

Stormwater System Operation & Maintenance Plan



Cranberry Highway

Located in Wareham, MA Applicant: The Parikh Network 09-24-2021 Revised 03-08-2023

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Operation & Maintenance Plan Overview

An essential component of a successful Stormwater System (SS) is the ongoing Operation and Maintenance (O&M) of the various components of the stormwater drainage, control, and conveyance systems. These components include swales, pipes, catch basins, and treatment/ control devices are commonly referred to as Best Management Practices (BMPs). Failure to provide effective maintenance can reduce the hydraulic capacity and the pollutant removal efficiency of stormwater practices.

Many people expect that stormwater facilities will continue to function correctly forever. However, it is inevitable that deterioration of the stormwater system will occur once it becomes operational. The question is not whether stormwater system maintenance is necessary but how often.

This plan has been developed to proactively address operations and maintenance to minimize potential problems and maximize potential stormwater runoff treatment and management. Ongoing inspections and maintenance will extend the service life of the Best Management Practices.

This plan addresses:

- 1. Stormwater management system(s) owners;
- 2. The party or parties responsible for operation and maintenance, including how future property owners will be notified of the presence of the stormwater management system and the requirement for proper operation and maintenance;
- 3. A description and delineation of public safety features;
- 4. The routine (scheduled) and non-routine (corrective) maintenance tasks for each BMP to be undertaken after construction is complete and a schedule for implementing those tasks;
- 5. A plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point;
- 6. An estimated operation and maintenance budget; and
- 7. Funding source for operation and maintenance activities and equipment.

A major contributor to unmaintained stormwater facilities is a lack of clear ownership and responsibility definition. In order for an inspection and maintenance program to be effective, the roles for each responsibility must be clearly defined prior to construction of a system. This can be accomplished with a maintenance agreement between the site owners and the responsible authority.

This report is suitable for recording as an attachment to a maintenance agreement between the site owner and the responsible authority. A copy of a sample agreement is attached to this report as Appendix B.

Stormwater System Owner / Party Responsible for O&M

Stormwater BMPs are maintained during construction by the site contractor as identified in the Stormwater Pollution Prevention Plan (SWPPP) for the site. A copy of the SWPPP is required to be kept on site during construction. The SWPPP requires maintenance and inspection of the BMPs during the construction phase of project and requires a log be kept of these activities. Once construction is complete and the contractor's warranty period is elapsed, the contractor must obtain the signature of the stormwater system's owner releasing the contractor from his maintenance and inspection responsibilities. A copy of this release of contractor's responsibility must be attached to this document.

The property owner will also be the owner of the stormwater system. Upon completion of construction, the owner of the property along with mailing and emergency contact information must be added below.

Owner:	
Mailing Address:	
<u> </u>	
Emergency Contact Name:	
Phone:	

Transfer of Ownership

In the event that the owner of the property changes, the current owner (grantor) must provide a copy of this document to the new owner (grantee). The new owner must notify the Massachusetts Department of Environmental Protection (MassDEP) of the change of ownership and provide a signed updated Operations and Maintenance Plan to MassDEP.

<u>The Stormwater System Owner is the Party Responsible for the ongoing O&M of the system.</u> The two key components to adequately maintain the stormwater infrastructure are:

- 1. Performance of periodic and scheduled inspections
- 2. Performance of scheduled maintenance

The actual operation and maintenance of the system may be performed by a third party designated by the owner. If the owner contracts with a third party for O&M the name, address, and emergency contact information must be added below, and updated if the third party designee changes.

Name:			
Mailing Address:			
Ū			
Emergency Contact Nan	ne:		
Phone:			

Public Safety

Public safety was a critical factor in designing the stormwater system. Public safety features included in this design are:

- Accessibility to Stormwater BMPs
- Winter & Non-Winter Maintenance

Accessibility to Stormwater BMPs

As shown on the site plans, the underground infiltration systems are located in paved areas and therefore have unobstructed access.

Winter Maintenance

The following tasks must be performed to protect public safety during the winter season:

- Roadways and parking lots to be salted/ sanded/ plowed in accordance with applicable Town of Wareham and MassDOT/ MassDEP requirements;
- Inspect the open and closed drainage networks adjacent to the snow stockpiles to ensure they are free of clogging and debris;
- Inspect roadways and drainage structures post-storm event to alleviate any signs of icing or damming.

Non-Winter Maintenance

The following tasks must be performed to protect public safety during the non-winter seasons:

- Roadways and parking lots to be swept in accordance with applicable Town of Wareham and MassDOT/ MassDEP requirements;
- The stormwater management systems must be inspected and maintained in accordance with the enclosed Operations & Maintenance Plan.

Particular care must be taken in the operation and maintenance of these features.

Stormwater System Plan

A plan identifying each component of the stormwater system is included on the following page.



Inspections & Maintenance

Inspections must be performed on a regular basis and scheduled based on the BMP type and configuration. It is not mandatory that all inspectors be trained engineers, but they must have some knowledge or experience with stormwater systems and in general, trained stormwater engineers should direct the inspectors. Follow-up inspections by registered professional engineers must be performed where a routine inspection has revealed a question of structural or hydraulic integrity affecting public safety.

Not all inspections can be conducted by direct human observation. For subsurface systems, video equipment may be required. There may be cases where other specialized equipment is necessary. The inspection program must be tailored to address the operational characteristics of the system.

The inspection process must document observations made in the field and must cover structural conditions, hydraulic operational conditions, evidence of vandalism, condition of vegetation, occurrence of obstructions, unsafe conditions, and build-up of trash, sediments and pollutants.

Maintenance of the stormwater management system is essential and can be divided into two types, scheduled and corrective.

Scheduled maintenance tasks are those that are typically accomplished on a regular basis and can generally be scheduled without referencing inspection reports. These items consist of such things as vegetation maintenance (such as mowing) and trash and debris removal. These tasks are required at well-defined time intervals and are a requirement for all stormwater structural facilities.

Corrective maintenance tasks consist of items such as sediment removal, stream bank stabilization, and outlet structure repairs that are done on an as-needed basis. These tasks are typically scheduled based on inspection results or in response to complaints.

Since specialized equipment may be required, some maintenance tasks can be effectively handled on a contract basis with an outside entity specializing in that field. In addition, some maintenance may also require a formal design and bid process to accomplish the work.

Appendix A provides an "Inspection Schedule & Maintenance Checklist" for the stormwater system components on this site. Completed checklists must be maintained as an ongoing record of inspections for each component of the stormwater system.

In addition to the maintenance of the stormwater system, maintenance of other site improvements can significantly enhance the ability for the BMPs to function as designed. Several of these have been listed below, along with the recommended maintenance.

Lawn, Garden and Landscape Management

- Lawns should be cut no shorter than 1-1/2" in the spring and fall to stimulate root growth, and no shorter than 2 to 3 inches throughout the summer.
- Infiltration ponds should be mowed at least twice per year.
- Fertilize no more than twice per year, once in May-June and once in September-October.
- Avoid spreading fertilizer on impervious surfaces.
- Weeds should be dug or pulled out. Large areas of weeds can be removed by covering with large plastic sheet(s) for a few days.
- Chemical pesticides should be used as a last resort. A healthy lawn is naturally disease resistant.
 - Visible insects can be removed by hand, by spraying with water, or even vacuum cleaning.
 - Store bought traps, specific for a species, can be used.
 - Slugs and other soft bodied insects can be eliminated using diatomaceous earth.
 - o Plants infected with bacteria and fungi should be removed and disposed of.
 - Beneficial organisms should be maintained on the property and should be encouraged/ attracted to the property. Homeowners and property facility maintenance personal should become familiar with beneficial organisms.
- Irrigation should be minimal if required at all. Most lawns do not require watering and will become dormant during dry periods.
 - Established lawns require no more than one inch of water per week.
 - Lawn areas should be watered before 9am to avoid evaporation.

Road and Parking Area Management

Street and Parking Lot Sweeping

• All street and parking areas on site must be swept a minimum of 2 times per year. Deicing:

- Salt storage areas must be completely covered and located on an impervious surface.
- Runoff must be contained in appropriate areas.
- See The Guidelines on Road Salt Storage offered by MassDEP for more detailed definitions and best management practices. The Guidelines on Road Salt Storage can be found online at: <u>https://www.mass.gov/guides/guidelines-on-road-salt-storage</u>

Sealants:

• Only asphalt based sealants are permitted, no coal-tar based asphalt sealants can be used on site. Snow Removal:

- Snow must not be dumped in any water body including rivers, reservoirs, ponds, lakes, wetlands, bays, or the ocean.
- Avoid disposing of snow on top of storm drain catch basins or stormwater drainage swales or ditches.
- Snow must be stored in upland areas, not in or adjacent to water bodies or wetlands. Snow must be stored in a location that will allow snow melt and enter the onsite drainage system so it can be treated by onsite BMPs.

Solid Waste Containment

• Trash and recycling receptacles must be located onsite for all commercial areas.

Reference; Additional information relating to operation and maintenance of specific BMPs can be found in the Massachusetts Stormwater Handbook, particularly Volume 2, Chapter 2. (https://www.mass.gov/files/documents/2016/08/qi/v2c2.pdf)

Estimated Inspections & Maintenance Budget

It is important to be able to budget for the O&M costs associated with the stormwater system. To assist the owner in budgeting, below is an estimate of the costs that may be incurred in maintaining the system. The costs have been estimated on a <u>Yearly</u> basis.

Infiltration Structure:

For a 25 year finance period, Infiltration Structures cost approximately \$1,277.77 per acre of tributary area per year. The site contains approximately 0.75 acres of area flowing to infiltration structures. This equates to an approximate cost of \$960 per year to maintain the infiltration structures.

Based on the costs outlined above, the stormwater system will cost approximately \$960 per year to maintain. This is only an estimate and costs may vary.

These costs are the responsibility of the stormwater system owner. Funding for the costs will be provided by the owner.

Reference; Maintenance costs are based on information provided by Horsely Witten during the January 19, 2011 Stormwater Manual Training.

(http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/t4guide/slides/sess210.ppt)

Appendix A – Inspection Schedule & Maintenance Checklists

Drainage Structures (Catch Basins, Manholes, etc.) Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

Notes:

- Beyond inspection frequency noted, inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
Semi-annually inspect drainage structures for damage		
Use a vacuum truck or other means to clean out any sediment or debris present in any drainage structure or whenever sediments reach ½ of the sump depth, which ever comes first.		
Semi-annually inspect drainage structures for debris and remove as necessary		

Drainage Structures (Catch Basins, Manholes, etc.) Operation, Maintenance, and Management Inspection Checklist

Inspection	n Checklist
Project:	Date:
Location:	Time:
Site Status:	Inspector:
COMMENTS:	
ACTIONS TO BE TAKEN:	

Street Sweeping Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date: Time:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
Sweep all roadways two times per year. One of these sweepings must occur after winter sanding operations have concluded.		

COMMENTS:

Street Sweeping Operation, Maintenance, and Management Inspection Checklist

Project:	Date:
Location:	Time:
Site Status:	Inspector:
ACTIONS TO BE TAKEN:	

Underground System Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor
- Repair or complete replacement to Underground Infiltration System Practice is required if system fails to infiltrate fully within 48 hours.
- Inspection Ports are provided over each row of the chambers for inspections. Manholes are provided at one end of each isolator row for access and maintenance.

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Debris	Cleanout (Quart	erly)
The isolator row chamber(s) clear of debris/ floatables or accumulated sediment.		
Inflow pipes clear of debris/ floatables		
Overflow spillway clear of debris/ floatables		
Inlet area clear of debris/ floatables		
2. Dewa	atering (Annual)	
Chamber dewaters between storms		
Outlet devices shall be cleaned/repaired when draw down exceeds 36 hours.		

Underground System Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

3. Sediment Clea	anout of Chamber (Annual)
No evidence of sedimentation in chamber	
Sedimentation accumulation doesn't yet require cleanout	
Sediment Shall be removed from the system when sediment volume exceeds 10% of the total vault volume	
Remove sediments by hydro-jetting of sediments and vactoring (vacuuming)	
4. I	nlets (Quarterly)
Good condition	
No evidence of disrepair (presence of structural damage)	
5. Aggreg	ate Repairs (Annual)
Annual inspection for damage	
Annual inspection for hydrocarbon build-up and removal if detected.	
Annual inspection for sediment accumulation in the facility	
Surface of aggregate clean	
Top layer of stone does not need replacement	
Chamber does not need rehabilitation (presence of structural damage)	

Underground System Operation, Maintenance, and Management Inspection Checklist

Project:	Date:
Location:	Time:
Site Status:	Inspector:
COMMENTS:	
ACTIONS TO BE TAKEN:	





Operation and Maintenance Manual

Downstream Defender®

Vortex Separator for Stormwater Treatment

Turning Water Around ...®

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's Downstream Defender[®]. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc have a policy of continuous product development and reserve the right to amend specifications without notice.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102 Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Downstream Defender[®] by Hydro International

The Downstream Defender[®] is an advanced Hydrodynamic Vortex Separator designed to provide high removal efficiencies of settleable solids and their associated pollutants, oil, and floatables over a wide range of flow rates.

The Downstream Defender[®] has unique, flow-modifying internal components developed from extensive full-scale testing, CFD modeling and over thirty years of hydrodynamic separation experience in wastewater, combined sewer and stormwater applications. These internal components distinguish the Downstream Defender[®] from simple swirl-type devices and conventional oil/grit separators by minimizing turbulence and headlosses, enhancing separation, and preventing washout of previously stored pollutants.

The high removal efficiencies and inherent low headlosses of the Downstream Defender[®] allow for a small footprint making it a compact and economical solution for the treatment of non-point source pollution.





Benefits of the Downstream Defender®

- · Removes sediment, floatables, oil and grease
- No pollutant washouts
- Small footprint
- · No loss of treatment capacity between clean-outs
- · Low headloss
- Efficient over a wide ranges of flows
- Easy to install
- Low maintenance

Applications

- · New developments and retrofits
- Utility yards
- Streets and roadways
- Parking lots
- · Pre-treatment for filters, infiltration and storage
- · Industrial and commercial facilities
- Wetlands protection

Downstream Defender[®] Components

- 1. Central Access Port
- 2. Floatables Access Port (6-ft., 8-ft. and 10-ft. models only)
- 3. Dip Plate
- 4. Tangential Inlet
- 5. Center Shaft
- 6. Center Cone
- 7. Benching Skirt
- 8. Floatables Lid
- 9. Outlet Pipe
- 10. Floatables Storage
- 11. Isolated Sediment Storage Zone

HYDRO MAINTENANCE SERVICES

Hydro International has been engineering stormwater treatment systems for over 30 years. We understand the mechanics of removing pollutants from stormwater and how to keep systems running at an optimal level.

NOBODY KNOWS OUR SYSTEMS BETTER THAN WE DO



AVOID SERVICE NEGLIGENCE

Sanitation services providers not intimately familiar with stormwater treatment systems are at risk of the following:

- Inadvertently breaking parts or failing to clean/replace system components appropriately.
- Charging you for more frequent maintenance because they lacked the tools to service your system properly in the first place.
- Billing you for replacement parts that might have been covered under your Hydro warranty plan
- Charging for maintenance that may not yet have been required.

BETTER TOOLS, BETTER RESULTS

Not all vactor trucks are created equal. Appropriate tools and suction power are needed to service stormwater systems appropriately. Companies who don't specialize in stormwater treatment won't have the tools to properly clean systems or install new parts.



SERVICE WARRANTY

Make sure you're not paying for service that is covered under your warranty plan. Only Hydro International's service teams can identify tune-ups that should be on us, not you.

LEAVE THE DIRTY WORK TO US

Trash, sediment and polluted water is stored inside treatment systems until they are removed by our team with a vactor truck. Sometimes teams must physically enter the system chambers in order to prepare the system for maintenance and install any replacement parts. Services include but are not limited to:

- Solids removal
- Removal of liquid pollutants
- Replacement media installation (when applicable)



TREATMENT SYSTEMS SERVICED BY HYDRO:

- Stormwwater filters
- Stormwater separators
- Baffle boxes
- Biofilters/biorention systems
- Storage structures
- Catch basins
- Stormwater ponds
- Permeable pavement



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Downstream Defender® Operation and Maintenance Manual



Operation

Introduction

The Downstream Defender® operates on simple fluid hydraulics It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The Downstream Defender[®] has been designed to allow for easy and safe access for inspection/monitoring and clean-out procedures. Entry into the unit or removal of the internal components is not necessary for maintenance, thus safety concerns related to confined-spaceentry are avoided.

Pollutant Capture and Retention

The internal components of the Downstream Defender® have been designed to protect the oil, floatables and sediment storage volumes so that separator performance is not reduced as pollutants accumulate between clean-outs. Additionally, the Downstream Defender® is designed and installed into the storm drain system so that the vessel remains wet between storm events. Oil and floatables are stored on the water surface in the outer annulus separate from the sediment storage volume in the sump of the unit providing the option for separate oil disposal, and accessories such as adsorbant pads. Since the oil/floatables and sediment storage volumes are isolated from the active separation region, the potential for re-suspension and washout of stored pollutants between clean-outs is minimized.

Wet Sump

The sump of the Downstream Defender® retains a standing water level between storm events. The water in the sump prevents stored sediment from solidifying in the base of the unit. The cleanout procedure becomes more difficult and labor intensive if the system allows fine sediment to dry-out and consolidate. Dried sediment must be manually removed by maintenance crews. This is a labor intensive operation in a hazardous environment.

Blockage Protection

The Downstream Defender® has large clear openings and no internal restrictions or weirs, minimizing the risk of blockage and hydraulic losses. In addition to increasing the system headloss, orifices and internal weirs can increase the risk of blockage within the unit.

Maintenance

Overview

The Downstream Defender® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the Downstream Defender®. The Downstream Defender[®] will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the Downstream Defender® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.



Fig.1 Pollutant storage volumes of the Downswtream Defender®.

The Downstream Defender® allows for easy and safe inspection monitoring and clean-out procedures. A commercially municipally owned sump-vac is used to remove captured sedime and floatables. Access ports are located in the top of the manho On the 6-ft, 8-ft and 10-ft units, the floatables access port is abo the outlet pipe between the concrete manhole wall and the plate. The sediment removal access ports for all Downstrea Defender® models are located directly over the hollow center sha

Maintenance events may include Inspection, Oil & Floatable Removal, and Sediment Removal. Maintenance events do r require entry into the Downstream Defender®, nor do they requ the internal components of the Downstream Defender® to removed. In the case of inspection and floatables removal, vactor truck is not required. However, a vactor truck is required the maintenance event is to include oil removal and/or sedime removal.

Determining Your Maintenance Schedule

The frequency of cleanout is determined in the field af installation. During the first year of operation, the unit should inspected every six months to determine the rate of sediment a floatables accumulation. A simple probe such as a Sludge Judg can be used to determine the level of accumulated solids stored the sump. This information can be recorded in the maintenan log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil/flotable removal, for a 6-ft Downstream Defender® typically takes less th 30 minutes and removes a combined water/oil volume of abo 500 gallons.

Table 1. Downstream Defender[®] Pollutant Storage Capacities and Max. Cleanout Depths.

Unit Diameter	Total Oil Storage	Oil Clean-out Depth	Total Sediment Storage	Sediment Clean-out Depth	Max. Liquid Volume Removed
(feet)	(gallons)	(inches)	(gallons)	(inches)	(gallons)
4	70	<16	141	<18	384
6	216	<23	424	<24	1,239
8	540	<33	939	<30	2,884
10	1,050	<42	1,757	<36	5,546
12	1,770	<49	2,970	<42	9,460

NOTES

1. Refer to Dowmstream Defender[®] Clean-out Detail (Fig. 1) for measurement of depths.

2. Oil accumulation is typically less than sediment, however, removal of oil and sediment during the same service is recommended. 3. Remove floatables first, then remove sediment storage volume.

4. Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1.

Downstream Defender[®] Operation and Maintenance Manual

on, or ent ble. ove	Inspection Procedures Inspection is a simple process that does not involve entry into the Downstream Defender [®] . Maintenance crews should be familiar with the Downstream Defender [®] and its components prior to inspection.
am aft. les not	 Scheduling It is important to inspect your Downstream Defender[®] every six months during the first year of operation to determine your site-specific rate of pollutant accumulation
iire be , a	 Typically, inspection may be conducted during any season of the year
d if ent	 Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1
ter be	 Recommended Equipment Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
ind ne®	Crow bar or other tool to remove grate or lid
l in Ice	Pole with skimmer or net
	 Sediment probe (such as a Sludge Judge[®])
les Ian	Trash bag for removed floatables
out	Downstream Defender [®] Maintenance Log

Downstream Defender[®] Operation and Maintenance Manual



1. Set up any necessary safety equipment around the access

port or grate of the Downstream Defender® as stipulated by

local ordinances. Safety equipment should notify passing

pedestrian and road traffic that work is being done.

2. Remove the lids to the manhole (Fig. 4). NOTE: The 4-ft

3. Without entering the vessel, look down into the chamber to

inspect the inside. Make note of any irregularities. See

4. Without entering the vessel, use the pole with the skimmer net

5. Using a sediment probe such as a Sludge Judge[®], measure

6. On the Maintenance Log (see page 9), record the date, unit

location, estimated volume of floatables and gross debris

removed, and the depth of sediment measured. Also note

any apparent irregularities such as damaged components or

the depth of sediment that has collected in the sump of the

to remove floatables and loose debris from the outer annulus

Downstream Defender® will only have one lid.

Fig.7 and 8 for typical inspection views.



Inspection Procedures

of the chamber.

vessel (Fig.5).

blockages.



Fig.5



Fig.6

- 7. Securely replace the grate or lid.
- 8. Take down safety equipment.
- 9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Cleanout

Floatables cleanout is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.6).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- · Floatables and sump cleanout are typically conducted once a year during any season.
- If sediment depths are greater than 75% of maximum cleanout depths stated in Table 1, sediment removal is required.
- Floatables and sump cleanout should occur as soon as possible following a spill in the contributing drainage area.



Fig.7 View over center shaft into sediment storage zone.



Fig.8 View of outer annulus of floatables and oil collection zone.

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Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge[®])
- · Vactor truck (6-inch flexible hose recommended)
- Downstream Defender[®] Maintenance Log
- 1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender[®] as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
- 2. Remove the lids to the manhole (NOTE: The 4-ft Downstream Defender[®] will only have one lid).
- 3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
- 4. Using the Floatables Port for access, remove oil and floatables stored on the surface of the water with the vactor hose or the skimmer net (Fig.9).
- 5. Using a sediment probe such as a Sludge Judge[®], measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (Pg.9).
- 6. Once all floatables have been removed, drop the vactor hose to the base of the sump via the Central Access Port. Vactor out the sediment and gross debris off the sump floor (Fig.6).

Maintenance at a Glance

	Activity	Frequency
	Inspection	- Regularly dur - Every 6 mont
	Oil and Floatables Removal	- Once per yea - Following a s
	Sediment Removal	- Once per yea - Following a s

NOTE: For most cleanouts it is not necessary to remove the entire volume of liquid in the vessel. Only removing the first few inches of oils/floatables and the sediment storage volume is required.

Downstream Defender[®] Operation and Maintenance Manual

- 7. Retract the vactor hose from the vessel.
- 8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
- 9. Securely replace the grate or lid.



Fig.9 Floatables and sediment are removed with a vactor hose

ing first year of installation hs after the first year of installation ar, with sediment removal pill in the drainage area ar or as needed pill in the drainage area



Downstream Defender® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:						
SITE NAME:						
SITE LOCATION:						
OWNER:	CONTRACTOR:					
CONTACT NAME:	CONTACT NAME:					
COMPANY NAME:	COMPANY NAME:					
ADDRESS:	ADDRESS:					
TELEPHONE:	TELEPHONE:					
FAX:	FAX:					

INSTALLATION DATE: / /

MODEL (CIRCLE ONE):

6-FT

8-FT

10-FT

CUSTOM

Downstream Defender[®] Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment * Depth Measured	Volume of Sediment Removed	Site Activity and Comments
Date	IIIIIIIII		Medsureu	Removed	one Adimity and Comments

*Note: Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1.

4-FT

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102 Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com



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Tel: (207) 756-6200 Fax: (207) 756-6212 stormwaterinquiry@hydro-int.com

www.hydro-int.com

Appendix B – Sample Stormwater Facility Maintenance Agreement

A site-specific Stormwater Facility Maintenance Agreement between the Owner and the responsible authority must be developed prior to construction

Sample Stormwater Facility Maintenance Agreement

THIS AGREEMENT, made and entered into this ____ day of _____, 20___, by and between (Insert Full Name of Owner)

hereinafter called the "Landowner", and the [Local Jurisdiction], hereinafter called the "[Town/City]". WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as (Tax Map/Parcel Identification Number) as recorded by deed in the land records of [Local Jurisdiction] Deed Book Page , hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site Plan/Subdivision Plan known as

______, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the [Town/City], provides for detention of stormwater within the confines of the property; and

WHEREAS, the [Town/City] and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of [Local Jurisdiction] require that on-site storm water management facilities be constructed and maintained on the Property; and

WHEREAS, the [Town/City] requires that on-site stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.

2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater management facilities in accordance with the required Operation and Maintenance Plan. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions. The Stormwater Best Management Practices Operation, Maintenance and Management Checklists are to be used to establish what good working condition is acceptable to the [Town/City].

3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, basin areas, access roads, etc. Deficiencies shall be noted in the inspection report.

4. The Landowner, its successors and assigns, hereby grant permission to the [Town/City], its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the [Town/City] deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The [Town/City] shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.

5. In the event the Landowner, its successors and assigns, fails to maintain the stomwater management facilities in good working condition acceptable to the [Town/City], the [Town/City] may enter upon the Property and take <u>whatever</u> <u>steps necessary</u> to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the [Town/City] to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the [Town/City] is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the [Town/City].

6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.

7. In the event the [Town/City] pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assigns, shall reimburse the [Town/City] upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the [Town/City] hereunder.

8. This Agreement imposes no liability of any kind whatsoever on the [Town/City] and the Landowner agrees to hold the [Town/City] harmless from any liability in the event the stormwater management facilities fail to operate properly.

9. This Agreement shall be recorded among the land records of [Local Jurisdiction] and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

WITNESS the following signatures and seals:

Company/Corporation/Partnership Name (Seal)

Ву: _____

(Type Name and Title)

The foregoing Agreement was acknowledged before me this _____ day of _____, 20____, by

NOTARY PUBLIC My Commission Expires: _____

By: _____

(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of ____, 20___, by

NOTARY PUBLIC My Commission Expires: _____

Approved as to Form:

[Town/City] Attorney Date