

Stormwater Ponds



Description:

Constructed stormwater retention basin that has a permanent pool (or micropool). Runoff from each rain event is detained and treated in the pool through settling and biological uptake mechanisms.

Design Options:

Micropool Extended Detention (P-1), Wet Pond (P-2), Wet Extended Detention (P-3), Multiple Pond (P-4), Pocket Pond (P-5)

<u>KEY CONSIDERATIONS</u>	<u>STORMWATER MANAGEMENT SUITABILITY</u>
<p>FEASIBILITY</p> <ul style="list-style-type: none"> Contributing drainage area greater than 10 acres for P-1, 25 acres for P-2 to P-4. Follow DEC Guidelines for Design of Dams. Provide a minimum 2' separation from the groundwater in sole source aquifers. Do not locate ponds in jurisdictional wetlands. Avoid directing hotspot runoff to design P-5. <p>CONVEYANCE</p> <ul style="list-style-type: none"> Forebay at each inlet, unless the inlet contributes less than 10% of the total inflow, 4' to 6' deep. Stabilize the channel below the pond to prevent erosion. Stilling basin at the outlet to reduce velocities. <p>PRETREATMENT</p> <ul style="list-style-type: none"> Forebay volume at least 10% of the WQ_v Forebay shall be designed with non-erosive outlet conditions. Provide direct access to the forebay for maintenance equipment In sole source aquifers, provide 100% pretreatment for hotspot runoff. <p>TREATMENT</p> <ul style="list-style-type: none"> Provide the water quality volume in a combination of permanent pool and extended detention (Table 6.1 in manual provides limitations on storage breakdown) Minimum length to width ratio of 1.5:1 Minimum surface area to drainage area ratio of 1:100 <p>LANDSCAPING</p> <ul style="list-style-type: none"> Provide a minimum 10' and preferably 15' safety bench extending from the high water mark, with a maximum slope of 6%. Provide an aquatic bench extending 15 feet outward from the shoreline, and a maximum depth of 18" below normal water elevation. Develop a landscaping plan. Provide a 25' pond buffer. No woody vegetation within 15 feet of the toe of the embankment, or 25 feet from the principal spillway. 	<p><input checked="" type="checkbox"/> Water Quality</p> <p><input checked="" type="checkbox"/> Channel Protection</p> <p><input checked="" type="checkbox"/> Overbank Flood Protection</p> <p><input checked="" type="checkbox"/> Extreme Flood Protection</p> <p>Accepts Hotspot Runoff: Yes <i>(2 feet minimum separation distance required to water table)</i></p> <p><u>FEASIBILITY CONSIDERATIONS</u></p> <p><input type="checkbox"/> Cost</p> <p><input type="checkbox"/> Maintenance Burden</p> <p>Key: L=Low M=Moderate H=High</p> <p><u>Residential Subdivision Use:</u> Yes High Density/Ultra-Urban: No</p> <p>Soils: Hydrologic group 'A' soils may require pond liner <i>Hydrologic group 'D' soils may have compaction constraints</i></p> <p>Other Considerations:</p> <ul style="list-style-type: none"> Thermal effects Outlet clogging Safety bench

MAINTENANCE REQUIREMENTS

- Legally binding maintenance agreement
- Sediment removal from forebay every five to six years or when 50% full.
- Provide a maintenance easement and right-of-way.
- Removable trash rack on the principal spillway.
- Non-clogging low flow orifice
- Riser in the embankment.
- Pond drain required, capable of drawing down the pond in 24 hours.
- Notification required for pond drainage.
- Provide an adjustable gate valve on both the WQ_v-ED pipe, and the pond drain.
- Side Slopes less than 3:1, and terminate at a safety bench.
- Principal spillway shall not permit access by small children, and endwalls above pipes greater than 48" in diameter shall be fenced.

POLLUTANT REMOVAL

G

Phosphorus

G

Nitrogen

G

Metals - Cadmium, Copper, Lead, and Zinc removal

G

Pathogens Coliform, E.Coli, Streptococci removal

Key: G=Good F=Fair P=Poor

Stormwater/Wetland Pond Construction Inspection Checklist

Project:
 Location:
 Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Pre-Construction/Materials and Equipment		
Pre-construction meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked		
1. Material (including protective coating, if specified)		
2. Diameter		
3. Dimensions of metal riser or pre-cast concrete outlet structure		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope		
6. Number and dimensions of prefabricated anti-seep collars		
7. Watertight connectors and gaskets		
8. Outlet drain valve		
Project benchmark near pond site		
Equipment for temporary de-watering		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil, and organic matter		
3. Pipe Spillway Installation		
Method of installation detailed on plans		
A. Bed preparation		
Installation trench excavated with specified side slopes		
Stable, uniform, dry subgrade of relatively impervious material (If subgrade is wet, contractor shall have defined steps before proceeding with installation)		
Invert at proper elevation and grade		
B. Pipe placement		
Metal / plastic pipe		
1. Watertight connectors and gaskets properly installed		
2. Anti-seep collars properly spaced and having watertight connections to pipe		
3. Backfill placed and tamped by hand under “haunches” of pipe		
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 feet cover over pipe is reached		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
3. Pipe Spillway Installation		
Concrete pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area		
3. Excavation for lower half of anti-seep collar(s) with reinforcing steel set		
4. Entire area where anti-seep collar(s) will come in contact with pipe coated with mastic or other approved waterproof sealant		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix		
6. Upper half of anti-seep collar(s) formed with reinforcing steel set		
7. Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
8. Forms stripped and collar inspected for honeycomb prior to backfilling. Parge if necessary.		
C. Backfilling		
Fill placed in maximum 8 inch lifts		
Backfill taken minimum 2 feet above top of anti-seep collar elevation before traversing with heavy equipment		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
4. Riser / Outlet Structure Installation		
Riser located within embankment		
A. Metal riser		
Riser base excavated or formed on stable subgrade to design dimensions		
Set on blocks to design elevations and plumbed		
Reinforcing bars placed at right angles and projecting into sides of riser		
Concrete poured so as to fill inside of riser to invert of barrel		
B. Pre-cast concrete structure		
Dry and stable subgrade		
Riser base set to design elevation		
If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely		
Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway		
C. Poured concrete structure		
Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set		
Structure formed to design dimensions, with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
Forms stripped & inspected for “honeycomb” prior to backfilling; parge if necessary		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Embankment Construction		
Fill material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment		
2. Constructed to design cross-section, side slopes and top width		
3. Constructed to design elevation plus allowance for settlement		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes		
Inlet pipes have adequate outfall protection		
Forebay(s)		
Pond benches		
7. Earth Emergency Spillway Construction		
Spillway located in cut or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width		
Entrance channel, crest, and exit channel constructed to design grades and elevations		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
8. Outlet Protection		
A. End section		
Securely in place and properly backfilled		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified		
Endwall formed to design dimensions with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing, if necessary)		
Forms stripped and structure inspected for “honeycomb” prior to backfilling; parge if necessary		
C. Riprap apron / channel		
Apron / channel excavated to design cross-section with proper transition to existing ground		
Filter fabric in place		
Stone sized as per plan and uniformly place at the thickness specified		
9. Vegetative Stabilization		
Approved seed mixture or sod		
Proper surface preparation and required soil amendments		
Excelsior mat or other stabilization, as per plan		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
10. Miscellaneous		
Drain for ponds having a permanent pool		
Trash rack / anti-vortex device secured to outlet structure		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required)		
Access road		
Set aside for clean-out maintenance		
11. Stormwater Wetlands		
Adequate water balance		
Variety of depth zones present		
Approved pondscaping plan in place Reinforcement budget for additional plantings		
Plants and materials ordered 6 months prior to construction		
Construction planned to allow for adequate planting and establishment of plant community (April-June planting window)		
Wetland buffer area preserved to maximum extent possible		

Comments:

Actions to be Taken:

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project _____
 Location: _____
 Site Status: _____

 Date: _____
 Time: _____

 Inspector: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
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 (Annual)		
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 insider 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		
8. 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) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
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 (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4. Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
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 (Annual)		
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.		
8. Other (specify)		

Comments:

Actions to be Taken:

Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
 Location:
 Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Monthly)		
Trench dewaterers between storms		
4. Sediment Cleanout of Trench (Annual)		
No evidence of sedimentation in trench		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		

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

Comments:

Actions to be Taken:

Sand/Organic Filter Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

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

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

Comments:

Actions to be Taken:

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
 Location:
 Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
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		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
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 (Monthly)		
Dewaterers between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

Open Channel Operation, Maintenance, and Management Inspection Checklist

Project:
 Location:
 Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaterers between storms		

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

Comments:

Actions to be Taken:

3791

2011-2012 Regular Sessions

I N S E N A T E

March 4, 2011

Introduced by Sen. GRISANTI -- read twice and ordered printed, and when printed to be committed to the Committee on Environmental Conservation

AN ACT to amend the environmental conservation law, in relation to requiring modification of the New York State Stormwater Management Design Manual by the department of environmental conservation

THE PEOPLE OF THE STATE OF NEW YORK, REPRESENTED IN SENATE AND ASSEMBLY, DO ENACT AS FOLLOWS:

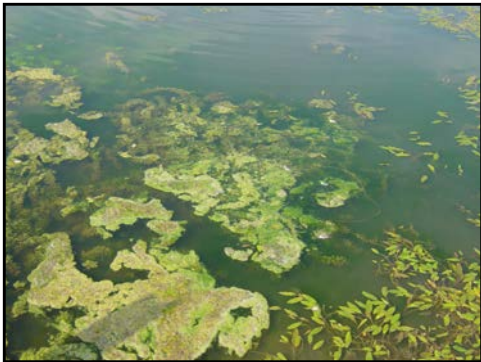
- 1 Section 1. The environmental conservation law is amended by adding a
2 new section 17-0810 to read as follows:
3 S 17-0810. STORMWATER MANAGEMENT DESIGN MANUAL MODIFICATION.
4 ON OR BEFORE ONE YEAR FOLLOWING THE EFFECTIVE DATE OF THIS SECTION,
5 THE DEPARTMENT SHALL MODIFY THE NEW YORK STATE STORMWATER MANAGEMENT
6 DESIGN MANUAL TO INCLUDE THE FOLLOWING PROVISIONS:
7 1. REQUIRE SIGNAGE PROHIBITING SWIMMING AND WADING, WARNING OF POSSI-
8 BLE CONTAMINATION OR POLLUTION OF THE STORMWATER RETENTION POND, AND A
9 DESCRIPTION WITH THE DEPTH OF THE STORMWATER RETENTION POND;
10 2. DEFINE A REASONABLE SLOPE PAST THE AQUATIC BENCH TO LIMIT THE IMME-
11 DIATE DROP OFF TO THE DEEPER END OF THE STORMWATER RETENTION POND;
12 3. REQUIRE AQUATIC VEGETATION BE ESTABLISHED IN THE AQUATIC AND SAFETY
13 BENCHES BEFORE THE STORMWATER RETENTION POND IS RENDERED IN-SERVICE;
14 4. ENSURE MAINTENANCE PLANS INCLUDE A REQUIREMENT FOR EXAMINING THE
15 STATUS OF SAFETY FEATURES BY THE MAINTENANCE AUTHORITY IN THEIR ROUTINE
16 MAINTENANCE SCHEDULE OF STORMWATER RETENTION PONDS; AND
17 5. ANY OTHER PROVISIONS THE DEPARTMENT DEEMS ESSENTIAL TO FURTHER
18 PROMOTE SAFETY IN AND AROUND STORMWATER RETENTION PONDS.
19 S 2. This act shall take effect on the one hundred eightieth day after
20 it shall have become a law.

EXPLANATION--Matter in ITALICS (underscored) is new; matter in brackets [] is old law to be omitted.

LBD08922-03-1

Maintenance

- Determine maintenance activities - such as removal and replacement of dead and diseased vegetation, water and mulching frequency, repair and replacement of staking and wires, and who is the responsible entity in order to ensure vegetation is maintained on the bank to prevent erosion.
- If you do fertilize or mow, prevent grass clippings and excess fertilizer from entering pond. Do not apply fertilizers and pesticides before or during rain, runoff can carry them into the pond and can lead to excessive algae growth.
- Do not apply fertilizer within 15' from the edge of the pond.



Stormwater pond with algae growth due to improper use of fertilizer and grass clippings.

Contact Information

For more information refer to the New York State Stormwater Management Design Manual.

Available for free download from the NYS Department of Environmental Conservation's Website:
www.dec.ny.gov/chemical/29072.html



Prepared by the Stormwater Coalition of Monroe County Construction Task Group:
www.thestormwatercoalition.org

For more information:

The NYS DEC
Stormwater Information Website:
www.dec.ny.gov/chemical/8694.html

Or



Monroe County Soil and Water Conservation District at:
www.monroecountyswcd.org
(585) 473-2120 x3

Proper Landscaping and Maintenance Near Stormwater Ponds



What is a Stormwater Pond?

- In 2003, the NYS Department of Environmental Conservation (DEC) implemented new regulations that require construction projects that disturb 1 acre of soil or greater to file for a permit with the NYS DEC and implement practices such as detention ponds to treat water quality and quantity.

The NYS DEC Permit Requires:

1. Development of a plan to control runoff and pollutants from a site during and after construction activities.
 - **Post-construction stormwater controls such as stormwater ponds are designed and engineered to capture and treat stormwater runoff from nearby roofs, parking lots and roads in accordance with these regulations. These ponds are designed to NYS standards and specifications.**
2. Maintenance of construction and post-construction stormwater controls.
 - The grade and shape of stormwater ponds are specifically designed to aid in their functioning. **Any changes to existing drainage patterns can alter the functioning of these ponds and lead to many problems in the future.**



Tips to Remember When Establishing

Here are some important things that a landscaper must consider when establishing and maintaining vegetation surrounding or adjacent to one of these ponds.

- Plan ahead. Specify a step-by-step procedure for plant installation through site clean-up, including planting schedule and installation specifications. Order plants well in advance in case of long lead times. Existing and proposed utilities should be identified and considered.
- Reduce the amount of time that the banks of a pond have bare soil exposed.
- Use native plants when possible. Avoid invasive plants that spread quickly and reduce plant diversity.



Pond dominated by purple loosestrife, a non-native invasive species.

- Avoid planting woody vegetation with extensive root systems near inlets and outlets of ponds that can impair functioning of these structures.

Vegetation on Stormwater Ponds

- **Always notify your municipality prior to making any modification to existing-drainage patterns.**

Plant Selection Considerations:

- Select plants that work with existing conditions on site such as grade, soil characteristics, wind exposure, insect, disease, drought resistance, and light exposure.

(For a list of suggested plant species see Table H.5 in the New York State Stormwater Management Design Manual, which can be found at: www.dec.ny.gov/chemical/29072.html)

- When possible, select vegetation that is low maintenance and does not require pruning, fertilizer, or mowing, such as native plants.

Mulch Recommendations:

- Use standard landscape style, single or double shredded hardwood mulch or chips. Mulch should be well-aged, free of other materials, such as weeds, soil, roots, etc. Mulch should be applied to a minimum depth of 3 inches; **Grass clippings should not be used as mulch along the edge of the pond.** They are high in nitrogen and contribute excess nutrients to ponds, which can cause algal growth.

Post-Construction Maintenance Plan

Maintenance Plan Preparation Comments

Project: XYZ Commercial Center

Section A: **Operation and Maintenance Information**

Site Address: 123 Ridgeview Ave
Lincoln, NY 12345

Descriptive Site Location: 5-acre property bounded by Ridgeview Avenue to the South, Spring Creek to the North. Adjacent to existing Poplar Hill Shopping Center.

Property Owner: XYZ Partners, Ltd
1 Main Parkway Suite
Lincoln, NY 12345
PH: 123-456-7890

Property Management
(If different from the owner):
ABC Properties
1 Development Parkway
Lincoln, NY 12345
PH: 123-456-7890

If a commercial property or homeowners association is to be managed by an individual or organization other than the property owner, include the contact information here.

Section B: **Design and Construction Information**

Permitting Authority: Lincoln County
Department of Permitting
Lincoln, NY 12345
PH: 123-999-1111

Design Engineer: Cynthia Ong
Reyes and Ong Engineers
18000 Engineering Drive
Newtown, NY 12346
PH: 123-111-9999

Contractor: B.A. Smith Grading
12 Access Road
Lincoln, NY 12345
PH: 123-191-1919

Proprietary Device Manufacturer or Distributor:
Not applicable

Emergency Contact

Town of Lincoln Department of Public Works
Emergency Response Number: 123-000-0001

This section refers to the construction of the stormwater management facility. The permitting authority would be the department(s) that issued an erosion control and stormwater management permit, floodplain permit, storm drain permit, or grading permit.

The design engineer's contact information may be needed if structural repairs are undertaken.

The general contractor or landscaping contractor may be contacted to perform maintenance on items under warranty.

If a proprietary stormwater device is used (e.g., a catch basin insert device or hydrodynamic device in a manhole) include contact information for the manufacturer or distributor.

Local government authority to contact in case of failure of the stormwater treatment practice that threatens public safety.

Section C: Maintenance and Inspection Responsibilities

Maintenance Mechanism:

- Maintenance Agreement
 - Commercial Property
 - Homeowners Association
- Maintenance Assumed by Government Entity List _____

Identify the responsible party for maintenance.

Required Inspections:

- Inspection by a licensed professional engineer is required in accordance with Schedule A.
- Town of Lincoln has authority to enter the site to inspect. The frequency of this inspection has not been established.

Include inspection, tracking and reporting responsibilities outlined in the maintenance agreement, local codes, or programmatic information from the municipal department responsible for inspection.

Providers of maintenance services, if known:

- Pedraza Properties to coordinate maintenance activities and inspection.
- Green Thumb Landscaping provides landscaping and snow removal services to all Pedraza Properties in Lincoln. Green Thumb will conduct mowing of filter strip areas and swale, weeding of bioretention cell.
- Reyes and Ong Engineers will be contracted to provide inspection of stormwater management practices and submit the required reports to the Town of Lincoln.

This may include a Property Management Company (if different from owner), landscaping company, contractor, engineer, or others.

Section D: Funding Mechanism

- Maintenance Performed by Municipality and Funded through:
 - General Revenues
 - Stormwater Utility or other fee assessment
- OR
- Maintenance Performed by Owner and Funded or Guaranteed through:
 - Performance Bond
 - Letter of Credit
 - Escrow Account
 - Other _____

Identify the financial mechanism that will be used.

Estimated annual operation and maintenance cost:

The estimated cost of maintenance beyond the landscaping costs are \$_____. A detailed cost estimate is attached.

Include a detailed estimate of the annual routine maintenance cost and the cost of infrequent maintenance items. The annual operation and maintenance cost is usually roughly 3-9% of the capital cost of the facility. See attachment.

Section E: Post-construction
Stormwater Management Facilities

Site map identifying location of each facility.
See sheet C-01 of attached construction drawings

Show or reference a schematic site map showing the location of each stormwater management practice. This is especially helpful for underground facilities and bioretention facilities that may not be immediately recognized.

Facility: North Bioretention

Name/identifier for facility (match site plans).

Type: Bioretention Cell

Type of facility e.g. bioretention, stormwater pond w/extended detention, underground sand filter, etc.

Location: Northwest corner of the property in turf area. North of building, parking and rear access road.

Contributing Drainage Area: 0.8 acres

Attachments:
See sheets C-02, C-03, C-06, L-02 and L-03 of construction drawings.

List manuals, warranties, or other information that exists for this facility and will be attached to this document.

Special needs:

- Instruct landscaping contractor not to fertilize or replant this area.

List unique maintenance needs for this facility. For example, will inspectors need to be trained in confined space entry? Is a vacuum truck needed for frequent maintenance?

Facility: Grass Swale

Type: Grass Swale

Location: Adjacent to rear access road.

Contributing Drainage Area: 0.75 acres

Attachments:

See sheets C-02, C-04, C-06, and L-02 of construction drawings.

Special needs:

- Instruct landscaping contractor not to fertilize this area.
- Property manager to be aware that this area is designed to retain water after storms.

Post-Construction Maintenance Plan Project: XYZ Commercial Center	<i>Maintenance Plan Preparation Comments</i>
<p>Section F: <u>Attachments to Maintenance Plan:</u></p> <ul style="list-style-type: none"> ▪ As-built plans ▪ Final landscaping plans ▪ Design calculations report (Drainage Area map included) ▪ Specifications for potential repair items ▪ Operation, Maintenance, and Inspection Checklist <ol style="list-style-type: none"> 1. Bioretention 2. Grass Swales ▪ Manuals and warranties Not applicable ▪ Bid specifications – 1 copy included; Appendix A contains permits ▪ Easements The storm drain easement and stormwater management easement have been recorded with Lincoln County Clerk of Court. Copies of these documents are attached. ▪ Covenants Not Applicable ▪ Maintenance Agreement The required maintenance agreement has been recorded. A copy is attached. ▪ Detailed Cost Estimate ▪ Maintenance and Tracking Log 	<p><i>[Not included in this sample plan.] Include the redlined or as-built sheets that include the plan and profile for stormwater facilities and storm drains.</i></p> <p><i>[Not included in this sample plan.] Landscaping plans showing planting zones and planting specification. Include any specifications on vegetation maintenance as well as any warranty information regarding plantings.</i></p> <p><i>[Not included in this sample plan.] While not needed for routine maintenance and inspection, these calculations will reduce the time and cost for major repairs when given to the designer or contractor completing repairs.</i></p> <p><i>These are comparable to construction specification in the level of detail. These can be used by the owner or municipality to establish a contract for maintenance services. Sample specifications are included in this plan.</i></p> <p><i>[Not included in this sample plan.] Lists frequencies for maintenance and inspection items. This should be adapted from Appendix G of the NYS Stormwater Management Design Manual.</i></p> <p><i>[Not included in this sample plan.] Include any documentation or instructions for proprietary products and mechanical components such as valves, pumps, aerators, etc.</i></p> <p><i>[Not included in this sample plan.] The bid specifications or other document that includes a copy of construction permits, particularly if there are any performance requirements that extend beyond the transfer of ownership.</i></p> <p><i>[Not included in this sample plan.] If easements are required by the local jurisdiction to provide municipal inspectors and the public works department with access to the site, include copies of the recorded documents.</i></p> <p><i>[Not included in this sample plan.] In residential developments where stormwater management responsibility falls to the homeowner’s association, a covenant may be in place to make requirements of individual homeowners. If so, this document should be attached to the maintenance plan.</i></p> <p><i>Include a copy of the legal document as recorded. A sample maintenance agreement is provided in Appendix C of this document.</i></p> <p><i>Base on unit costs for maintenance activities. See attachment that follows for example on bioretention. If the municipality or county requires a specific format for the submittal of inspection results and tracking, include that here. Sample is attached.</i></p>

Example Attachments
Specifications for Bioretention

MAINTENANCE DETAILS FOR BIORETENTION

Inspection of Bioretention

The Contractor shall make a visual inspection of the bioretention area in the presence of the Engineer. Trash, debris, oil, sludge, sediment, solid levels, grass levels, and vegetation deficiencies shall be recorded and reported to the Engineer. The surface of the bioretention area shall be inspected for erosion and gulying and any deficiencies in the surface material or drainage blanket shall be reported to the Engineer. The Contractor shall record the color and condition of the mulch layer over the entire surface area of the facility. All structural components, which include all outlet structures, valves, pipes, erosion control materials, and the underdrain system, shall be inspected and any damage shall be reported to the Engineer. If standing water is observed in the bioretention area more than 48-hours after a storm event then the Contractor is responsible for investigating whether the clogging is due to a filter media clog or underdrain system clog by visually inspecting the underdrain system with access provided by the outlet structure. The Contractor shall be responsible for recording the information and contacting the Engineer for guidance or if directed by the Engineer prior to inspection, shall follow the methods described below for Underdrain Flushing or Underdrain Replacement.

All material shall be disposed of by the Contractor as specified above and in accordance with all federal, state, and local regulations.

Stormwater Facilities Weeding and Litter Removal

The work consists of removing any weeds, trash and/or debris from the bottom of the bioretention area in accordance with the specifications or at the discretion of the Engineer. Weeding shall include any weeds that negatively impact stormwater flowage through the facility, any weeds that negatively impact site lines of the roadway, and/or any weeds that are destroying original design vegetation.

Mowing

The work includes mowing of the grass around the perimeter of the bioretention area in accordance with the methods described above.

Stormwater Facilities Sediment Removal

The work includes the removal of sediment within the bioretention facility in all areas where buildup is greater than or equal to 75 mm, has accumulated to a depth of one-third the design volume, or as directed by the Engineer. The sediment shall be disposed of off-site in a pre-approved location in accordance with the methods above.

Erosion Remediation Maintenance

Any areas within the extents of the bioretention facility that are subject to erosion or gulying shall be replenished with granular drainage blanket material and mulch or as directed by the Engineer in accordance with this specification. Slope protection material shall be placed, at the discretion of the Engineer, in areas prone to erosion, in accordance with the above specifications. Embankment stability shall be inspected for seepage and burrowing animals and any erosion or gulying shall be reported to the Engineer.

Pruning

The work includes pruning of all dead or dying vegetation within the extents of the bioretention area, removal of all herbaceous vegetation root stock when overcrowding the maintenance access to the facility and removal of any vegetation that has a negative impact on stormwater flowage through the facility. Any perimeter vegetation encroaching upon the bioretention area shall be pruned if it is prohibiting access to the facility, compromising sight visibility and/or compromising original design vegetation.

Mulch Layer Removal and Replacement

The mulch layer shall be inspected at the time of the maintenance visit and if the Engineer concludes that the layer is clogged and the clogging of the system is due to a mulch layer clog then the material shall be replaced in accordance with the methods described above. To replace the mulch layer the surface of the bioretention area shall be excavated down to the drainage blanket media and properly disposed of in a pre-approved off-site location. After excavation the Engineer shall be notified and shall conduct an inspection of the drainage blanket to determine if further excavation is necessary. If the Engineer deems the drainage blanket as adequate then the mulch layer shall be replaced to its original design depth. If the Engineer determines that the drainage blanket has been contaminated then the drainage blanket layer shall be rehabilitated as specified below.

Drainage Blanket Roto-tilling

If the Engineer has concluded that the clogging of the bioretention area is due to blanket media clogging and that less than 50 percent of the blanket media surface area has been contaminated then the Contractor shall roto-till the bottom 150 mm of the drainage blanket, prior to replacing the mulch layer, to brake up hard packed soil.

Drainage Blanket Media Replacement

If the Engineer has concluded that the clogging of the bioretention area is due to blanket media clogging and that more than 50 percent of the blanket media surface area has been contaminated then the media shall be excavated and replaced prior to replacing the mulch layer in accordance with the methods described above.

Stormwater Facilities Underdrain System Flushing

If the Engineer has concluded that the clogging of the bioretention area is due to an underdrain system clog then the underdrain system shall be snaked and/or flushed in accordance with the methods described above.

Stormwater Facilities Underdrain System Replacement

If the Engineer has concluded that the clogging of the bioretention area is due to an underdrain system clog and the system has been snaked and/or flushed and the surface of the bioretention area has been cleaned of sediment and continues to pond stormwater more than 48-hours after a storm event or a visual inspection reveals that damage has been done to the underdrain system then the system shall be excavated and replaced in accordance with the methods described above. The work shall also include replacement of the gravel blanket surrounding the underdrain piping and any/all associated filter fabric or as directed by the Engineer.

Replacement Planting

This item shall include all work associated with the replacement of any/all vegetation that has died off or has not fully established, as determined at the time of the inspection. The plantings shall be replaced as directed in the specifications above and/or the Engineers recommendations.

General Cleanup

The Contractor shall be responsible for returning all areas within the extents of the bioretention facilities to the status that was found at the start of the project or in conformance of the original design Drawings. Any item within the bioretention facility area, including but not limited to vegetation, pipes, end sections, rip rap, weirs, berms, outlet structures, and frames and grates/covers, damaged or destroyed while completing this work item shall be replaced and paid for by the Contractor.

METHOD OF MEASUREMENT

The work to be performed to maintain the stormwater bioretention facility shall be measured as follows:

Item No.	Item	Pay Unit
1	Inspection of Bioretention	Square Meter
2	Stormwater Facilities Weeding and Litter Removal	Square Meter
3	Mowing	Square Meter
4	Stormwater Facilities Sediment Removal	Cubic Meter
5	Erosion Remediation Maintenance	Square Meter
6	Erosion Control Material (Rip rap & Geotextile)	Cubic Meter
7	Pruning	Square Meter
8	Soil Media Roto-tilling	Square Meter
9	Mulch Layer Removal and Replacement	Cubic Meter
10	Granular Drainage Blanket Replacement	Cubic Meter
11	Stormwater Facilities Underdrain System Flushing	Meter
12	Stormwater Facilities Underdrain System Replacement	Meter
13	Replacement Planting	Each