

**AMENDMENT TO AGREEMENT FOR STORM WATER SYSTEM MAINTENANCE**

On the 16th day of May, 2008, L & R Homes, Inc., a Michigan corporation, of 2490 Walton Boulevard, Suite 103, Rochester Hills, MI 48309 entered into with the City of Rochester Hills, MI, whose address is 1000 Rochester Hills Drive, Rochester Hills, MI 48307 (the "City"), an Agreement for Storm Water System Maintenance, as recorded by the Oakland County Register of Deeds on February 11, 2009 in Liber 40883, Page 509 -514 (the "Agreement"), specifically pertaining to certain property located in the City of Rochester Hills, Oakland County, Michigan, more particularly described as Exhibit A attached hereto.

Subsequent to the Agreement, L & R Homes, Inc., a Michigan corporation, in order to comply with the newly adopted engineering standards it was necessary to expand the storm water detention pond, such that it is now necessary to amend the Agreement to provide for the expanded storm water detention pond.

Based on these facts and circumstances, the parties agree to and by this document do hereby amend the existing Agreement so that the previous Exhibits A, B, and C attached to included as part of the originally recorded Agreement are hereby superseded and replaced with the revised Exhibits A, B and C attached hereto and the original Exhibits A, B, and C shall be of no further force or effect.

IN WITNESS HEREOF, the undersigned have hereunto affixed their signatures on the 13th day of September, 20 18.

John Staran  
Approved 9/20/18

**L & R Homes, Inc., a  
Michigan corporation**

By: Vito L. Randazzo

Vito L. Randazzo

Its: Authorized Agent

**CITY OF ROCHESTER HILLS**

By: \_\_\_\_\_

Bryan K. Barnett, Mayor

By: \_\_\_\_\_

Tina Barton, City Clerk

STATE OF MICHIGAN )  
 )SS  
COUNTY OF OAKLAND )

The foregoing instrument was acknowledged before me this 13<sup>th</sup> day of September, 2018,

by Vito L. Randazzo, who is the Authorized Agent of L & R Homes, Inc., a Michigan corporation, on behalf of the corporation.

  
\_\_\_\_\_  
JOSY A FOISY, Notary Public  
NOTARY PUBLIC, STATE OF MI  
COUNTY OF OAKLAND  
MY COMMISSION EXPIRES Sep 23, 2019  
ACTING IN COUNTY OF Oakland  
Oakland County, Michigan  
My Commission Expires:

STATE OF MICHIGAN )  
 )SS  
COUNTY OF OAKLAND )

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_,

by Bryan K. Barnett, Mayor and Tina Barton, Clerk, of the City of Rochester Hills, on behalf of the City.

\_\_\_\_\_  
, Notary Public  
Oakland County, Michigan  
My Commission Expires:

Drafted by:  
Vito L. Randazzo  
L. & R. Homes, Inc  
2490 Walton Boulevard, Suite 103  
Rochester Hills, MI 48309

When recorded, return to:  
Clerks Dept.  
City of Rochester Hills  
1000 Rochester Hills Drive  
Rochester Hills, MI 48309

# EXHIBIT 'A'

## LEGAL DESCRIPTION:

### PARCEL:

Part of the NW ¼ of Section 34, T.3N., R.11E., Rochester Hills, Oakland County, Michigan, being more particularly described as follows: Lot 28 and Lot 29 of "Supervisor's Plat No. 5," as recorded in Liber 6, of Plats, Page 55, Oakland County Records, also described as: Beginning at a point which is S89°59'03"E 1059.69 feet along the North line of Section 34 and the centerline of Auburn Rd (120 ft. wd. R.O.W.) and S00°00'58"W 60.00 feet from the Northwest Corner of Section 34; thence S89°59'03"E 330 feet along the North line of said Lot 28 and 29; thence S00°00'54"E 1259.78 feet along the East line of Lot 29 and the West line of Hazelwood Condominiums (L.26610, P.623-680); thence N90°00'00"W 330 feet along the South line of Lot 28 and 29; thence N00°00'54"W 1259.87 feet along the West line of Lot 28 to the point of beginning.

Containing 415,741 square feet --- 9.544 acres (Net), more or less.

### EXCLUDING INTERIOR ROAD ROW AS FOLLOWS:

Part of the NW ¼ of Section 34, T.3N., R.11E., City of Rochester Hills, Oakland County, Michigan, being more particularly described as follows:

Beginning at a point which is S89°59'03"E 1389.69 feet along the North Line of Section 34, being also a Center Line of Auburn Road (120' wd. R-O-W) and S00°00'54"E 60.00 feet to a point on the South Line of Auburn Road, said point being the NE Corner of Lot 29 of "Supervisor's Plat No.5" (L.6, P.55, O.C.R.) and continuing S00°00'54"E 192.03 feet along the East Line of Lot 29 of "Supervisor's Plat No. 5", being also the West Line of "Hazelwood Hills", an Oakland County Condominium Plan No. 1464 (L.26610, P.674-680, O.C.R.), from the NW Corner of said Section 34; thence continuing S00°00'54"E 60.00 feet along the East Line of Lot 29 of "Supervisor's Plat No.5", being also the West Line of "Hazelwood Hills"; thence S89°59'06"W 121.50 feet along the South Line of Grand Park Drive ( 60' wd. Public R-O-W); thence Southwesterly 21.21 feet along the arc of a curve to the left (Radius of 13.50 feet, central angle of 90°00'00", long chord bears S44°59'06"W 19.09 feet), said curve being a part of the Southerly Line of Grand Park Drive and the Northeasterly Line of Raffle Drive (60' wd. Public R-O-W); thence the following two (2) courses along the Easterly Line of said Raffle Drive; S00°00'54"E 863.29 feet and southerly 27.81 feet along the arc of a curve to the left (Radius of 76.50 feet, central angle of 20°49'47", long chord bears S10°25'48"E 27.66 feet); thence Southwesterly 148.00 feet along the arc of a curve to the right ( Radius of 76.50 feet, central angle of 110°50'42", long chord bears S34°34'40"W 125.97 feet), said curve being the Southeasterly Line of Raffle Drive; thence N90°00'00"W 128.48 feet along the South Line of Raffle Drive, being a part of the South Line of Lot 28 of "Supervisor's Plat No. 5", to the SW Corner of Lot 28 of " Supervisor's Plat No.5"; thence N00°00'54"W 60.00 feet across said Raffle Drive and along a part of the West Line of Lot 28 of "Supervisor's Plan No.5"; thence N90°00'00"E 121.50 feet along the North Line of Raffle Drive; thence northeasterly 21.21 feet along the arc of a curve to the left ( Radius of 13.50 feet, central angle of 90°00'54", long chord bears N44°59'33"E 19.09 feet), said curve being the Southwesterly Line of said Raffle Drive; thence the following two (2) courses along the West Line of Raffle Drive; N00°00'54"W 876.62 feet and Northerly 34.16 feet along the arc of a curve to the left ( Radius of 76.50 feet, central angle of 25°34'59", long chord bears N12°48'24"W 33.87 feet); thence Northeasterly 198.67 feet along the arc of a curve to the right (Radius of 76.50 feet, central angle of 148°48'00", long chord bears N48°48'07"E 147.36 feet), said curve being a part of the Northwesterly Line of Raffle Drive and the Northerly Line of Grand Park Drive; thence the following two (2) courses along the North Line of said Grand Park Drive; Easterly 44.35 feet along the arc of a curve to the left (Radius of 76.50 feet, central angle of 33°13'01", long chord bears S73°24'24"E 43.73 feet) and N89°59'06"E 49.68 feet to the Point of Beginning. Containing 83,089 square feet --- 1.907 acres.

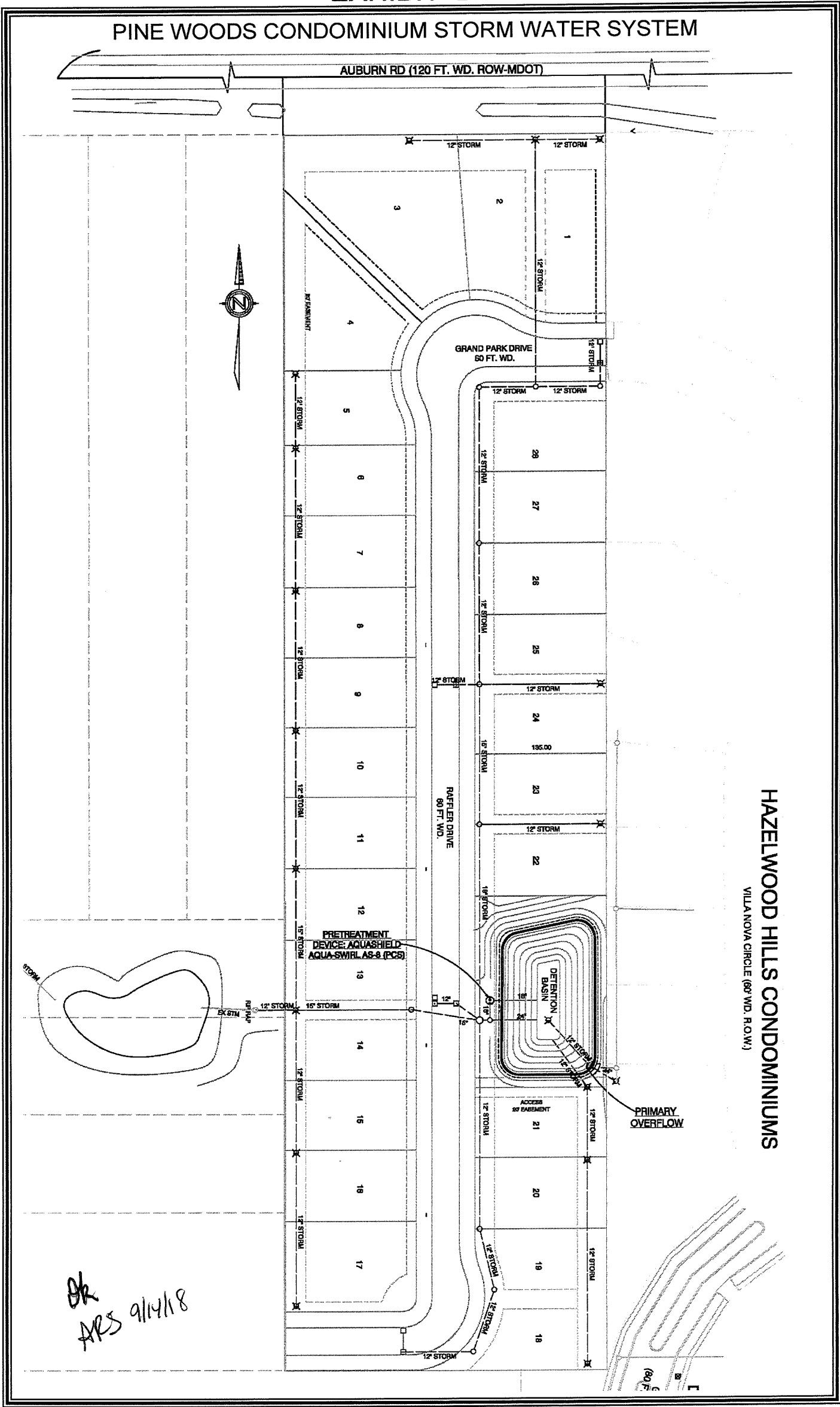
Parcel # 15-34-101.073, -074, & -075

Scott W.

Approved 12/3/18

# EXHIBIT 'B'

## PINE WOODS CONDOMINIUM STORM WATER SYSTEM



**HAZELWOOD HILLS CONDOMINIUMS**  
VILLA NOVA CIRCLE (60' WD. R.O.W.)

OK  
ARS 9/14/18

# EXHIBIT 'C'

## OPERATIONS AND MAINTENANCE MANUAL

PINE WOODS CONDOMINIUM  
STORM WATER SYSTEM MAINTENANCE PLAN  
ROCHESTER HILLS, MI

DEVELOPER:  
L & R Homes, Inc.  
2490 Walton Boulevard, Suite 103  
Rochester Hills, MI 48309

OK ARS  
9/14/18



right to enter the property and perform all necessary work at the property owners' cost. Refer to the Agreement for Storm Water System Maintenance, dated May 16, 2008, as recorded in Liber 40883, PG 509-514, O.C.R., for additional details.

### **General Maintenance Items:**

#### **Trash and Debris Removal:**

Removal of trash and debris from all areas of the property should be performed monthly. Removal of these items will prevent damage to vegetated areas and eliminate their potential to inhibit the operation of any of the storm-water management systems. Sediment, debris and trash that are removed and collected should be disposed of according to local, State and Federal regulations at suitable disposal and/or recycling centers.

### **Storm Water System Maintenance Items:**

The following narratives give an overview of the maintenance requirements of the different components of the storm-water system. The inspection checklists attached to this report offer a more complete listing of what should be inspected, when inspection should occur and the likely frequency of maintenance activities.

#### Storm Sewer and Structures:

Catch basins, inlets, manholes and sewer pipes should be inspected to check for sediment accumulation and clogging, floatable debris, dead vegetation etc. The structures and sewers should also be observed during a wet weather event to ensure their proper operation. Accumulated sediment and debris should be removed on an annual basis or as needed based on observed conditions. Structural repairs or maintenance should occur as needed based on observed conditions such as cracks, spalling, joint failure, leakage, misalignment or settlement of structures. A civil engineer should be retained if problems are thought to exist.

#### Detention Basin Outlet Control Structure and Overflow Structure:

Both the outlet control and overflow structures and connecting pipes should be inspected for sediment accumulation, floatable debris, trash and any other foreign matter that may impede flow or restrict the devices from working properly. The stone surrounding the outlet control structure should be inspected for sediment build up, and the holes at the base of the outlet control structure should be inspected to make sure they do not become blocked. The grates of the structures should be inspected for structural integrity and buildup of debris. The outlet control system should be inspected during a wet weather event to ensure all components are functioning properly. A civil engineer should be retained if problems are thought to exist.

Maintenance will include the removal of any debris, trash or sediment from the structures and/or pipe, cleaning of the stone on the outlet control structure and removal of debris from the structure grates. The stone may need replacement if cleaning does not adequately remove sediment build-up.

#### Detention Basin:

The inlet pipes to the basin should be inspected for structural integrity (pipes cracked, broken, spalled) and that the grates are free from debris. The area around and immediately downstream of the inlet pipes should be inspected for sediment build-up, erosion and the riprap (if present) should be inspected for integrity and sedimentation. Maintenance of the inlet pipes would include removal of any sediment build-up and debris, repair or replacement of any components that are in need of attention and to restore any areas that have eroded.

The basin should be inspected for healthy grass growth, side slope erosion, and excessive sedimentation in the basin. The spillway in the basin should be inspected for sedimentation, erosion and overall integrity. The basin should be inspected during a wet weather event to ensure all aspects of the basin are functioning correctly. A civil engineer should be retained if problems are thought to exist or if the inspection personnel are not familiar with the operating conditions of the basins.

The planted vegetation within the basin should conform to that shown on the construction plans, and any invasive species should be removed. The vegetation should be inspected for healthy growth by a landscape architect if the inspection personnel are not familiar with the specific plantings inside the basins.

Any resident complaints regarding the basins' aesthetics or operation should be investigated during inspections and wet weather operations.

#### Storm Water Pre-Treatment Device:

Refer to the attached maintenance manual from the manufacturer for all inspections and maintenance requirements for the pre-treatment structure.

The following pages include inspection checklists for the various components listed above, as well as, the manufacturer's manual for the stormwater pre-treatment structure.

# STORM WATER SEWER SYSTEM

DATE/TME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## STORM-WATER SEWER SYSTEM MAINTENANCE AND TASKS SCHEDULE-POST CONSTRUCTION

### SYSTEM COMPONENTS

Maintenance Activities	Catch Basin Inlets and Manholes	Storm Sewer Pipes	Rip Rap	Buffer Strip	Frequency	Comments
<u>MONITORING/INSPECTIONS</u>						
Inspect for Sediment Accumulation	X	X			Annually	_____
Inspect for Floatables, dead vegetation and debris	X	X		X	Annually and after major rainfall	_____
Inspect for erosion			X	X	Annually	_____
Inspect all components during wet weather and compare to as-built plans	X	X			Annually	_____
Inspect inside of structures and pipes for cracks, spelling, joint failure, settlement, sagging and misalignment	X	X			Annually	_____
<u>PREVENTATIVE MAINTENANCE</u>						
Remove accumulated sediment	X	X			Annually, or as needed	_____
Remove floatables, dead vegetation and debris	X	X		X	Annually, or as needed	_____
<u>REMEDIAL ACTIONS</u>						
Repair/stabilize areas of erosion			X	X	As needed	_____
Structural Repairs	X	X			As needed	_____
Make adjustments/repairs to ensure proper functioning	X	X	X		As needed	_____

SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_  
 \_\_\_\_\_

OVERALL CONDITION OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_



# OUTLET CONTROL AND OVERFLOW STRUCTURES

DATE/TME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## OUTLET CONTROL AND OVERFLOW MAINTENANCE AND TASKS SCHEDULE-POST CONSTRUCTION

### SYSTEM COMPONENTS

Maintenance Activities	<u>Structures</u>	<u>Outlet Pipes</u>	<u>Rip Rap</u>	<u>Grates</u>	<u>Frequency</u>	<u>Comments</u>
<u>MONITORING/INSPECTIONS</u>						
Inspect for Sediment Accumulation	X	X	X		Annually	_____
Inspect for Floatables, dead vegetation and debris	X	X	X	X	Annually and after major rainfall	_____
Inspect for erosion			X		Annually	_____
Inspect all components during wet weather and compare to as-built plans	X	X	X	X	Annually	_____
Inspect inside of structures and pipes for cracks, spelling, joint failure, settlement, sagging and misalignment	X	X			Annually	_____
<u>PREVENTATIVE MAINTENANCE</u>						
Remove accumulated sediment	X	X	X		Annually, or as needed	_____
Remove floatables, dead vegetation and debris	X	X	X	X	Annually, or as needed	_____
Replace or wash/clean stone filtering	X				As needed	_____
<u>REMEDIAL ACTIONS</u>						
Repair/stabilize areas of erosion			X		As needed	_____
Structural Repairs	X	X			As needed	_____
Make adjustments/repairs to ensure proper functioning	X	X	X	X	As needed	_____

SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_

OVERALL CONDITON OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_

# DETENTION BASIN

DATE/TME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## DETENTION MAINTENANCE AND TASKS SCHEDULE-POST CONSTRUCTION

### SYSTEM COMPONENTS

Maintenance Activities	Rip Rap at inlets	Overflow Spillway	Sideslopes & Banks	Buffer Strip	Basin	Frequency	Comments
<u>MONITORING/INSPECTIONS</u>							
Inspect for Sediment Accumulation	X	X			X	Annually	_____
Inspect for Floatables, dead vegetation and debris	X	X	X	X	X	Annually and after major rainfall	_____
Inspect for erosion	X	X	X	X	X	Annually	_____
Inspect all components during wet weather and compare to as- built plans	X	X			X	Annually	_____
Inspect for invasive plant species			X	X	X	Annually	_____
<u>PREVENTATIVE MAINTENANCE</u>							
Remove accumulated sediment	X	X			X	Annually, or as needed	_____
Remove floatables, dead vegetation and debris	X	X	X	X	X	Annually, or as needed	_____
Professional application of herbicide for invasive species that may be present			X	X	X	As needed	_____
Repair Erosion and/or reseed bare areas	X	X	X	X	X	As needed	_____
<u>REMEDIAL ACTIONS</u>							
Repair/stabilize areas of erosion	X	X	X	X	X	As needed	_____
Structural Repairs	X	X				As needed	_____
Make adjustments/repairs to ensure proper functioning	X	X			X	As needed	_____

SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_

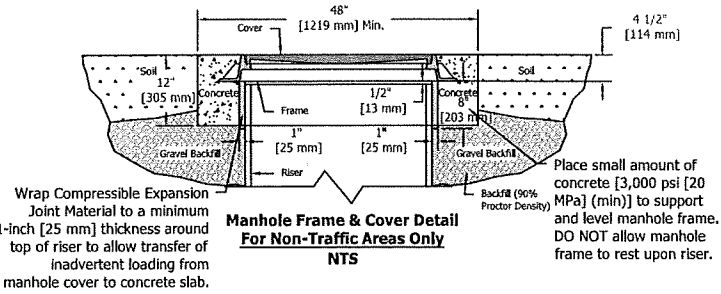
OVERALL CONDITON OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

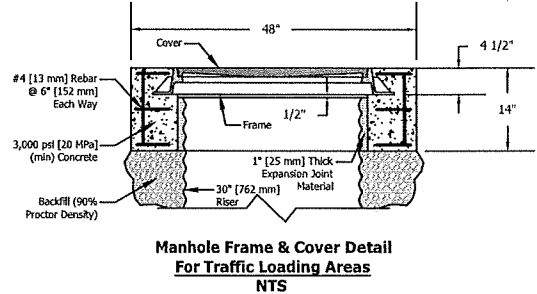
DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_

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.

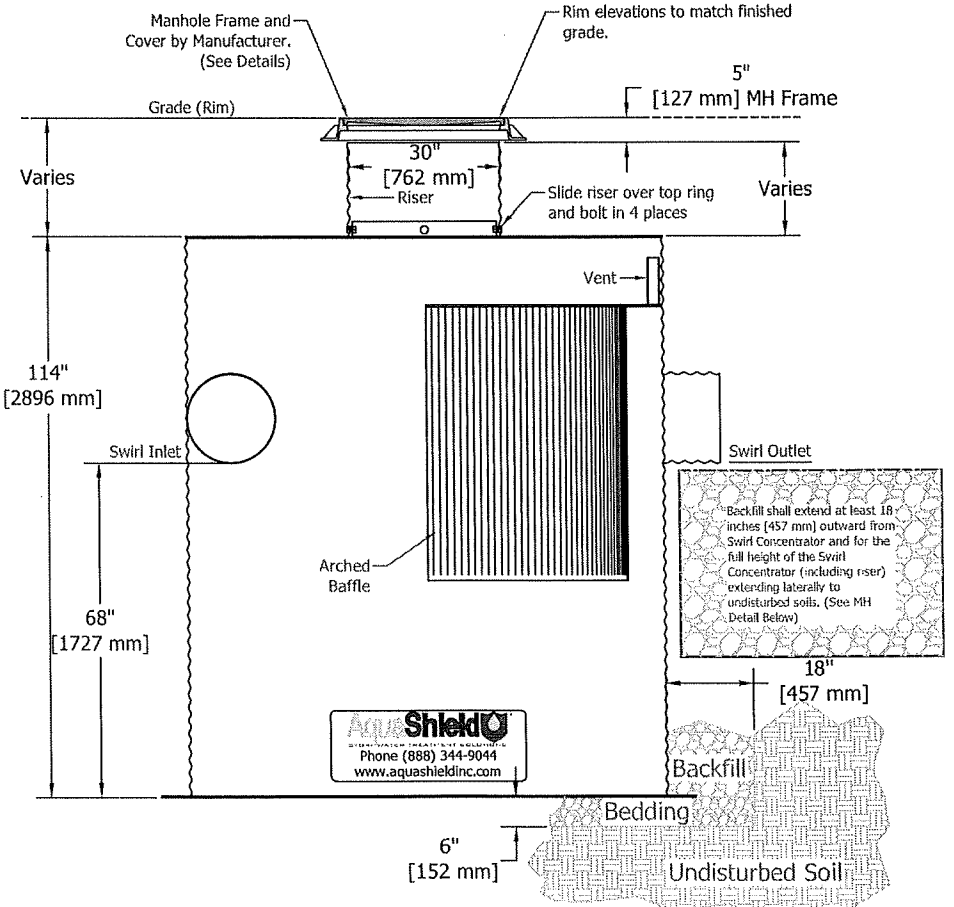
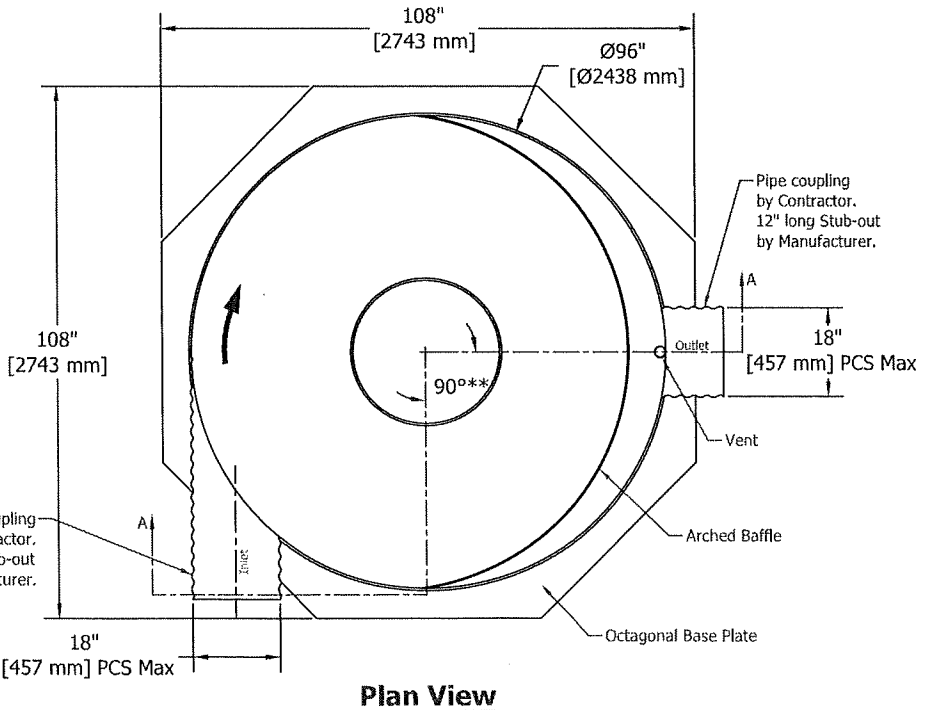


If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion 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.

\* 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.





**Aqua-Swirl<sup>®</sup>**  
**Stormwater Treatment System**  
**Inspection and Maintenance Manual**



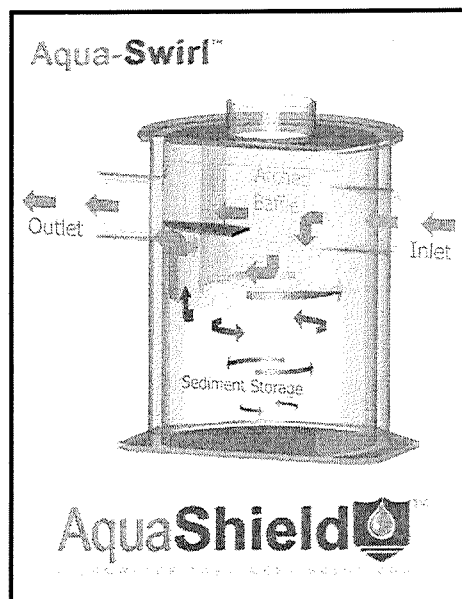
**AquaShield<sup>™</sup>, Inc.**  
**2733 Kanasita Drive**  
**Suite 111**  
**Chattanooga, TN 37343**  
**Toll free (888) 344-9044**  
**Phone: (423) 870-8888**  
**Fax: (423) 826-2112**  
**Email: [info@aquashieldinc.com](mailto:info@aquashieldinc.com)**  
**[www.aquashieldinc.com](http://www.aquashieldinc.com)**

**November 2016**

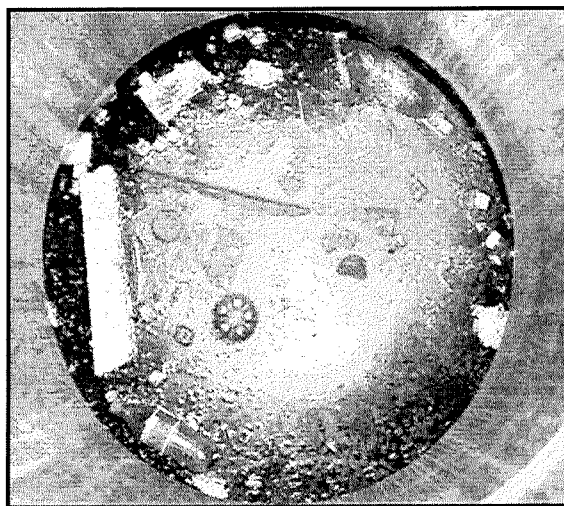


## **Aqua-Swirl<sup>®</sup> Stormwater Treatment System**

The Aqua-Swirl<sup>®</sup> Stormwater Treatment System (Aqua-Swirl<sup>®</sup>) is a vortex-type hydrodynamic separator designed and supplied by AquaShield<sup>™</sup>, Inc. (AquaShield<sup>™</sup>). Aqua-Swirl<sup>®</sup> technology 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.



Aqua-Swirl<sup>®</sup> Stormwater Treatment System



Floatable debris in the Aqua-Swirl<sup>®</sup>



## **System Operation**

---

The treatment operation begins when stormwater enters the Aqua-Swirl<sup>®</sup> through a tangential inlet pipe that produces a circular (or vortex) flow pattern that causes contaminants to settle to the base of the unit. Since stormwater flow is intermittent by nature, the Aqua-Swirl<sup>®</sup> retains water between storm events providing both dynamic and quiescent settling of solids. The dynamic settling occurs during each storm event while the quiescent settling takes place between successive storms. A combination of gravitational and hydrodynamic drag forces encourages the solids to drop out of the flow and migrate to the center of the chamber where velocities are the lowest.

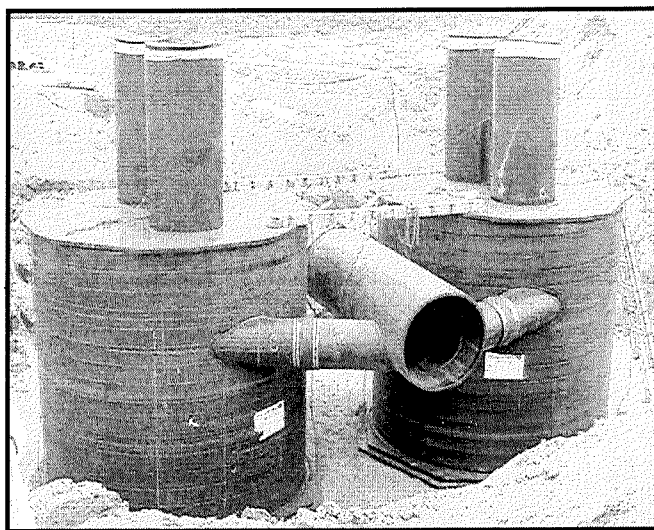
The treated flow then exits the Aqua-Swirl<sup>®</sup> behind the arched outer baffle. The top of the baffle is sealed across the treatment channel, thereby eliminating floatable pollutants from escaping the system. A vent pipe is extended up the riser to expose the backside of the baffle to atmospheric conditions, preventing a siphon from forming at the bottom of the baffle.



## **Custom Applications**

---

The Aqua-Swirl<sup>®</sup> system can be modified to fit a variety of purposes in the field, and the angles for inlet and outlet lines can be modified to fit most applications. The photo below demonstrates the flexibility of Aqua-Swirl<sup>®</sup> installations using a “twin” configuration in order to double the water quality treatment capacity. Two Aqua-Swirl<sup>®</sup> units were placed side by side in order to treat a high volume of water while occupying a small amount of space.



**Custom designed AS-9 Twin Aqua-Swirl<sup>®</sup>**



## **Retrofit Applications**

---

The Aqua-Swirl<sup>®</sup> system is designed so that it can easily be used for retrofit applications. With the invert of the inlet and outlet pipe at the same elevation, the Aqua-Swirl<sup>®</sup> can easily be connected directly to the existing storm conveyance drainage system. Furthermore, because of the lightweight nature and small footprint of the Aqua-Swirl<sup>®</sup>, existing infrastructure utilities (i.e., wires, poles, trees) would be unaffected by installation.

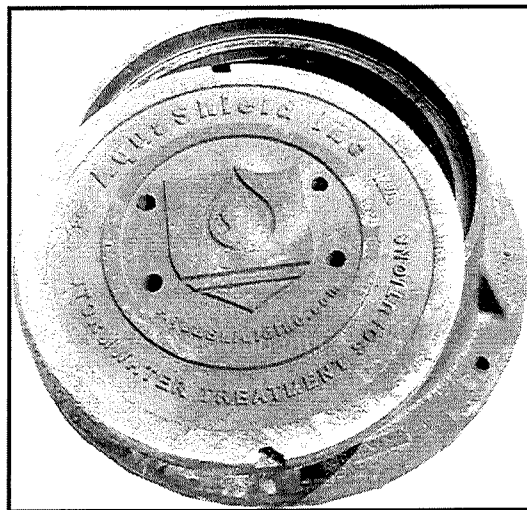


## **Aqua-Swirl<sup>®</sup> System Maintenance**

The long term performance of any stormwater treatment structure, including manufactured or land based systems, depends on a consistent maintenance plan. Inspection and maintenance functions are simple and easy for the Aqua-Swirl<sup>®</sup> allowing all inspections to be performed from the surface.

It is important that a routine inspection and maintenance program be established for each unit based on: (a) the volume or load of the contaminants of concern, (b) the frequency of releases of contaminants at the facility or location, and (c) the nature of the area being drained.

In order to ensure that our systems are being maintained properly, AquaShield<sup>™</sup> offers a maintenance solution to all of our customers. We will arrange to have maintenance performed.



Aqua-Swirl<sup>®</sup> manhole cover



## Inspection

---

The Aqua-Swirl<sup>®</sup> can be inspected from the surface, eliminating the need to enter the system to determine when cleanout should be performed. In most cases, AquaShield<sup>™</sup> recommends a quarterly inspection for the first year of operation to develop an appropriate schedule of 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 inspection.



## Maintenance

---

The Aqua-Swirl<sup>®</sup> has been designed to minimize and simplify the inspection and maintenance process. The single chamber system can be inspected and maintained entirely from the surface thereby eliminating the need for confined space entry. Furthermore, the entire structure (specifically, the floor) is accessible for visual inspection from the surface. There are no areas of the structure that are blocked from visual inspection or periodic cleaning. Inspection of any free-floating oil and floatable debris can be directly observed and maintained through the manhole access provided directly over the swirl chamber.

### Aqua-Swirl<sup>®</sup> Inspection Procedure

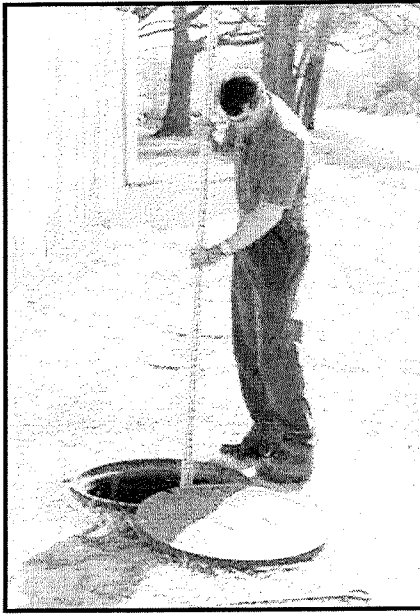
To inspect the Aqua-Swirl<sup>®</sup>, a hook is typically needed to remove the manhole cover. AquaShield<sup>™</sup> provides a customized manhole cover with our distinctive logo to make it easy for maintenance crews to locate the system in the field. We also provide a permanent metal information plate affixed inside the access riser which provides our contact information, the Aqua-Swirl<sup>®</sup> model size, and serial number.

The only tools needed to inspect the Aqua-Swirl<sup>®</sup> system are a flashlight and a measuring device such as a stadia rod or pole. Given the easy and direct accessibility provided, floating oil and debris can be observed directly from the surface. Sediment depths can easily be determined by lowering a measuring device to the top of the sediment pile and to the surface of the water.

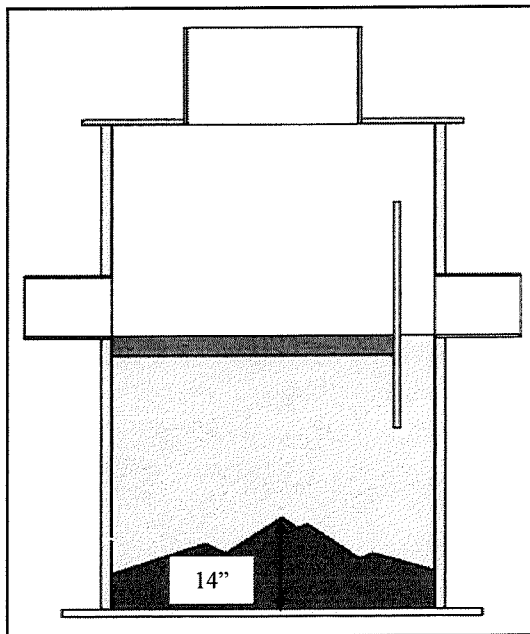
It should be noted that in order to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the *top* of the sediment pile. Keep in mind that the finer sediment at the top of the pile may offer less resistance to the measuring device than the larger particles which typically occur deeper within the sediment pile.

The Aqua-Swirl<sup>®</sup> 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.





Sediment inspection using a stadia rod



Maximum recommended sediment depth prior to cleanout is 14 inches for all Aqua-Swirl® models

### **Aqua-Swirl® Cleanout Procedure**

Cleaning the Aqua-Swirl® 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 Aqua-Swirl® 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 Aqua-Swirl<sup>®</sup>, there are no restrictions to impede on-site maintenance tasks.

### **Disposal of Recovered Materials**

AquaShield<sup>™</sup> recommends that all maintenance activities be performed in accordance with appropriate health and safety practices for the tasks and equipment being used. AquaShield<sup>™</sup> also recommends that all materials removed from the Aqua-Swirl<sup>®</sup> and any external structures (e.g, bypass features) be handled and disposed in full accordance with any applicable local and state requirements.



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

***Aqua-Swirl<sup>®</sup> Inspection and Maintenance Work Sheets  
on following pages***

## Aqua-Swirl<sup>®</sup> Inspection and Maintenance Manual Work Sheets

### SITE and OWNER INFORMATION

Site Name: \_\_\_\_\_

Site Location: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Inspector Company: \_\_\_\_\_ Phone #: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Owner Address: \_\_\_\_\_

Owner Phone #: \_\_\_\_\_ Emergency Phone #: \_\_\_\_\_

### INSPECTIONS

#### I. Floatable Debris and Oil

1. Remove manhole lid to expose liquid surface of the Aqua-Swirl<sup>®</sup>.
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 Aqua-Swirl<sup>®</sup> 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 invert 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 feature 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 vector company or AquaShield™ 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 that appropriate actions be taken to clean and dispose of materials captured and retained by the Aqua-Swirl®. All cleaning activities should be performed in accordance with property health and safety procedures.

AquaShield™ always recommends that all materials removed from the Aqua-Swirl® during the maintenance process be handled and disposed in accordance with local and state environmental or other regulatory requirements.

## **MAINTENANCE SCHEDULE**

### **I. During Construction**

Inspect the Aqua-Swirl® every three (3) months and clean the system as needed. The Aqua-Swirl® 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 Aqua-Swirl® 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 Aqua-Swirl® 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 Aqua-Swirl<sup>®</sup> 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 Aqua-Swirl<sup>®</sup> 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 Aqua-Swirl<sup>®</sup> is inspected. Maintenance should be performed on bypass structures as needed.

#### MAINTENANCE COMPANY INFORMATION

Company Name: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State/Prov.: \_\_\_\_\_ Zip/Postal Code: \_\_\_\_\_

Contact: \_\_\_\_\_ Title: \_\_\_\_\_

Office Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

#### ACTIVITY LOG

Date of Cleaning: \_\_\_\_\_ (Next inspection should be 3 months from this data for first year).

Time of Cleaning: Start: \_\_\_\_\_ End: \_\_\_\_\_

Date of Next Inspection: \_\_\_\_\_

Floatable debris present: Yes No

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Oil present: Yes No Oil depth (inches): \_\_\_\_\_

Measurement method and notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

#### STRUCTURAL CONDITIONS and OBSERVATIONS



## Aqua-Swirl®

### TABULAR MAINTENANCE SCHEDULE

Date Construction Started: \_\_\_\_\_

Date Construction Ended: \_\_\_\_\_

#### During Construction

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

\* The Aqua-Swirl® should be cleaned **once a year** regardless of whether it has reached full pollutant storage capacity. In addition, the system should be cleaned at the **end of construction** regardless of whether it has reach full pollutant storage capacity.

#### First Year Post-Construction

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

\* The Aqua-Swirl® should be cleaned **once a year** regardless of whether it has reached full pollutant storage capacity.

#### Second and Subsequent Years Post-Construction

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

\* If the Aqua-Swirl® 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 Aqua-Swirl® **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 or more frequently if past history warrants, and cleaned as needed. The Aqua-Swirl® should be cleaned annually regardless of whether it reaches its full sediment or floatable pollutant capacity.