

**EAST OF HUDSON  
WATERSHED  
CORPORATION**

**Stormwater Retrofit Program:  
Operations and Maintenance Manual**



## **1. INTRODUCTION**

The East of Hudson Watershed Corporation (EOHWC) is a Regional Stormwater Entity (RSE) with 19 members (18 municipalities and one County), operating within 18 Municipal Separate Storm Sewer Systems (MS4) and within three Counties in the East of Hudson (EOH) watershed. The EOHWC is governed by a Board of Directors, composed of the chief elected official of each member. The chief elected official may delegate authority to another municipal employee.

Each member has passed resolutions to join the EOHWC and authorize implementation of the SRPs by the EOHWC on behalf of each member. The 19 municipalities, represented by EOHWC have over 150 stormwater retrofit practices planned for, or constructed within their individual municipalities. Each of these projects will, over time, require maintenance in order for the practice to maintain optimal efficiency in its operation.

The purpose of this manual is to provide the participating municipalities with a technical breakdown of the NYSDEC requirements for long term maintenance on all completed projects as part of the Stormwater Retrofit Program.

## **2. REQUIREMENTS**

It shall be the responsibility of the individual municipalities to provide all inspections and maintenance required for all projects within their associated borders. The financial obligation associated with this policy will be assessed annually to verify the actual annual costs required of each MS4. This annual cost is reflective of the number and size of the SRP's within its borders. EOHWC is responsible for the allocation of corporation resources. EOHWC can also assist in the distribution and coordination of equipment to any municipality that can demonstrate a need for the equipment.

All retrofit projects which have been constructed as part of the EOHWC program are required to be maintained for the lifetime of the designated project. The functional lifetime of each stormwater management practice (SMP) is approximately 20 years, but can be extended if the project is maintained properly.



NYSDEC Maintenance Requirements are discussed in Appendix A for each type of stormwater retrofit project which has been implemented by the EOHWC.

Appendix B contains a project based breakdown of all the SRPs within the stormwater retrofit program. All MS4's which have completed or have proposed projects are represented, with all proposed or constructed SRPs listed by MS4.

Appendix C contains accepted Maintenance Checklists for all stormwater retrofit projects and the EOHWC Maintenance Completion Form. Each MS4 is required to maintain proper records of all inspections as they are performed and should have all records ready for submission to the NYSDEC upon request. Each MS4 is to fill out the mandatory inspection checklist **and** the EOHWC Maintenance Completion Form for every SRP which is worked on.

### **3. SUBMITTALS**

All maintenance records and forms should be submitted to the EOHWC to document that work is being completed by the MS4's. This submission schedule will coincide with requests for funding from the EOHWC, but all MS4's are required to abide by the following schedule:

- April 30, 2016. O&M Documentation for January, 2016 thru Apr, 2016.
- August 31, 2016. O&M Documentation for May, 2016 thru Aug, 2016.
- December 31, 2016. O&M Documentation for Sep, 2016 thru Dec, 2016.

Inspection related submittals are to include, but are not limited to:

- Mandatory Inspection Checklists for each SRP; and
- EOHWC Maintenance Completion Form.



EAST OF HUDSON  
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Appendix A:  
NYSDEC Maintenance  
Requirements

GENERAL MAINTENACE REQUIREMENTS  
NYS STORMWATER MANAGEMENT DESIGN MANUAL

A. Stormwater Ponds<sup>4</sup>

- P-1 Micropool Extended Detention Pond
  - P-2 Wet Pond
  - P-3 Wet Extended Detention Pond
  - P-4 Multiple Pond System
1. Sediment removal in the forebay shall occur every 3 years or after 30% of total forebay capacity has been lost.
  2. Sediment removal from the main basin every 5 years or when the minimum water depth approaches 3 feet. More regular maintenance will help ensure that the system is achieving the highest removal of phosphorus.
  3. Annually mowing of side slopes.

B. Wetland Systems<sup>4</sup>

- W-1 Shallow Wetland
  - W-2 ED Shallow Wetland
  - W-3 Pond/Wetland System
  - W-4 Pocket Wetland
1. Maintain a minimum of 50% cover of planted wetland zones

C. Infiltrations Systems<sup>4</sup>

- I-1 Infiltration Trench
  - I-2 Infiltration Basin
  - I-3 Dry Well
  - I-4 Underground Infiltration Systems
1. The vegetative cover needs to be regularly maintained. Grass cover may be mowed and bare areas should be reseeded
  2. Disc, aerate or scrape the basin bottom to restore original cross section and infiltration rate every one to five years.

D. Filtering Systems<sup>4</sup>

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<sup>4</sup> Based on the maintenance requirements in the NYS Stormwater Management Design Manual.

- F-1 Surface Sand Filter
  - F-2 Underground Sand Filter
  - F-3 Perimeter Sand Filter
  - F-4 Organic Filter(peat)
  - F-5 Bioretention
1. Remove sediment/gross solids from sedimentation chamber and filter surface annually or when depth exceeds 3 inches.
  2. Remove sediment/gross solids from bioretention surface annually or when depth exceeds 3 inches.
  3. Keep the vegetation height limited to 18 inches in bioretention systems to facilitate routine maintenance and allow for observation of system function.
  4. Rehabilitate/replace mulch and bioretention media (top 6 inches minimum) when flowthrough rate is reduced to <60% design treatment flow rate. This is determined by observing ponding in the facility following a storm event.

E. Swales

- O-1 Dry Swale
1. Remove sediment built-up within the bottom of the channel when 25% of the original water quality volume has been exceeded.
  2. Maintain a grass height of 4" to 6".

F. Hydrodynamic Separators

1. Inspect unit two to four times per year.
2. Clean out during dry weather conditions with Vac Truck when sediment accumulation reaches 12 to 18 inches from the dry-weather water surface elevation.

G. StormFilter Vault Maintenance Guidelines<sup>5</sup>

1. Maintenance is performed on an as needed basis, based on inspection. Maintenance lifecycle is 1-3 years. The primary factor controlling timing of maintenance of the StormFilter is sediment loading. Until appropriate timeline for inspections is determined, conduct annual inspections and after each major storm event. Use the following as a general guide.
2. Depending on the configuration of the particular system, workers will be required to enter

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<sup>5</sup> Based on manufacturer's recommendations

the vault to perform the maintenance. OSHA rules for confined space entry must be followed.

3. Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flow is occurring. To conduct cartridge replacement and sediment removal:
  - a. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
  - b. Unscrew (counterclockwise rotations) each filter cartridge from the underdrain connector. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
  - c. Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge and remove the used cartridges (up to 250 lbs.) from the vault.
  - d. Remove accumulated sediment from the floor of the vault and from the forebay. Use vacuum truck for highest effectiveness.
  - e. Once the sediments are removed, assess the condition of the vault and the connectors. Lightly wash down the vault interior.
  - f. Lower new cartridges into vault and re-install.

#### H. Raingardens

1. Routine maintenance may include the occasional replacement of plants, mulching, weeding and thinning to maintain the desired appearance.
  - a. Watering for the first year, or during droughts is essential, and can be minimized with the use of a weed-free mulch layer.
  - b. Keep plants pruned if they start to get “leggy” and floppy.
  - c. Cut off old flower heads after a plant is done blooming.
  - d. Keeping the garden weeded is one of the most important tasks, especially in the first couple of years while the native plants are establishing their root systems.
2. Once the rain garden has matured, the garden area should be free of bare areas except where stepping stones are located. Inspect for sediment accumulations or heavy organic matter where runoff enters the garden and remove as necessary.
3. The top few inches of planting soil should be removed and replaced when water ponds for more than 48 hours. Blockages may cause diversion of flow around the garden.



4. If the garden overflow device is an earthen berm or lip, check for erosion and repair as soon as possible. If this continues, a harder armoring of stone may be necessary.
5. Make sure all appropriate elevations have been maintained, no settlement has occurred and no low spots have been created.



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Appendix B:  
EOHWC List of SRPs By  
Municipality

## SRP Summary by Municipality

Municipality	Project ID	Common Name	Retrofit
Bedford	B-CR-29	Mount Holly Road	Channel Stabilization
Bedford	B-MU-07	Bedford Hills Memorial Park	Extended Detention Pond (P-3)
Bedford	B-MU-21	Beaver Dam Road	New Forebay, HDS, and Infiltration
Bedford	B-MU-22	Narrows	Hydrodynamic Separator and Infiltration
Bedford	B-MU-23	North Street	Pavers/Underdrain
Bedford	B-MU-24	School Street	Pavers/Underdrain
Bedford	B-MU-25	Guard Hill Rd	Channel Stabilization
Bedford	B-MU-28	High St/Ridge St	Channel Stabilization
Bedford	B-MU-30	South Church Street	Infiltration
Bedford	B-MU-32	Babbitt Road	Channel Stabilization
Bedford	B-MU-35	Broad Brook Rd	Infiltration
Bedford	B-MU-41	Succabone and Bisbee	Subsurface Infiltration
Bedford	B-NCR-27	South Beach Rd	Channel Stabilization

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Yorktown	Y-MU-17A	Sparkle Lake	HDS and Infiltration Trench
Yorktown	Y-MU-17B	Sparkle Lake	Stormfilter
Yorktown	Y-MU-11D	Junior Lake Parking Lot	Permeable Pavers
Yorktown	Y-MU-10	Railroad Ave Park	Pocket Pond (P-5)
Yorktown	Y-MU-14	Police Station and Court	Wet Extended Detention Pond (P-3)
Yorktown	Y-MU-40	Saw Mill River Rd	Wet Pond

SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>	<b>Construction Completion Date</b>
Pawling (V)	VPW-3		Channel Stabilization	By Town
Pawling (V)	VPW-4		Channel Stabilization	By Town

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Pawling (T)	PW-120	138 South Harmony Rd	Outfall Protection, Channel Stabilization
Pawling (T)	PW-82	39 Sans Souci Dr	Outfall Protection, Channel Stabilization
Pawling (T)	PW-83	47 Sans Souci Dr	Channel Stabilization, Sediment Removal
Pawling (T)	PW-342A	Pawling Fire District	Pocket Pond (P-5)
Pawling (T)	PW-342B	Pawling Fire District	Pocket Pond (P-5)
Pawling (T)	PW-343	Holmes Whaley Lake Civic Association	Infiltration

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Southeast	SE-POT-01	Lake Tonetta	Subsurface Gravel Wetland
Southeast	Southeast-PA-23	CV Star Intermediate School	Micropool Extended Detention Pond (P-1)
Southeast	Southeast-EB-05	Rockledge Drive	Outfall Stabilization
Southeast	Southeast-PA-05	Brewster Hill	Channel Stabilization
Southeast	SE-DI-03	Lincoln Rd	Hydrodynamic Separator & Outfall Stabilization
Southeast	SE-PRE-01	Lower Mine Road	Outfall Stabilization
Southeast	SE-PRE-02	Seven Oaks Lane	Outfall Stabilization / Deep Sump Catch Basin
Southeast	SE-PRE-03	Maple Road	Outfall Stabilization / Deep Sump Catch Basin
Southeast	SE-PRE-04	Joe's Hill Road	Outfall Stabilization
Southeast	SE-PRE-05	Nichols Rd	Outfall Stabilization
Southeast	SE-PRE-06		Outfall Stabilization
Southeast	SE-PRE-07	Starlea Road	Outfall Stabilization / Deep Sump Catch Basin
Southeast	SE-PRE-08	Ives Farm	Outfall Stabilization
Southeast	SE-PRE-09	Panorama	Outfall Stabilization
Southeast	SE-PRE-10	Carlson Lake	Outfall Stabilization / Deep Sump Catch Basin
Southeast	SE-PRE-11	Shore Drive, Lake Tonetta	Outfall Stabilization / Hydrodynamic Separator
Southeast	Southeast-PA-24	Lower Mine Road/NYS 22	Grass Swale
Southeast	SE-POT-02	Brewster Heights	Hydrodynamic Separator & Channel Stabilization



## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Somers	S-MU-03	Boces	Channel Stabilization
Somers	S-MU-01	Somers Town Hall	Permeable Pavement
Somers	S-MU-09A	Reis Park - Library Roof Disconnect	Hydrodynamic Separator and Infiltration
Somers	S-MU-09B	Reis Park - Maintenance Bldg & Parking	Hydrodynamic Separator and Infiltration
Somers	S-MU-09C	Reis Park - Main Parking Lot & Tennis Court	Permeable Pavement
Somers	S-MU-09D	Reis Park - Main Driveway & Rear Parking	Bioretention
Somers	S-MU-09E	Reis Park & Town Hall Porous Pavement	Dry Swale (O-1), Sub. Surface Detention
Somers	S-MU-09F	Reis Park - Athletic Fields	Bioretention
Somers	S-MU-12	Plumbrook Pond Ditch Stabilization	Channel Stabilization
Somers	S-MU-13	Plumbrook Pond Ditch Stabilization-2	Channel Stabilization
Somers	S-MU-27a	Somers School District Ditch Stabilization	Stabilization
Somers	S-MU-27b		Stabilization
Somers	S-MU-29	Plum Brook Rd Retrofit	Stabilization
Somers	S-MU-30		Stabilization
Somers	S-MU-32	Erosion Control Near Muscoot River	Stabilization
Somers	S-NC-31	Moseman Ave Water Quality Improvement	Micropool Extended Detention
Somers	S-MU-16/17	Somers Town Highway Garage	Multiple Pond System (P-4)
Somers	S-MU-33	Van Tassell Memorial Park	Porous Pavement/Infiltration
Somers	S-NC-36	Lower Moseman Ave	Channel Stabilization

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Putnam Valley	PutVal-PA-02	Greenway Terrace	Detention Pond/Stormfilter

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Putnam County	PC-1	Putnam National Golf Course	Subsurface Infiltration
Putnam County	PC-1A	Putnam National Golf Course	Wet Extended Detention Pond (P-3)
Putnam County	PC-4	North Brewster Rd	Channel Stabilization
Putnam County	PC-6	Teakettle Spout Lake	Impervious Removal and Restabilization
Putnam County	PC-9	Veterans Memorial Park	Sand Filter
Putnam County	PC-5N, 5S	PCDH&F	Wet Extended Detention Pond

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Patterson	Patterson-PA-11	Patterson Highway Garage	Two Pocket Ponds; Bioretention Basin
Patterson	Pat-EB-09-01	Big Elm Rd	Pocket Pond (P-5)
Patterson	Pat-MB-06	Fields Corner Rd	Dry Swale (O-1)
Patterson	Pat-EB-09-04a/b/c	Old Rt 22	Grass Swale
Patterson	PAT-PRE-02	T&T Associates	Grass Swale
Patterson	PAT-PRE-03	Brewster Plastics	Detention Pond
Patterson	PAT-PRE-04	White Birch Realty	Sand Filter
Patterson	PAT-PRE-05	Old Road Highway Improvement	Grass Swale
Patterson	PAT-PRE-06a	Putnam Lake Retrofit Project - Site 1	Detention Pond
Patterson	PAT-PRE-06b	Putnam Lake Retrofit Project - Site 2a	Detention Pond
Patterson	PAT-PRE-06c	Putnam Lake Retrofit Project - Site 2b	HDS
Patterson	PAT-PRE-06d	Putnam Lake Retrofit Project - Site 3a	HDS
Patterson	PAT-PRE-06e	Putnam Lake Retrofit Project - Site 3b	HDS
Patterson	PAT-PRE-06f	Putnam Lake Retrofit Project - Site 3c	HDS
Patterson	PAT-PRE-06g	Putnam Lake Retrofit Project - Site 3d	HDS
Patterson	PAT-PRE-06h	Putnam Lake Retrofit Project - Site 5	Detention Pond
Patterson	PAT-PRE-06i	Putnam Lake Retrofit Project - Site 6	HDS
Patterson	PAT-PRE-06j	Putnam Lake Retrofit Project - Site 7	HDS
Patterson	Patterson-PA-10	Patterson Town Hall	Infiltration
Patterson	Pat-EB-09-03B	Veterans Memorial Park	Organic Filter (F-4)
Patterson	Patterson-PA-15A	Matthew Paterson Elementary School	Grass Swale
Patterson	Patterson-PA-15B	Matthew Paterson Elementary School	Surface Sand Filter

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
North Salem	NS-MU-05	North Salem Highway Garage	Infiltration and Micropool ED Basin
North Salem	NS-MU-08/09	Sunset Dr and Westview Cross Rd	Channel Stabilization and Infiltration
North Salem	NS-MU-01B	Back St & W.Cross St	Surface Sand Filter
North Salem	NS-MU-11	Route 22 & Route 116	Extended Detention Pond
North Salem	NS-EB-01	Peach Lake	Stormfilter

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
New Castle	New-NCR-33A	Burden Preserve	Channel Stabilizaiton
New Castle	New-NCR-33B	Burden Preserve	Channel Stabilizaiton

## SRP Summary by Municipality

Municipality	Project ID	Common Name	Retrofit
Mt. Kisco	MK-NC-15		Road Stabilization
Mt. Kisco	MK-NC-18		Road Stabilization
Mt. Kisco	MK-NC-19		Rooftop Disconnect
Mt. Kisco	MK-NC-23		Road Stabilization
Mt. Kisco	MK-NC-24		Road Stabilization
Mt. Kisco	MK-NC-31		Infiltration
Mt. Kisco	MK-NC-32		Road Stabilization
Mt. Kisco	MK-NC-29	Mt. Kisco DPW Yard	Wet Pond
Mt. Kisco	MK-NC-20	CVS/South Bedford Road	Channel Stabilization
Mt. Kisco	MK-NC-21	MKMG Satellite Offices	Pocket Wetland
Mt. Kisco	MK-NC-22	Leonard Park	Bioretention/Surface Sand Filter

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Lewisboro	L-CR-15	Twin Lakes Rd	Plunge Pool
Lewisboro	L-CR-21	Lake Kitchawan Stream	HDS (Vortech Unit)
Lewisboro	L-CR-26	Truesdale Lake Drive	HDS/Forebay
Lewisboro	L-CR-11A	John Jay Middle and High School	Micropool ED Pond
Lewisboro	L-CR-11B	John Jay Middle and High School	Wet ED Pond
Lewisboro	L-CR-11C	John Jay Middle and High School	Channel Stabilization
Lewisboro	L-CR-28	Schoolhouse Rd	Wet ED Pond
Lewisboro	L-CR-29	Salem Hill Rd	Wet ED Pond
Lewisboro	L-CR-30	Mead St	ED Shallow Wetland



## SRP Summary by Municipality

Municipality	Project ID	Common Name	Retrofit
Kent	Kent-MB-Add-19	Ryan Park	Sand Filter (F-1) & Eliminated Eroded Channel
Kent	Kent-MB-Add-4	Ryan Park	Hydrodynamic Separator
Kent	Kent-MB-Add 2	Lake Shore Dr & Cottage Rd	Wet Extended Detention Pond (P-3)
Kent	Kent-MB-Add 3	Lake Shore Dr & Valhalla Rd	Micropool Extended Detention Pond (P-1)
Kent	Kent-MB-Add 5	Kent Recreation Building	Dry Swale (O-1)
Kent	Kent-MB-NLC	North Lake Carmel SW Improvements	Multiple Retrofits
Kent	Kent-Pre-03	Barrett Hill/Route 52	HDS
Kent	Kent-Pre-06a	(blank)	Outfall Stabilization
Kent	Kent-Pre-06b	(blank)	Outfall Stabilization
Kent	Kent-Pre-06c	(blank)	Outfall Stabilization
Kent	Kent-Pre-06d	(blank)	Outfall Stabilization
Kent	Kent-Pre-06e	(blank)	Channel Stabilization
Kent	Kent-Pre-06f	(blank)	Outfall Stabilization
Kent	Kent-MB-311B	NYS Rt 311 & I-84	Channel Stabilization, P-1 Pond,

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Cortlandt	C-NC-01B	Quarry Acres Subdivision	Micropool ED (P-1) and Channel Stabilization

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Carmel	Carmel-AM-112	Austin Rd Elementary School	Wet Extended Detention Pond (P-3)
Carmel	Carmel-AM-116	Mahopac Middle School	Infiltration & Sand Filter
Carmel	Carmel-CF-119B	Kelly Ridge & St. Michael's Terrace	Outfall Channel Stabilization
Carmel	Carmel-AM-125		Detention Pond
Carmel	Carmel-AM-127	Kirk Lake	Hydrodynamic Separator
Carmel	Carmel-AM-129	Hitchcock Hill Rd	HDS
Carmel	Carmel-CF-123	Garret Place	Outfall Channel Stabilization
Carmel	Carmel-PRE-02	Lakeview Court	Outfall Stabilization
Carmel	Carmel-PRE-03	Silvergate Road	Outfall Stabilization
Carmel	Carmel-PRE-04	Red Mills Road	Outfall Stabilization
Carmel	Carmel-PRE-06	Belden Road	Channel Stabilization
Carmel	Carmel-PRE-07	Colier Drive	Channel Stabilization
Carmel	Carmel-AM-111A	Falls Elementary School	Infiltration
Carmel	Carmel-CF-102A	Guide Post Seminary	Cartridge filter, channel stabilization
Carmel	Carmel-CF-102B	Guide Post Seminary	Cartridge filter, channel stabilization

## SRP Summary by Municipality

<b>Municipality</b>	<b>Project ID</b>	<b>Common Name</b>	<b>Retrofit</b>
Brewster	VB-DI-31	Tonetta Brook Retrofit	Extended Detention Pond (P-3)
Brewster	VB-DI-32	Wells Brook Retrofit	Extended Detention Pond (P-3)

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Appendix C:  
Maintenance Forms

# EOHWC Maintenance Completion Form

Project Number:		
Project SMP:		
O&M Tasks:		
Comments:		
<b>Equipment Utilized in Maintenance:</b>		<b>Used</b>
Backhoe Loader:		
Vacuum Truck:		
Dump Truck:		
Frontend Loader:		
Bobcat:		
Street Sweeper:		
Misc.		
Misc.		
<b>Individual Workers:</b>		<b>Hours</b>
<b>Materials</b>		
<b>Item</b>	<b>Unit</b>	<b>Quantity</b>
Fill	Yds <sup>3</sup>	
Stone	Yds <sup>3</sup>	
Misc.		
Misc.		

**NYSDEC Modified Maintenance Inspection Checklists to Include:**

**All Stormwater Ponds and All Wetland Types: Operation, Maintenance and Management Inspection Checklist.**

**Project:** \_\_\_\_\_

**Location:** \_\_\_\_\_

**Site Status:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Time:** \_\_\_\_\_

**Inspector:** \_\_\_\_\_

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking bulging or sliding of dam or bermed area		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6. Pond toe & chimney drains clear and functioning		
7. Seeps/leaks on downstream face		
8. Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam "As-Built"		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway		
Type: Reinforced concrete Corrugated pipe Masonry		
1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insides riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1" )		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
B. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		



Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebay		
1. Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4. Endwalls / Headwalls		
5. Other (specify)		
7. Other		
1. Encroachment on pond wetland or easement area		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Complaints from residents		
3. Aesthetics		
a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants "choked" with sediment		
7. Eutrophication level of the wetland.		
B. Other (specify)		

Comments:

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Actions to be taken:

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## Infiltration Practices (Trench, Basin, Subsurface Infiltration Operation, Maintenance and Management Inspection Checklist

**Project:** \_\_\_\_\_

**Location:** \_\_\_\_\_

**Site Status:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Time:** \_\_\_\_\_

**Inspector:** \_\_\_\_\_

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
<b>1. Debris Cleanout</b>		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
<b>2. Sediment Traps or Forebay</b>		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
<b>3. Dewatering</b>		
Trench dewaterers between storms		
<b>4. Sediment Cleanout of Trench</b>		
No evidence of sedimentation in trench		
Sediment accumulation does not require cleanout		
<b>5. Inlets</b>		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway		
Good condition no need for repair		
No evidence of erosion		
7. Aggregate Repairs		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench does not need rehabilitation		

Comments:

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Actions to be taken:

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## Sand/Organic Filter Operation, Maintenance and Management Inspection Checklist

**Project:** \_\_\_\_\_

**Location:** \_\_\_\_\_  
\_\_\_\_\_

**Site Status:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Time:** \_\_\_\_\_

**Inspector:**

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
<b>1. Debris Cleanout</b>		
Contributing areas clean of debris		
Filtration facility clean of debris		
Inlet and outlets clear of debris		
<b>2. Oil and Grease (Monthly)</b>		
No evidence of filter surface clogging		
Activities in drainage area minimize oil and grease entry		
<b>3. Vegetation</b>		
Contributing drainage area stabilized		
No evidence of erosion		
Area mowed and clipping removed		
<b>4. Water Retention Where Required</b>		
Water holding chambers at normal pool		
No evidence of leakage		
<b>5. Sediment Deposition</b>		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Filter chamber free of sediments		
Sedimentation chamber not more than half full of sediments		
6. Structural Components		
No evidence of structural deterioration		
Any grates are in good condition		
No evidence of spalling or cracking of structural parts		
7. Outlet/Overflow Spillway		
Good condition no need for repairs		
No evidence of erosion (if draining into a natural channel)		
8. Overall Function of Facility		
Evidence of flow bypassing facility		
No noticeable odors outside of facility		

Comments:

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Actions to be taken:

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## Bioretention Operation, Maintenance and Management Inspection Checklist

**Project:** \_\_\_\_\_

**Location:** \_\_\_\_\_  
 \_\_\_\_\_

**Site Status:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Time:** \_\_\_\_\_

**Inspector:** \_\_\_\_\_

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
<b>1. Debris Cleanout</b>		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches etc.) have been removed		
<b>2. Vegetation</b>		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
<b>3. Check Dams/Energy Dissipaters/Sumps</b>		
No evidence of sediment buildup		



MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway		
Good condition no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed		
Filter bed has not been blocked or filled inappropriately		

Comments:

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Actions to be taken:

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## Open Channel (Wet and Dry Swale), Channel Stabilization and Outlet Stabilization Operation, Maintenance, and Management Inspection Checklist

**Project:** \_\_\_\_\_

**Location:** \_\_\_\_\_  
\_\_\_\_\_

**Site Status:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Time:** \_\_\_\_\_

**Inspector:** \_\_\_\_\_

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout		
Contributing areas clean of debris		
2. Check Dams, Outfalls or Energy Dissipater's		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering		
Dewaters between storms		

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Sediment deposition		
Clean of sediment		
6. Outlet/Overflow Spillway		
Good condition no need for repairs		
No evidence of erosion		

Comments:

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Actions to be taken:

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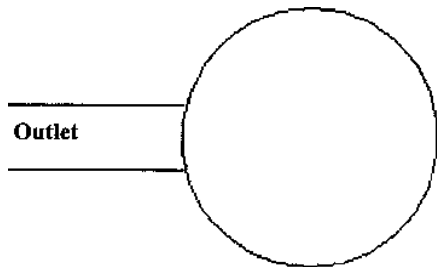
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## Catch Basin / Manhole (Dry Well) / Inlet Inspection Form

Structure ID:		Street:	
Heading: <input type="checkbox"/> North <input type="checkbox"/> South <input type="checkbox"/> East <input type="checkbox"/> West		Position in Street: <input type="checkbox"/> Right <input type="checkbox"/> Left <input type="checkbox"/> Center	
Starting Intersection:		Next Intersection:	
Subwatershed:		Outfall ID:	
Today's date:		Time:	
Form completed by:			
Temperature (°F):	Rainfall (in.):	Last 24 hours:	Last 48 hours:
Latitude:	Longitude:	GPS Unit:	GPSLMK#:
<b>Land Use in Drainage Area (Check all that apply):</b>			
<input type="checkbox"/> Industrial <input type="checkbox"/> Ultra-Urban Residential <input type="checkbox"/> Suburban Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Institutional <input type="checkbox"/> Open Space			
Notes :			

### Section 2: Structure Description

Provide Sketch of Structure with pipe inlets, location of curb, dimensions, other notes



Surface Inlet Style	<input type="checkbox"/> Metal frame and grate with curb <input type="checkbox"/> Metal frame and grate without curb <input type="checkbox"/> Metal manhole cover <input type="checkbox"/> Concrete Frame w/curb <input type="checkbox"/> Concrete Frame without curb <input type="checkbox"/> Headwall <input type="checkbox"/> Flared end <input type="checkbox"/> None <input type="checkbox"/> Other: _____		
	Size:		
	Condition:		
Material	<input type="checkbox"/> Cast-in-place Concrete <input type="checkbox"/> Precast Concrete <input type="checkbox"/> Concrete Block Masonry <input type="checkbox"/> Brick <input type="checkbox"/> Other		
	Condition:		
Sump	Water: <input type="checkbox"/> Dry <input type="checkbox"/> Partially full <input type="checkbox"/> Full                   With Sediment: <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Full		
Non-Stormwater Discharge: <input type="checkbox"/> Yes <input type="checkbox"/> No			

Catch Basin/Manhole/Inlet Inventory Data Collection Field Sheet

<b>OUTLET</b>					
ITEM	MATERIAL	SHAPE		Diameter/Dimensions:	
<input type="checkbox"/> Closed Pipe	<input type="checkbox"/> RCP <input type="checkbox"/> CMP	<input type="checkbox"/> Circular <input type="checkbox"/> Elliptical <input type="checkbox"/> Box <input type="checkbox"/> Other:	<input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Triple <input type="checkbox"/> Other:	In Water:	
	<input type="checkbox"/> PVC <input type="checkbox"/> HDPE			<input type="checkbox"/> No	<input type="checkbox"/> With Sediment:
	<input type="checkbox"/> Steel			<input type="checkbox"/> Partially	<input type="checkbox"/> No
	<input type="checkbox"/> Other:			<input type="checkbox"/> Fully	<input type="checkbox"/> Partially
					<input type="checkbox"/> Fully
Flow Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Flow Description (If present) <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial			
<b>Discharge From:</b> <input type="checkbox"/> Continuation of Town of Patterson system. <input type="checkbox"/> Private Site: _____					
<input type="checkbox"/> MS4 Name: _____					
<b>INLET #1</b>					
ITEM	MATERIAL	SHAPE		Diameter/Dimensions:	
<input type="checkbox"/> Closed Pipe	<input type="checkbox"/> RCP <input type="checkbox"/> CMP	<input type="checkbox"/> Circular <input type="checkbox"/> Elliptical <input type="checkbox"/> Box <input type="checkbox"/> Other:	<input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Triple <input type="checkbox"/> Other:	In Water:	
	<input type="checkbox"/> PVC <input type="checkbox"/> HDPE			<input type="checkbox"/> No	<input type="checkbox"/> With Sediment:
	<input type="checkbox"/> Steel			<input type="checkbox"/> Partially	<input type="checkbox"/> No
	<input type="checkbox"/> Other:			<input type="checkbox"/> Fully	<input type="checkbox"/> Partially
					<input type="checkbox"/> Fully
Flow Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Flow Description (If present) <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial			
<b>Discharge From:</b> <input type="checkbox"/> Continuation of Town of Patterson system. <input type="checkbox"/> Private Site: _____					
<input type="checkbox"/> MS4 Name: _____					
<b>INLET #2</b>					
ITEM	MATERIAL	SHAPE		Diameter/Dimensions:	
<input type="checkbox"/> Closed Pipe	<input type="checkbox"/> RCP <input type="checkbox"/> CMP	<input type="checkbox"/> Circular <input type="checkbox"/> Elliptical <input type="checkbox"/> Box <input type="checkbox"/> Other:	<input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Triple <input type="checkbox"/> Other:	In Water:	
	<input type="checkbox"/> PVC <input type="checkbox"/> HDPE			<input type="checkbox"/> No	<input type="checkbox"/> With Sediment:
	<input type="checkbox"/> Steel			<input type="checkbox"/> Partially	<input type="checkbox"/> No
	<input type="checkbox"/> Other:			<input type="checkbox"/> Fully	<input type="checkbox"/> Partially
					<input type="checkbox"/> Fully
Flow Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Flow Description (If present) <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial			
<b>Discharge From:</b> <input type="checkbox"/> Continuation of Town of Patterson system. <input type="checkbox"/> Private Site: _____					
<input type="checkbox"/> MS4 Name: _____					
<b>INLET #3</b>					
ITEM	MATERIAL	SHAPE		Diameter/Dimensions:	
<input type="checkbox"/> Closed Pipe	<input type="checkbox"/> RCP <input type="checkbox"/> CMP	<input type="checkbox"/> Circular <input type="checkbox"/> Elliptical <input type="checkbox"/> Box <input type="checkbox"/> Other:	<input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Triple <input type="checkbox"/> Other:	In Water:	
	<input type="checkbox"/> PVC <input type="checkbox"/> HDPE			<input type="checkbox"/> No	<input type="checkbox"/> With Sediment:
	<input type="checkbox"/> Steel			<input type="checkbox"/> Partially	<input type="checkbox"/> No
	<input type="checkbox"/> Other:			<input type="checkbox"/> Fully	<input type="checkbox"/> Partially
					<input type="checkbox"/> Fully
Flow Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Flow Description (If present) <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial			
<b>Discharge From:</b> <input type="checkbox"/> Continuation of Town of Patterson system. <input type="checkbox"/> Private Site: _____					
<input type="checkbox"/> MS4 Name: _____					

## OUTFALL PROTECTION INSPECTION FORM

### Section 1: Background Data

Outfall ID:		Street Name:	
Date:		Time (Military):	
Temperature (°F)	Rainfall (in.)	Last 24 Hours:	Last 48 Hours:
Watershed:		Investigator:	
Latitude:	Longitude:	GPS Unit:	
Camera:		Photo #s:	
Land Use in Drainage Area (Check all that apply): <input type="checkbox"/> Industrial <input type="checkbox"/> Commercial <input type="checkbox"/> Institutional <input type="checkbox"/> Open Space <input type="checkbox"/> Municipal <input type="checkbox"/> Ultra-Urban Residential <input type="checkbox"/> Suburban Residential <input type="checkbox"/> Other Known Industries:			
Notes:			

### Section 2: Outfall Description

<b>Outfall to:</b>	<input type="checkbox"/> Intermittent Stream <input type="checkbox"/> Perennial Stream <input type="checkbox"/> Lake <input type="checkbox"/> Wetland Name of Waterbody: _____ <input type="checkbox"/> Putnam County MS4 <input type="checkbox"/> NYSDOT MS4 <input type="checkbox"/> Town of Southeast MS4 Other MS4: _____				
<b>Outfall Style:</b>	<input type="checkbox"/> HDPE Flared End <input type="checkbox"/> Metal Flared End <input type="checkbox"/> Concrete Headwall <input type="checkbox"/> Stone Headwall <input type="checkbox"/> Concrete Catch Basin <input type="checkbox"/> Stone Catch Basin <input type="checkbox"/> Other: _____				
	<b>MATERIAL</b>	<b>SHAPE</b>		<b>DIMENSIONS (IN.)</b>	<b>CONDITION</b>
<b>Closed Pipe</b>	<input type="checkbox"/> RCP <input type="checkbox"/> CMP <input type="checkbox"/> PVC <input type="checkbox"/> HDPE <input type="checkbox"/> STEEL <input type="checkbox"/> Other:	<input type="checkbox"/> Circular <input type="checkbox"/> Elliptical <input type="checkbox"/> Box <input type="checkbox"/> Other:	<input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Triple <input type="checkbox"/> Other:	Diameter/Dimensions:	
<b>Open Drainage</b>	<input type="checkbox"/> Concrete <input type="checkbox"/> Grass <input type="checkbox"/> Earthen <input type="checkbox"/> Asphalt <input type="checkbox"/> Rip-rap <input type="checkbox"/> Curb <input type="checkbox"/> Other:	<input type="checkbox"/> Trapezoid <input type="checkbox"/> Parabolic <input type="checkbox"/> Other:		Depth: Top Width: Bottom Width:	
<b>Observations Of Conditions at Discharge</b>					
<input type="checkbox"/> Erosion at outfall: Describe:					
<input type="checkbox"/> Sediment present: Describe:					
<input type="checkbox"/> Plunge Pool					
<input type="checkbox"/> Outfall in line with stream					
<b>Flow or Standing Water Present?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No		Outfall Submerged In Water: <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully		
Flow Description (If Present): <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial					

## Outfall Reconnaissance Inventory Field Sheet

### Section 4: Physical Indicators for Flowing Outfalls Only

Are any Physical Indicator Present in the flow?  Yes  No (If No, Skip to Section 5)

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	<input type="checkbox"/>	<input type="checkbox"/> Sewage <input type="checkbox"/> Rancid/sour <input type="checkbox"/> Petroleum/gas <input type="checkbox"/> Sulfide <input type="checkbox"/> Other:	<input type="checkbox"/> 1 - Faint	<input type="checkbox"/> 2 - Easily detected	<input type="checkbox"/> 3 - Noticeable from a distance
Color	<input type="checkbox"/>	<input type="checkbox"/> Clear <input type="checkbox"/> Brown <input type="checkbox"/> Gray <input type="checkbox"/> Yellow <input type="checkbox"/> Green <input type="checkbox"/> Orange <input type="checkbox"/> Red <input type="checkbox"/> Other:	<input type="checkbox"/> 1 - Faint colors in sample bottle	<input type="checkbox"/> 2 - Clearly visible in sample bottle	<input type="checkbox"/> 3 - Clearly visible in outfall flow
Turbidity	<input type="checkbox"/>	See severity	<input type="checkbox"/> 1 - Slight cloudiness	<input type="checkbox"/> 2-Cloudy	<input type="checkbox"/> 3 - Opaque
Floatables -Does Not Include Trash!!	<input type="checkbox"/>	<input type="checkbox"/> Sewage (Toilet Paper, etc.) <input type="checkbox"/> Suds <input type="checkbox"/> Petroleum (oil sheen) <input type="checkbox"/> Other:	<input type="checkbox"/> 1 - Few/slight; origin not obvious	<input type="checkbox"/> 2 - Some; indications of origin (e.g., possible suds or oil sheen)	<input type="checkbox"/> 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

### Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present?  Yes  No (If No, Skip to

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	<input type="checkbox"/>	<input type="checkbox"/> Spalling, Cracking or Chipping <input type="checkbox"/> Peeling Paint <input type="checkbox"/> Corrosion	
Deposits/Stains	<input type="checkbox"/>	<input type="checkbox"/> Oily <input type="checkbox"/> Flow Line <input type="checkbox"/> Paint <input type="checkbox"/> Other:	
Abnormal Vegetation	<input type="checkbox"/>	<input type="checkbox"/> Excessive <input type="checkbox"/> Inhibited	
Poor pool quality	<input type="checkbox"/>	<input type="checkbox"/> Odors <input type="checkbox"/> Colors <input type="checkbox"/> Floatables <input type="checkbox"/> Oil Sheen <input type="checkbox"/> Suds <input type="checkbox"/> Excessive Algae <input type="checkbox"/> Other:	
Pipe benthic growth	<input type="checkbox"/>	<input type="checkbox"/> Brown <input type="checkbox"/> Orange <input type="checkbox"/> Green <input type="checkbox"/> Other:	

### Section 6: Overall Outfall Characterization for Presence of Illicit Discharge

<input type="checkbox"/> Unlikely <input type="checkbox"/> Potential (presence of two or more indicators) <input type="checkbox"/> Suspect (one or more indicators with a severity of 3) <input type="checkbox"/> Obvious
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### Section 7: Data Collection

1. Sample for the lab?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
2. If yes, collected from:	<input type="checkbox"/> Flow	<input type="checkbox"/> Pool	
3. Intermittent flow trap set?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	If Yes, type: <input type="checkbox"/> OBM <input type="checkbox"/> Caulk dam

### Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?



## Hydrodynamic Separator Inspection Report

Project Name:		Inspection Date:
BMP Location:		BMP ID Number;
<b>Code Key:</b>		
N/A = Not Applicable                  M = Monitor (potential for future problem)		
NP = Not a Problem                    WN = Work Needed		

### INFLOW POINTS

Assessment	Code	Comments
Obstruction: vegetation/debris/sediment		
Structural condition		
Filter condition		
Other (describe)		

### SEPARATOR BODY

Assessment	Code	Comments
Sediment/debris accumulation		
Separator structural condition		
Central shaft condition		
Oil accumulation		
Standing water		
Other (describe)		

### OUTLET DEVICE

Assessment	Code	Comments
Obstruction: vegetation/debris/sediment		
Erosion/undercutting		
Joint failure/loss of joint material		
Leaking device		
Emergency bypass condition		
Other (describe)		

**MISCELLANEOUS**

Assessment	Code	Comments
Trash/debris		
Access		
Vandalism		
Odors present		
Signage (if applicable)		
Other (describe)		

**PHOTOGRAPHS**

Attach color digital photographs of the site and structural BMPs including a caption describing each photo.

**ADDITIONAL COMMENTS**

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