device. From the surface, the inspector can observe any floating oil and debris. To measure sediment depths, lower the measuring device to the top of the sediment pile. Keep in mind that the finer sediment at the top of the pile may offer less resistance to pressure.

The AquaSwirl design allows for the sediment to accumulate in a semi-conical fashion as illustrated below. That is, the depth to sediment as measured below the water surface may be less in the center of the swirl chamber; and likewise, may be greater at the edges of the swirl chamber.



AquaShield recommends a maximum 14-inch sediment depth prior to clean out.

AquaSwirl Cleanout Procedure

Cleaning the AquaSwirl is simple and quick. Free-floating oil and floatable debris can be observed and removed directly through the 30-inch service access riser provided. A vacuum truck is typically used to remove the accumulated sediment and debris. An advantage of the AquaSwirl design is that the entire sediment storage area can be reached with a vacuum hose from the surface reaching all the sides. Since there are no multiple or limited (blind) access chambers in the AquaSwirl, there are no restrictions to impede on-site maintenance tasks. If applicable, the trash screen can be reached from the surface and cleaned with a vacuum hose.



Vacuum (Vactor) truck quickly cleans the single open access swirl chamber.

Disposal of Recovered Materials

AquaShield recommends that all maintenance activities be performed in accordance with appropriate health and safety practices for the tasks and equipment being used. All material removed during maintenance shall be handled and disposed of in full accordance with any applicable local and state requirements.

AquaSwirl Inspection and Maintenance Worksheets on following pages.

AquaSwirl Inspection Worksheets

SITE and OWNER INFORMATION

Site Name: _____ Date / Time: _____

Site Location: _____

Inspector Name: _____

Inspector Company: _____ Phone #: _____

Owner Name: _____ Phone #: _____

Owner Address: _____

INSPECTIONS

I. Floatable Debris and Oil

1. Remove manhole lid to expose liquid surface of the AquaSwirl
2. Remove floatable debris with basket or net if any present.
3. If oil is present, measure its depth. Clean liquids from system if one half (½) inch or more oil is present.

   Note: Water in AquaSwirl can appear black and similar to oil due to the dark body of the surrounding structure. Oil may appear darker than water in the system and is usually accompanied by oil-stained debris (e.g. Styrofoam, etc.). The depth of oil can be measured with an oil/water interface probe, a stadia rod with water finding paste, a coliwasa, or collect a representative sample with a jar attached to a rod.

II. Sediment Accumulation

1. Lower measuring device (e.g. stadia rod) into swirl chamber through service access provided until top of sediment pile is reached.
2. Record distance to top of sediment pile from top of standing water: _____ inches.
3. Maximum recommended sediment depth prior to cleanout is 14 inches for all models. Consult system shop drawing for treatment chamber depth as measured from the inlet pipe inverted to base of the unit.

III. Diversion Structures (External Bypass Features)

If a diversion (external bypass) configuration is present, it should be inspected as follows:

1. Inspect weir or other bypass features for structural decay or damage. Weirs are more susceptible to damage than off-set piping and should be checked to confirm that they are not crumbling (concrete or brick) or decaying (steel).
2. Inspect diversion structure and bypass piping for signs of structural damage or blockage from debris or sediment accumulation.
3. When feasible, measure elevations on diversion weir or piping to ensure it is consistent with site plan designs.
4. Inspect downstream (convergence) structure(s) for sign of blockage or structural failure as noted above.

CLEANING

Schedule cleaning with local Vactor company to remove sediment, oil and other floatable pollutants. The captured material generally does not require special treatment or handling for disposal. Site-specific conditions or the presence of known contaminants may necessitate appropriate actions be taken to clean and dispose of materials captured and retained by the AquaSwirl. All cleaning activities should be performed in accordance with property health and safety procedures.

AquaShield always recommends that all materials removed from the AquaSwirl during the maintenance process be handled and disposed of in accordance with local and state environmental or other regulatory requirements.

MAINTENANCE SCHEDULE

I. **During Construction**
Inspect the AquaSwirl every three (3) months and clean the system as needed. The AquaSwirl should be inspected and cleaned at the end of construction regardless of whether it has reached its maintenance trigger.

II. **First Year Post-Construction**
Inspect the AquaSwirl every three (3) months and clean the system as needed. Inspect and clean the system once annually regardless of whether it has reached its sediment or floatable pollutant storage capacity.

III. **Second and Subsequent Years Post-Construction**
If the AquaSwirl did not reach full sediment or floatable pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned once annually.

If the AquaSwirl reached full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months and cleaned as needed. The AquaSwirl should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.

IV. **Bypass Structures**
Bypass structures should be inspected whenever the AquaSwirl is inspected. Maintenance should be performed on bypass structures as needed.

AquaSwirl Maintenance Worksheets

MAINTENANCE COMPANY INFORMATION

Company Name: _____

Street Address: _____

City: _____ State/Prov.: _____ Zip/Postal Code: _____

Contact: _____ Title: _____

Office Phone: _____ Cell Phone: _____

ACTIVITY LOG

Date of Cleaning: _____ Time of Cleaning: _____

Date of Next Inspection: _____ Floatable debris present: Yes No

Oil present: Yes No Oil depth (inches): _____ Measurement Method: _____

STRUCTURAL CONDITIONS and OBSERVATIONS

Structural damage: Yes No Where: _____

Structural wear: Yes No Where: _____

Odors present: Yes No Describe: _____

Clogging: Yes No Describe: _____

NOTES

Additional Comments and/or Actions To Be Taken	Time Frame

ATTACHMENTS

- Attach site plan showing AquaSwirl location.
- Attach detail drawing showing AquaSwirl dimensions and model number.
- If a diversion configuration is used, attach details showing basic design and elevations (where feasible).

TABULAR MAINTENANCE SCHEDULE

Date Construction Started: _____ Date Construction Ended: _____

DURING CONSTRUCTION

	Month											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Inspect and Clean as needed			X			X			X			X
Inspect Bypass as needed			X			X			X			X
Clean System*												X*

* The AquaSwirl should be cleaned at least **once a year** during construction. Additionally, the system should always be cleaned at the **end of construction**.

FIRST YEAR POST-CONSTRUCTION

	Month											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Inspect and Clean as needed			X			X			X			X
Inspect Bypass as needed			X			X			X			X
Clean System*												X*

* The AquaSwirl should be cleaned at least **once** during the first year.

Second and Subsequent Years Post-Construction

	Month											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Inspect and Clean as needed												X*
Inspect Bypass, as needed												X*
Clean System*												X*

* If the AquaSwirl **did not reach** full pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned annually. If the AquaSwirl **reached** full pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months or more.