Mahoning County Post Construction Best Management Practices (BMP's)

Maintenance and Inspection Requirements Guidance Manual

Table of Contents

9.0 - Pocket Wetland

10.0 - Vegetated Filter Strip

11.0 – Level Spreader

List of Appendices

1.0 -Introduction

1.1 Background

In 1972, the National Pollutant Discharge Elimination System (NPDES) program was established under the authority of the Clean Water Act. Phase II of the NPDES stormwater program was signed into law in December 1999. This regulation builds upon the existing Phase I program, developed in 1990, by requiring smaller communities, also known as small municipal separate storm sewer systems (MS4s), to be permitted. NPDES Phase II regulations emphasize the presumptive approach. The presumption is that each municipality has a general urban runoff problem and that this problem can be addressed through the implementation of six minimum control programs. The six minimum control measures are listed below.

Minimum control measures

1.) Public education and outreach on storm water impacts.

2.) Public involvement and participation.

3.) Illicit discharge detection and elimination.

4.) Construction site storm water runoff control.

5.) Post-construction storm water management in new development and redevelopment.

6.) Pollution prevention and good housekeeping for municipal operations.

This manual focuses on Minimal Control Measure 5.

5.) Post-construction storm water management in new development and redevelopment.

(a) Develop and implement strategies that include a combination of structural, non-structural or both types of best management practices as you determine appropriate for your community

(b) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under state or local law; and

(c) Ensure adequate long-term operation and maintenance of best management practices.

1.2 Types of Post Construction BMP's

Post-construction BMPs fall into 3 categories. Either they are (a) Non-Structural or (b) Structural (c) Alternative. Low Impact Development (LID) is a design philosophy that combines both structural and non-structural BMPs (http://www.lid-stormwater.net) and is increasing in popularity. Ohio EPA strongly encourages that all sites implement a mix of structural and non-structural post-construction BMPs. However, the CGP has not specified any non-structural BMPs which must be implemented. This was intentional, as most of these practices are controlled on the local government level.

1.2.1 Non-Structural BMP's

Non-Structural BMPs consist of preservation, planning or procedures that direct development away from water resources or limit the creation of impervious surfaces. Examples include conservation easements, riparian and wetland setbacks, rain barrels to capture and reuse storm water, breaking up the connectivity between impervious surfaces, use of permeable pavements, and conservation subdivision design (subdivisions which leave 40-50% of the land area in open space and place developed areas away from important water resources, yet still allows the same lot yield as traditional subdivision design).

1.2.2 Structural BMP's

Structural BMPs are practices that must be built to provide treatment of storm water either through storage, filtration or infiltration. Examples include extended detention basins, bioretention cells, sand filters, vegetated filter strips, water quality swales and infiltration trenches.

1.2.3 Alternative

The CGP allows the use of alternative BMPs as long as they are of equivalent effectiveness to the BMPs listed in Table 2. To be of equivalent effectiveness, BMPs must be capable of meeting the intent of the post-construction requirements of the CGP, namely (a) prevent hydrologic impacts to the receiving water(s) and (b) minimize the discharge of pollutants contained in storm water runoff. Because post-construction BMPs are a key component of SWP3s, and SWP3s are required to be complete and ready to implement upon submittal of a Notice of Intent (NOI) permit application.

NOTE: Any Alternative Post Construction BMP that is approved by State / Local Officials will require the Manufactures Maintenance Plan for review.

1.3 Purpose of Post Construction BMP's

The intent of post-construction BMPs is to assure that storm water runoff from developed land does not negatively impact receiving streams, either through hydrologic impacts or pollutant discharges. Thus, traditional storm water controls which simply address the peak rate of storm water discharge from flood-producing storm events are not adequate. As land is developed, it becomes more impervious. Vegetation in open fields and forests is replaced with paved surfaces and rooftops. This results in more rainfall becoming storm water runoff. In addition, conveyance systems are installed to drain the site more efficiently resulting in storm water runoff with more energy than the runoff from undeveloped land. These hydrologic impacts, coupled with the increased concentration of pollutants contained in storm water runoff from developed land use, result in degradation of the water resources to which the storm water is discharged. The smaller the receiving stream, the greater the importance of controlling the hydrologic and subsequent hydraulic impacts of the construction project.

1.4 When are Post Construction BMP's Required

Post-construction BMPs are required on all sites where the larger common plan of development or sale calls for 1 or more acres of land disturbance except:

1. Linear projects that do not create impervious surfaces (e.g., installation of a gas pipeline), or
2. Road construction projects by public entities where construction activities are initiated prior to March 10, 2006.

The exemption for public road projects is not automatic. Part III.G.2.e of the CGP states that post-construction BMPs must be implemented on these projects as of April 21, 2003, where practicable.

All other projects are subject to these requirements at this time and must include post-construction BMPs in the Storm Water Pollution Prevention Plan (SWP3).

2.0 -Infiltration Basin

2.1 Description

An infiltration basin is a shallow impoundment which is designed to infiltrate stormwater into the soil. This practice is believed to have high pollutant removal efficiency and can also help recharge the ground water, thus increasing base flow to stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

2.2 Conditions where practices apply

When designing infiltration basins, designers need to carefully consider both the restrictions on the site and design features to improve the long-term performance of the practice. Infiltration practices need to be located extremely carefully. In particular, designers need to ensure that the soils on the site are appropriate for infiltration, and that designs minimize the potential for ground water contamination and long-term maintenance problems.

2.3 Planning Considerations

When designing infiltration basins, designers need to carefully consider both the restrictions on the site and design features to improve the long-term performance of the practice. Infiltration practices need to be located extremely carefully. In particular, designers need to ensure that the soils on the site are appropriate for infiltration, and that designs minimize the potential for ground water contamination and long-term maintenance problems.

Infiltration basins are designed to collect stormwater from impervious areas and provide pollutant removal benefits through detention and filtration

3.0 - Enhanced Water Quality Swale

3.1 Description

In the context of BMPS to improve water quality, the term swale (a.k.a. grassed channel, dry swale, wet swale, biofilter, or bioswale) refers to a vegetated, open-channel management practices designed specifically to treat and attenuate stormwater runoff for a specified water quality volume. As stormwater runoff flows along these channels, it is treated through vegetation slowing the water to allow sedimentation, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Variations of the grassed swale include the grassed channel, dry swale, and wet swale. The specific design features and methods of treatment differ in each of these designs, but all are improvements on the traditional drainage ditch. These designs incorporate modified geometry and other features for use of the swale as a treatment and conveyance practice.

3.2 Conditions where practices apply

Grassed swales can be applied in most situations with some restrictions. Swales are well suited for treating highway or residential road runoff because they are linear practices. Swales are also useful as one of a series of stormwater BMPs or as part of a treatment train, for instance, conveying water to a detention pond and receiving water from filter strips. Furthermore, swales are highly recommended by the proponents of design approaches such as Low Impact Development and Better Site Design

3.3 Planning Considerations

In addition to the broad applicability concerns described above, designers need to consider site conditions. In addition, they need to incorporate design features to improve the longevity and performance of the practice while minimizing the maintenance burden. In addition to considering the restrictions and adaptations of grassed swales to different regions and land uses, designers need to ensure that this management practice is feasible at the site in question because some site conditions (i.e., steep slopes, highly impermeable soils) might restrict the effectiveness of grassed channels.

Grassed swales can be used along roadsides and parking lots to collect and treat stormwater runoff

4.0 Dry Extended Detention Basin

4.1 Description

Dry detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, and extended detention ponds) are basins whose outlets have been designed to detain stormwater runoff for some minimum time (e.g., 24 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool of water. However, they are often designed with small pools at the inlet and outlet of the basin. They can also be used to provide flood control by including additional flood detention storage.

4.2 Conditions where practices apply

Dry detention ponds have traditionally been one of the most widely used stormwater best management practices. In some instances, these ponds may be the most appropriate best management practice. However, they should not be used as a one size fits all solution. If pollutant removal efficiency is an important consideration then dry detention ponds may not be the most appropriate choice. Dry detention ponds require a large amount of space to build them.

4.3 Planning Considerations

Designers need to ensure that the dry detention pond is feasible at the site in question. In general, dry detention ponds should be used on sites with a minimum area of 10 acres. On smaller sites, it can be challenging to provide channel or water quality control because the orifice diameter at the outlet needed to control relatively small storms becomes very small and thus prone to clogging. Specific designs may vary considerably, depending on site constraints or preferences of the designer or community. Some features, however, should be incorporated into most dry extended detention pond designs. These design features can be divided into five basic categories: pretreatment, treatment, conveyance, maintenance reduction, and landscaping.

Photo of a dry detention pond designed to temporarily detain runoff during storm events

5.0 Wet Extended Detention Basin

5.1 Description

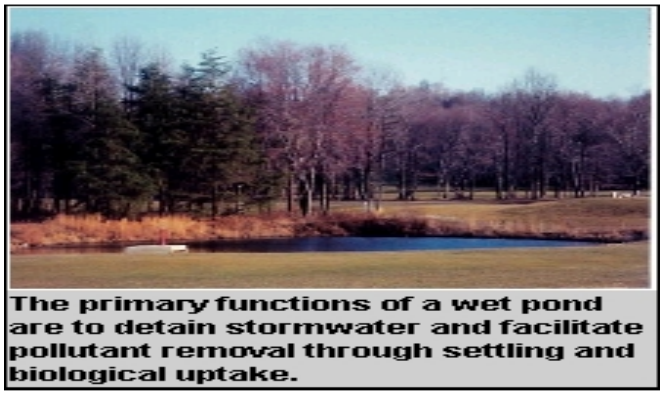
Wet ponds (a.k.a. stormwater ponds, wet retention ponds, wet extended detention ponds) constructed basins that have a permanent pool of water throughout the year (or at least throughout the wet season). Ponds treat incoming stormwater runoff by allowing particles to settle and algae to take up nutrients. The primary removal mechanism is settling as stormwater runoff resides in this pool, and pollutant uptake, particularly of nutrients, also occurs through biological activity in the pond. Traditionally, wet ponds have been widely used as stormwater best management practices.

5.2 Conditions where practices apply

Wet ponds are widely applicable stormwater management practices. Although they have limited applicability in highly urbanized settings and in arid climates, they have few other restrictions.

5.3 Planning Considerations

Wet ponds need sufficient drainage area to maintain the permanent pool. In humid regions, this is typically about 25 acres, but a greater area may be needed in regions with less rainfall. BMPs that focus on source control such as bioretention, should be considered for smaller drainage areas. Specific designs may vary considerably, depending on site constraints or preferences of the designer or community. There are some features, however, that should be incorporated into most wet pond designs. These design features can be divided into five basic categories: pretreatment, treatment, conveyance, maintenance reduction, and landscaping.



The primary functions of a wet pond are to detain stormwater and facilitate pollutant removal through settling and biological uptake.

6.0 - Constructed Wetland

6.1 Description

Stormwater wetlands (a.k.a. constructed wetlands) are structural practices similar to wet ponds (see Wet Ponds fact sheet) that incorporate wetland plants into the design. As stormwater runoff flows through the wetland, pollutant removal is achieved through settling and biological uptake within the practice. Wetlands are among the most effective stormwater practices in terms of poll utant removal, they also offer aesthetic and habitat value. Although natural wetlands can sometimes be used to treat stormwater runoff that has been properly pretreated, stormwater wetlands are fundamentally different from natural wetland systems. Stormwater wetlands are designed specifically for the purpose of treating stormwater runoff, and typically have less biodiversity than natural wetlands in terms of both plant and animal life. Several design variations of the stormwater wetland exist, each design differing in the relative amounts of shallow and deep water, and dry storage above the wetland.

6.2 Conditions where practices apply

Constructed wetlands are widely applicable stormwater management practices. While they have limited applicability in highly urbanized settings and in arid climates, wetlands have few other restrictions. Stormwater wetlands can be applied in most regions of the United States, with the exception of arid climates. In arid and semi-arid climates, it is difficult to design any stormwater practice that has a permanent pool. Because stormwater wetlands are shallow, a large portion is subject to evaporation relative to the volume of the practice. This makes maintaining the permanent pool in wetlands more challenging and important than maintaining the pool of a wet pond.

6.3 Planning Considerations

Wetlands need sufficient drainage area to maintain the permanent pool. In humid regions, this is typically about 25 acres, but a greater area may be needed in regions with less rainfall. Specific designs may vary considerably, depending on site constraints or preferences of the designer or community. There are some features, however, that should be incorporated into most wetland designs. These design features can be divided into five basic categories: pretreatment, treatment, conveyance, maintenance reduction, and landscaping.

A stormwater wetland detains stormwater, removes pollutants, and provides habitat and aesthetic benefits (Source: The Bioengineering Group, Inc., no date)

7.0 - Constructed Wetland

7.1 Description

Sand filters are usually designed as two-chambered stormwater practices; the first is a settling chamber, and the second is a filter bed filled with sand or another filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering medium. There are several modifications of the basic sand filter design, including the surface sand filter, underground sand filter, perimeter sand filter, organic media filter, and Multi-Chamber Treatment Train. All of these filtering practices operate on the same basic principle. Modifications to the traditional surface sand filter were made primarily to fit sand filters into more challenging design sites (e.g., underground and perimeter filters) or to improve pollutant removal (e.g., organic media filter).

7.2 Conditions where practices apply

Sand filters can be applied in most regions of the country and on most types of sites. Some restrictions at the site level, however, might restrict the use of sand filters as a stormwater management practice. Although sand filters can be used in both cold and arid climates, some design modifications might be necessary. In cold climates, filters can be used, but surface or perimeter filters will not be effective during the winter months, and unintended consequences might result from a frozen filter bed. Using alternative conveyance measures such as a weir system between the sediment chamber and filter bed may avoid freezing associated with the traditional standpipe.

7.3 Planning Considerations

Sand filters are best applied on relatively small sites (up to 10 acres for surface sand filters and closer to 2 acres for perimeter or underground filters [MDE, 2000]). Filters have been used on larger drainage areas, of up to 100 acres, but these systems can clog when they treat larger drainage areas unless adequate measures are provided to prevent clogging, such as a larger sedimentation chamber or more intensive regular maintenance. Sand filters can be used on sites with slopes up to about 6 percent. When sand filters are designed as a stand-alone practice, they can be used on almost any soil because they can be designed so that stormwater never infiltrates into the soil or interacts with the ground water.

8.0 – Bioretention

8.1 Description

Bioretention areas, or rain gardens, are landscaping features adapted to provide on-site treatment of stormwater runoff. They are commonly located in parking lot islands or within small pockets of residential land uses. Surface runoff is directed into shallow, landscaped depressions. These depressions are designed to incorporate many of the pollutant removal mechanisms that operate in forested ecosystems. During storms, runoff ponds above the mulch and soil in the system. Runoff from larger storms is generally diverted past the facility to the storm drain system. The remaining runoff filters through the mulch and prepared soil mix. The filtered runoff can be collected in a perforated underdrain and returned to the storm drain system.

8.2 Conditions where practices apply

Bioretention systems are generally applied to small sites and in a highly urbanized setting. Bioretention can be applied in many climatological and geologic situations, with some minor design modifications. Bioretention systems are applicable almost everywhere in the United States. In arid or cold climates, however, some minor design modifications may be needed.

8.3 Planning Considerations

In addition to the broad applicability concerns designers need to consider conditions at the site level. In addition, they need to incorporate design features to improve the longevity and performance of the practice, while minimizing the maintenance burden. Some considerations for selecting a stormwater management practice are the drainage area the practice will need to treat, the slopes both at the location of the practice and the drainage area, soil and subsurface conditions, and the depth of the seasonably high ground water table. Bioretention can be applied on many sites, with its primary restriction being the need to apply the practice on small

10.0 - Vegetated Filter Strip

10.1 Description

In the context of BMPS to improve water quality, the term swale (a.k.a. grassed channel, dry swale, wet swale, biofilter, or bioswale) refers to a vegetated, open-channel management practices designed specifically to treat and attenuate stormwater runoff for a specified water quality volume. As stormwater runoff flows along these channels, it is treated through vegetation slowing the water to allow sedimentation, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Variations of the grassed swale include the grassed channel, dry swale, and wet swale.

10.2 Conditions where practices apply

Grassed swales can be applied in most situations with some restrictions. Swales are well suited for treating highway or residential road runoff because they are linear practices. Swales are also useful as one of a series of stormwater BMPs or as part of a treatment train, for instance, conveying water to a detention pond and receiving water from filter strips.

10.3 Planning Considerations

In addition to considering the restrictions and adaptations of grassed swales to different regions and land uses, designers need to ensure that this management practice is feasible at the site in question because some site conditions (i.e., steep slopes, highly impermeable soils) might restrict the effectiveness of grassed channels. Grassed swales should generally treat runoff from small drainage areas (less than 5 acres). Grassed swales should be used on sites with relatively flat slopes of less than 4 percent slope; 1 to 2 percent slope is recommended. Grassed swales can be used on most soils, with some restrictions on the most impermeable soils.

Grassed swales can be used along roadsides and parking lots to collect and treat stormwater runoff

11.0 – Level Spreader

11.1 Description

A level spreader is a constructed weir that is shaped or graded flat perpendicular to the direction of flow. Level spreaders are used to convert concentrated flow to sheet flow over nearly level areas without causing erosion, formation or gullies, or flooding.

11.2 Conditions where practices apply

Level spreaders are relatively low cost structures that can uniformly disperse impervious surface runoff, roof downspout runoff, or other small volumes of concentrated flow.
Runoff containing high sediment loads must be treated by a sediment trapping device prior to release into the level spreader Level spreaders must be placed where there would be no traffic over the spreader to assure that the level lip remains level and undisturbed
Level spreaders can be used below pipe outlets where the flow can be converted to and continue as sheet flow. However, the pipe outlet must be stabilized with outlet protection prior to release of runoff into the level spreader.

11.3 Planning Considerations

The design capacity of the level spreader shall be estimated by determining the peak rate of runoff from a 10-yr. frequency storm. The design flow should not be greater than 30 cubic feet per second (cfs) from a 10-yr.-frequency storm. For design flows less than 4 cfs, the level spreader lip may be vegetated natural earth (not fill).The **vegetated lip spreader** shall be protected using an erosion control blanket (installed according to manufacturers recommendations) to prevent erosion and allow vegetation to become established. The blanket shall start a minimum of 4 feet above the lip and extend at least 1 foot downstream over the spreader lip secured with heavy-duty staples with the downstream and upstream ends buried at least 6 inches in a vertical trench.

For design flows greater than 4 cfs, the level spreader lip must be constructed of rigid, durable, non-erodible material (i.e. riprap, concrete, or precast block or geo-synthetic materials).
The ***rigid lip spreader*** constructed of riprap shall meet ODOT Type D riprap and shall be carefully installed with a 2-foot wide level lip. An apron with existing vegetation shall extend downstream from the rigid lip at least 3 feet. The riprap shall be a minimum of 12 inches thick. Spread gravel or soil over top of the placed riprap surface to fill the voids and interlock the riprap together.

Appendix A: Infiltration Basin Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Activity	Schedule
Inspect facility for signs of wetness or damage to structures	Semi Annually
Note eroded areas.	Semi Annually
If dead or dying grass on the bottom is observed, check to ensure that water percolates 2-3 days following storms.	Semi Annually
Note signs of petroleum hydrocarbon contamination and handle properly.	Semi Annually
Mow and remove litter and debris.	Standard Maintenance (As Needed)
Stabilize of eroded banks.	Standard Maintenance (As Needed)
Repair undercut and eroded areas at inflow and outflow structures.	Standard Maintenance (As Needed)
Disc or otherwise aerate bottom.	Annual Maintenance
Dethatch basin bottom.	Annual Maintenance
Scrape bottom and remove sediment. Restore original cross-section and infiltration rate.	5 Year Maintenance
Seed or sod to restore ground cover.	5 Year Maintenance

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix B: Enhanced Water Quality Swale Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Task	**Schedule**
Remove trash	Monthly
Mowing	Monthly-maintain 2-6 inches in height
Inspect for erosion and vegetative failure	Monthly-reseed as necessary
Inspect check dams and diversion devices	Monthly
Remove accumulated sediment	Semi-Annually
Repair any damaged or displaced rip rap	As needed

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix C: Dry Extended Detention Basin Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
Detention Pond 1 (South Pond)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Task	**Schedule**
Remove debris from side slopes and trash rack	Monthly
Check and clear orifice of any obstruction	Monthly
Outlet / inlet inspection and cleanout	Monthly
Bank mowing and inspection / stabilization of eroded areas	Monthly
Forebay inspection and cleanout	Monthly-remove sediment every 7 years or when sediment volume exceeds 50% of the storage volume
Check pond depth	Annually-remove sediment as needed
Remove woody vegetation along embankment	Annually
Inspect for structural damage	Annually
Inspect / exercise all mechanical devices	Annually
Repair broken pipes	As needed
Replace rip rap that is chocked with sediment	As needed
Security	As needed

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix D: Wet Extended Detention Basin Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Task	**Schedule**
Remove debris from side slopes and trash rack	Monthly
Check and clear orifice of any obstruction	Monthly
Outlet / inlet inspection and cleanout	Monthly
Bank mowing and inspection / stabilization of eroded areas	Monthly
Forebay inspection and cleanout	Monthly-remove sediment every 7 years or when sediment volume exceeds 50% of the storage volume
Check pond depth	Annually-remove sediment as needed
Remove woody vegetation along embankment	Annually
Inspect for structural damage	Annually
Inspect / exercise all mechanical devices	Annually
Repair broken pipes	As needed
Replace rip rap that is chocked with sediment	As needed
Security	As needed

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix E: Constructed Wetland Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Tasks	**Schedule**
Remove debris from side slopes and trash rack	Monthly
Outlet / inlet inspection and cleanout	Monthly
Forebay inspection and cleanout	Monthly-remove sediment every 7 years or when sediment volume exceeds 50% of the storage volume
Bank mowing and inspection / stabilization of eroded areas	Monthly
Removal of cattails and invasive species, replant as necessary	Semi-Annually
Inspect for structural damage	Annually
Sediment level	Annually-remove at 20 years or when plants are being impacted
Repair broken pipes	As needed
Replace rip rap that is chocked with sediment	As needed
Pest control	As needed
Security	As needed

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix F: Sand and Other Media Filter Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Task	**Schedule**
Remove trash	Monthly
Inspect outlet for obstructions	Monthly
Inspect for clogging	Monthly
Skim sand media	Monthly
Pump oil and grit separator	Annually
Replace sand media	As needed

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix G: Bioretention Cell Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Tasks	**Schedule**
Remove trash and debris	Monthly
Check and repair eroded areas	Monthly
Remulch any void areas	Monthly
Check vegetation and replace damaged vegetation	Monthly
Inspect for ponding, washed out areas, and soil conditions.	Monthly
Perimeter mowing	Monthly
Inspect collection system for proper functioning	Quarterly
Reseed grass swale or border	As needed
Apply new mulch if needed	Annually
Pruning	Annually
Perform soil test and replace soil if needed	Annually
Repair broken pipes	As needed
Replace rip rap that is chocked with sediment	As needed
Remove sediment	As needed
Replace mulch	Every three years

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix H: Vegetated Filter Strip Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Task	**Schedule**
Remove trash	Monthly
Mowing	Monthly-maintain 2-6 inches in height
Inspect for erosion and vegetative failure	Monthly-reseed as necessary
Check outlet pipes (if present) for clogging	Monthly
Repair flow dispersion device to avoid formation of channels	Monthly
Remove accumulated sediment	Semi-Annually
Reseed	Annually

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix I: Level Spreader Operation & Maintenance Agreement

1. General Post Construction BMP Information.

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude Coordinates

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine maintenance tasks and schedules for typical Post Construction BMP listed above.

Tasks	**Schedule**
Remove trash	Monthly
Inspect for undercutting	Monthly
Inspect for settlement	Monthly
Replace eroded rip rap or stone	Monthly
Mowing	Monthly-maintain 2-6 inches in height
Inspect for erosion and channeling	Monthly
Remove sediment from forebay	Annually
Remove large stemmed vegetation	Annually
Repair all concentrated flows	As needed

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)

Appendix J: Underground Stormwater Storage Systems Operation & Maintenance Agreement

1. General Post Construction BMP Information

Post Construction BMP Name	BMP Location
(Insert Name)	(Insert Latitude & Longitude)

2. Post Construction BMP site location map. (Please attach to this document)

3. Routine Inspection and Maintenance tasks and schedules for Post Construction BMP listed above are the manufactures recommendations for said practice. Property owner provided our office with a ___ page Inspection and Maintenance document and has agreed to carry out procedures listed therein. Copy of plan is in project folder.

Post Construction / Maintenance Certification

As the responsible party, I certify that the BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner will be notified of the BMPs in use at this site and must include written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

_____ _____

Facility Name Property Owner Signature Date

_____ _____

Applicant Title/ Contact Information Property Owner Name (Printed)