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**GUIDELINES FOR THE USE OF INNOVATIVE BMPS  
IN  
FAIRFAX COUNTY, VIRGINIA**

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DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL SERVICES

FAIRFAX COUNTY, VIRGINIA

October 2001

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## LIST OF INNOVATIVE BMPS

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<u>Minimum Std. VA SWM Handbook</u>	<u>BMP Type</u>	<u>Provisional Phosphorus Removal Efficiency</u>
3.06	Retention Basin III (Wet Pond with Sediment Forebay and Aquatic Bench)	65%
3.07	Extended Detention Dry Pond (with Sediment Trap)	45%
3.07	Enhanced Extended Detention Dry Pond (with Sediment Forebay and Shallow Marsh)	50%
3.09	Constructed Wetlands	30%
3.11	Bioretention Basin (Rain Garden)	
	(Capture and treatment volume equal to 0.5 inches of runoff from the impervious area.)	50%
	(Capture and treatment volume equal to 1.0 inches of runoff from the impervious area.)	65%
3.11A	Bioretention Filter (Rain Garden)	
	(Capture and treatment volume equal to 0.5 inches of runoff from the impervious area.)	50%
	(Capture and treatment volume equal to 1.0 inches of runoff from the impervious area.)	65%
3.13	Grassed Swale	15%
	Water Quality Swale	35%
3.14	Vegetated Filter Strip	10%
3.15	Manufactured BMP Systems	
	Hydrodynamic Structures (Stormceptor, Vortechs, Downstream Defender, BaySaver)	15%
	Filtering Structures (StormFilter, StormTreat System)	50%

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.06 Retention Basin III (Wet Pond with Sediment Forebay and Aquatic Bench)

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A retention basin is a stormwater management facility which includes a permanent impoundment, or pool of water, for the purpose of enhancing water quality and, therefore, is normally wet, even during nonrainfall periods. Storm runoff inflows may be temporarily stored above this permanent impoundment for the purpose of reducing flooding, or stream channel erosion. Retention basin III means a retention basin with the volume of the permanent pool equal to four times the mean storm volume with the addition of sediment forebay(s) and an aquatic bench.

Phosphorus Removal Efficiency      65%

#### Maintenance

With the exception of a residential regional pond, a Retention Basin III is acceptable for private maintenance only. A Private Maintenance Agreement shall be executed for all privately maintained facilities prior to plan approval.

#### Siting Considerations

Not permitted in residential areas except for regional facilities or where there are no other reasonable options available for compliance with water quality requirements (PFM 6-0301.4).

#### Design standards

Fairfax County Public Facilities Manual for basic pond design, maintenance access, dam embankment design, pond volume, and outlet structure design.

*Virginia SWM Handbook* Standard and Specifications 3.06 (Retention Basins) for aquatic bench design, Standard and Specification 3.04 (Sediment Forebay) for sediment forebay design, and Standard and Specification 3.05 (Landscaping) for plant selection and planting specifications.

*Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999) for plantings in areas outside of the aquatic bench and sediment forebay(s).

#### Special Design Considerations

Sediment forebays with maintenance access stabilized to provide for passage of heavy equipment must be provided at all discharge points into the facility which account for more than 10% of the drainage area to the facility. Sediment forebays shall be excavated to the extent feasible. If sufficient volume cannot be created by excavation, a rock or gabion berm keyed into the sides of the pond no higher than 2 feet may be used. The top of the berm shall be at or below the permanent pool elevation. When constructed in this manner, an overflow section is not required. The volume of the sediment forebay shall be a minimum of 0.1 inch per impervious acre.

Although an onsite area designated for sediment dewatering and disposal is desirable, it is not a requirement.

The aquatic bench and sediment forebay(s) shall be planted with a minimum of two different species of wetland plants for each water depth zone. The density of wetland plants shall be 18 inches or less on center. Additional information on wetland planting techniques is available in *Design of Stormwater Wetland Systems: Guidelines for creating Diverse and Effective Stormwater Wetland Systems in the Mid-Atlantic Region*, Metropolitan Washington Council of Governments, October, 1992.

The areas of the facility outside of the aquatic bench and sediment forebay(s) shall be planted in accordance with the *Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999).

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.07 Extended Detention Dry Pond (with Sediment Trap)

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An extended detention basin with a sediment trap is an impoundment that temporarily stores runoff for a specified period and discharges it through a hydraulic outlet structure to a downstream conveyance system. An extended detention basin is usually dry during non-rainfall periods. The sediment trap is constructed at the incoming discharge points to the extended detention basin. The purpose of the sediment trap is to allow sediment to settle from the incoming stormwater runoff before it is delivered to the balance of the BMP. The sediment trap helps to isolate the sediment deposition in an accessible area, which facilitates BMP maintenance efforts. The difference between a sediment trap and a sediment forebay is that a sediment trap is intended to be almost dry during non-rainfall events.

Phosphorus Removal Efficiency      45%

Maintenance Responsibility

Acceptable for Public Maintenance

Design standards

Fairfax County Public Facilities Manual for basic pond design, maintenance access, dam embankment design, extended detention volume, extended detention drawdown time, and outlet structure design.

*Virginia E & S Handbook* Standard and Specification 3.04 (Temporary Sediment Trap) for sediment trap design, and *Virginia SWM Handbook* Standard and Specification 3.09 (Constructed Wetlands) for shallow marsh design and Standard and Specification 3.05 (Landscaping) for plant selection and planting specifications.

*Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999) for plantings in areas outside of the sediment trap(s).

Special Design Considerations

Sediment traps with maintenance access stabilized to provide for passage of heavy equipment must be provided at all discharge points into the facility which account for more than 10% of the drainage area to the facility. The volume of the sediment trap shall be a minimum of 0.1 inch per impervious acre.

Depth of the sediment trap's permanent pool limited to 6 inches so that facility may be treated as a dry pond for County maintenance and permitted in residential areas. The berm which creates the temporary storage in the sediment trap shall not be greater than two feet in height. The outlet of the sediment trap shall be Class I rip-rap and shall transition to the required concrete trickle ditch in the bottom of the dry pond.

The volume of the sediment trap which is above the permanent pool of the sediment trap may be included in the BMP and detention routing computations. The volume of the berm should not be counted as available storage in preparing the stage storage relationship for the routing computations.

The sediment trap(s) shall be planted with a minimum of two different species of wetland plants for each water depth zone. The density of wetland plants shall be 18 inches or less on center.

The areas of the facility outside of the sediment trap(s) shall be planted in accordance with the *Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999).

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## INNOVATIVE BMP STANDARDS AND SPECIFICATIONS

### 3.07 Enhanced Extended Detention Dry Pond

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An enhanced extended detention basin with a sediment forebay is an impoundment that temporarily stores runoff for a specified period and discharges it through a hydraulic outlet structure to a downstream conveyance system. The sediment forebay is constructed at the incoming discharge points to the extended detention basin. The purpose of the sediment forebay is to allow sediment to settle from the incoming stormwater runoff before it is delivered to the balance of the BMP. The sediment forebay helps to isolate the sediment deposition in an accessible area, which facilitates BMP maintenance efforts. An enhanced extended detention basin has a higher efficiency than an extended detention basin because it incorporates a shallow marsh in its bottom and a wet sediment forebay. The shallow marsh provides additional pollutant removal through wetland plant uptake, adsorption, physical filtration, and decomposition. The shallow marsh vegetation also helps to reduce the resuspension of settled pollutants by trapping them.

Phosphorus Removal Efficiency      50%

#### Maintenance Responsibility

Designs with permanent pools greater than 18 inches in depth are acceptable for Private Maintenance only.

Designs with permanent pools no greater than 18 inches in depth are acceptable for Public Maintenance.

#### Siting Considerations

Designs with permanent pools greater than 18 inches in depth are considered to be wet ponds and are not permitted in residential areas except for regional facilities or where there are no other reasonable options available for compliance with water quality requirements (PFM 6-0301.4) as determined by the Director.

#### Design standards

Fairfax County Public Facilities Manual for basic pond design, maintenance access, dam embankment design, extended detention volume, extended detention drawdown time, and outlet structure design.

*Virginia SWM Handbook* Standard and Specification 3.07 (Extended Detention Basin) for shallow marsh design and marsh volume, Standard and Specification 3.04 (Sediment

Forebay) for sediment forebay design, and Standard and Specification 3.05 (Landscaping) for plant selection and planting specifications.

*Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999) for plantings in areas outside of the shallow marsh and sediment forebay(s).

### Special Design Considerations

Sediment forebays with maintenance access stabilized to provide for passage of heavy equipment must be provided at all discharge points into the facility that account for more than 10% of the drainage area to the facility. Sediment forebays shall be excavated to the extent feasible. If sufficient volume cannot be created by excavation, a rock or gabion berm keyed into the sides of the pond no higher than 2 feet may be used. The top of the berm shall be at or below the permanent pool elevation of the marsh. When constructed in this manner, an overflow section is not required. The volume of the sediment forebay shall be a minimum of 0.1 inch per impervious acre.

Although an onsite area designated for sediment dewatering and disposal is desirable, it is not a requirement.

Designs with permanent pools greater than 18 inches in depth shall be treated as wet ponds for dam safety purposes and embankment design. Designs with permanent pools no greater than 18 inches in depth shall be treated as dry ponds for dam safety purposes and embankment design.

For all publicly maintained facilities, the “Deep Pool” area shall be labeled “Micro Pool” on the design plans and shall be limited to a maximum depth of 18 inches.

For all publicly maintained facilities, the sediment forebay shall be limited to a maximum depth of 18 inches.

All facilities shall incorporate the installation of a concrete sediment apron in front of the riser structure, a galvanized or painted steel BMP plate, and a galvanized or painted steel debris cage in general accordance with the typical details in Plates 3.07-1, 2, 3 & 4.

Because the bottom of the pond is not intended to remain dry between storm events, a trickle ditch is not required.

The extended detention pool elevation should not be more than three feet above the permanent pool elevation of the marsh.

The shallow marsh and sediment forebay(s) shall be planted with a minimum of two different species of wetland plants for each water depth zone. The density of wetland plants shall be 18 inches or less on center. The areas outside of the shallow marsh and sediment forebay(s) shall be planted in accordance with the *Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999).



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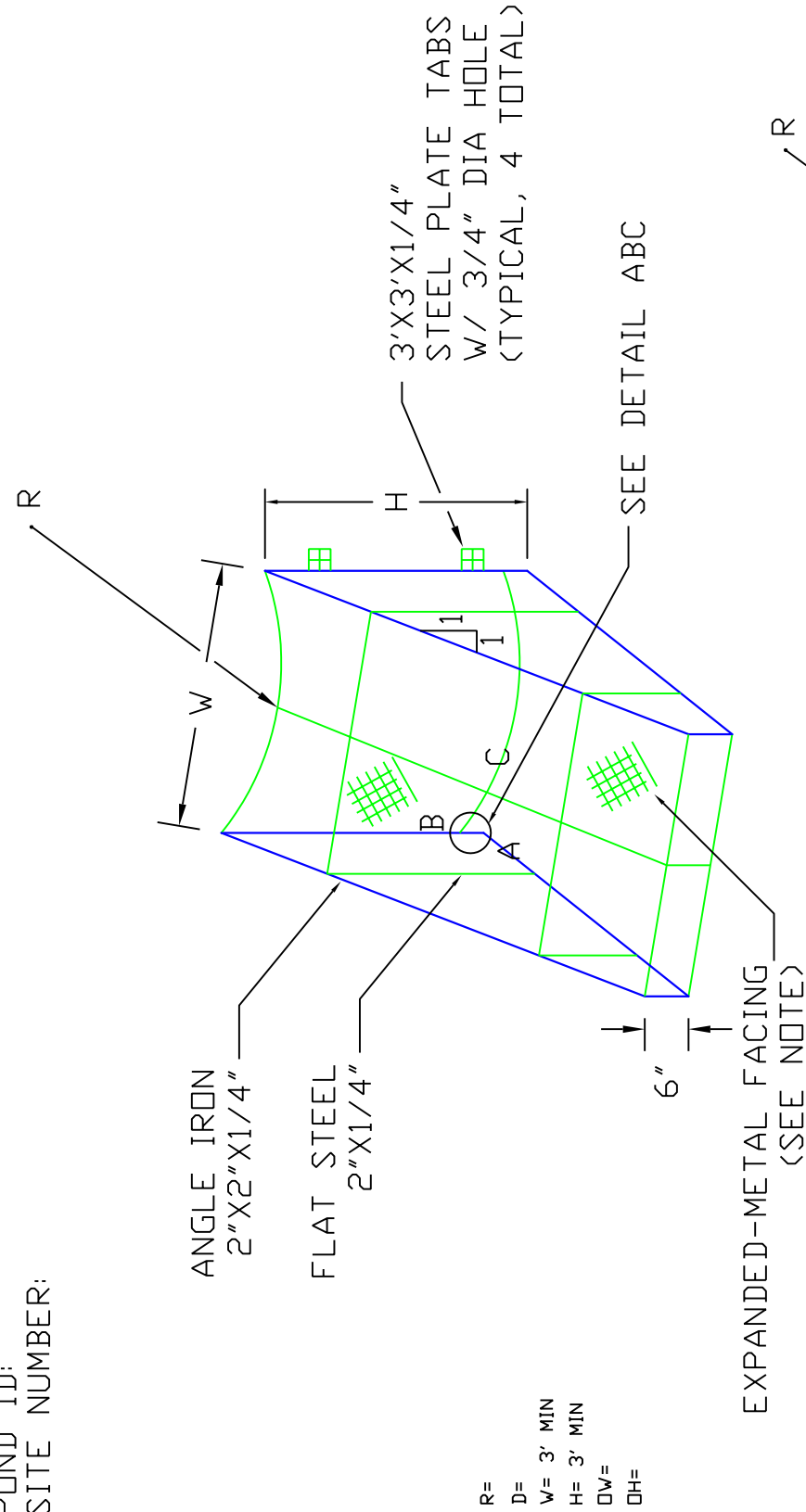
**INNOVATIVE BMP STANDARDS AND SPECIFICATIONS**

**Typical Details  
(Concrete Sediment Apron, BMP Plate & Debris Cage)  
for  
3.07 Enhanced Extended Detention Dry Pond**

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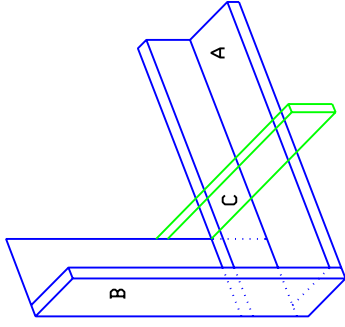
# LOW-FLOW DEBRIS CAGE CIRCULAR RISER

POND NAME:  
POND ID:  
SITE NUMBER:



R=  
D=  
W= 3' MIN  
H= 3' MIN  
OW=  
OH=

DETAIL ABC



3'X3'X1/4"  
STEEL PLATE TABS  
W/ 3/4" DIA HOLE  
(TYPICAL, 4 TOTAL)

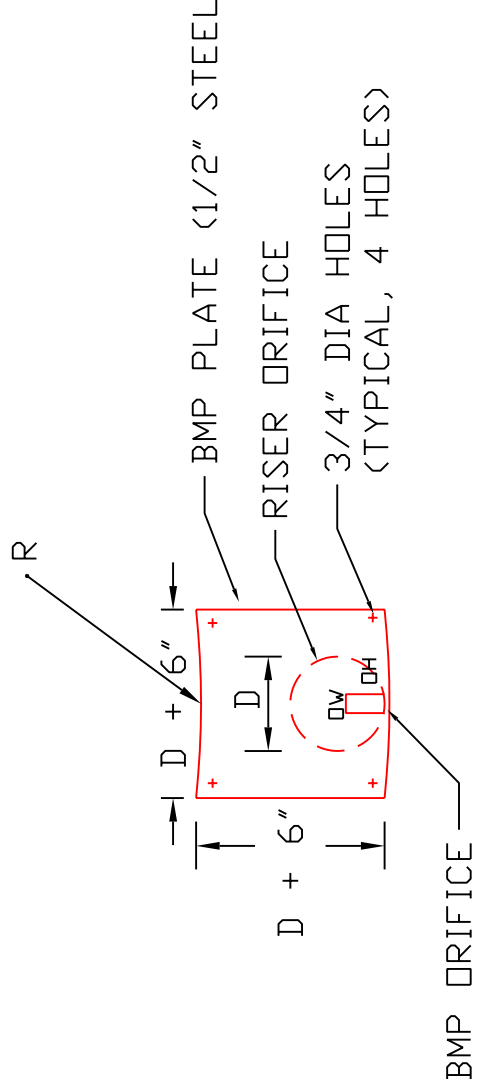
SEE DETAIL ABC

EXPANDED-METAL FACING  
(SEE NOTE)

NOTES:

- 1) ALL STEEL ITEMS SHALL BE GALVANIZED OR PAINTED. IF ITEMS ARE PAINTED, PAINTING SHALL CONSIST OF ONE COAT OF RUST PENETRATING PRIMER AND TWO COATS OF BLACK PAINT
- 2) EXPANDED METAL: 1/2" #20S STANDARD CARBON STEEL (OW<2")  
SWD (SMALL WIDTH OPENING) = 0.438"  
LWD (LARGE WIDTH OPENING) = 0.938"
- 3) EXPANDED METAL: 3/4" #16S STANDARD CARBON STEEL (OW >DR = 2")  
SWD = 0.813"  
LWD = 1.750"

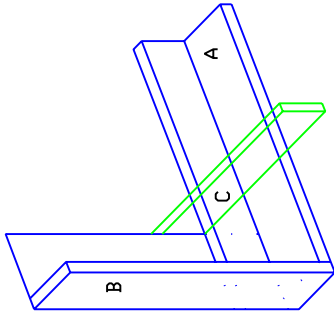
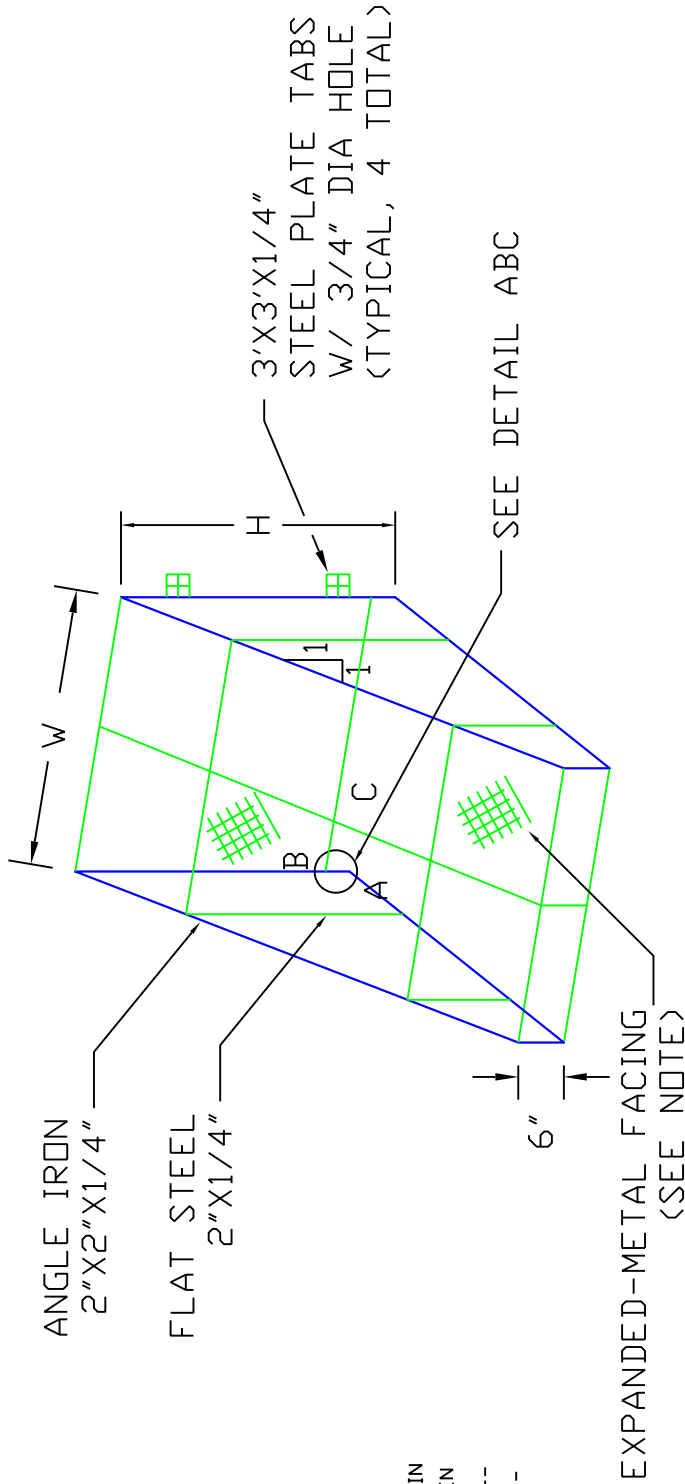
PER MANUFACTURE SPECS BY MCNICHOLS OR EQUIVALENT



BMP ORIFICE

# LOW-FLOW DEBRIS CAGE SQUARE RISER

POND NAME:  
POND ID:  
SITE NUMBER:



DETAIL ABC

R=-----  
D=-----  
W= 3' MIN  
H= 3' MIN  
DW=-----  
DH=-----

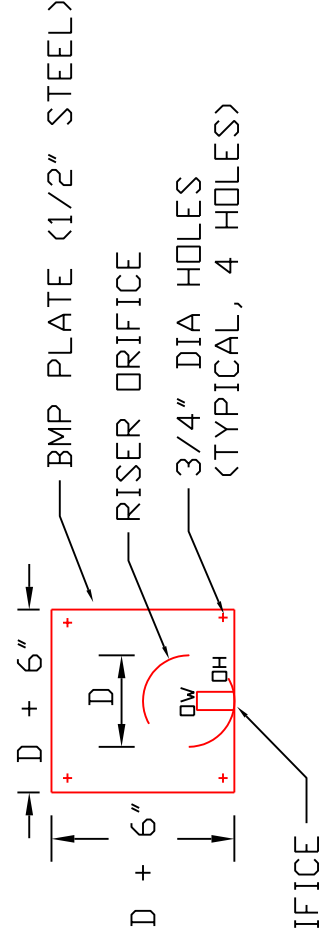
3'X3'X1/4"  
STEEL PLATE TABS  
W/ 3/4" DIA HOLE  
(TYPICAL, 4 TOTAL)

SEE DETAIL ABC

NOTES:

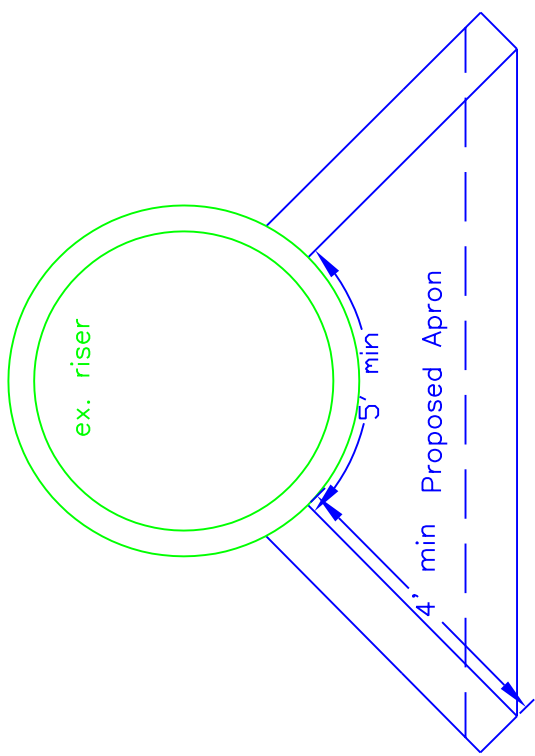
- 1) ALL STEEL ITEMS SHALL BE GALVANIZED OR PAINTED. IF ITEMS ARE PAINTED, PAINTING SHALL CONSIST OF ONE COAT OF RUST PENETRATING PRIMER AND TWO COATS OF BLACK PAINT
- 2) EXPANDED METAL: 1/2" #20S STANDARD CARBON STEEL (DW<2') SWD (SMALL WIDTH OPENING) = 0.438" LWD (LARGE WIDTH OPENING) = 0.938"
- 3) EXPANDED METAL: 3/4" #16S STANDARD CARBON STEEL (DW >OR = 2') SWD = 0.813" LWD = 1.750"

PER MANUFACTURE SPECS BY MCNICHOLS OR EQUIVALENT

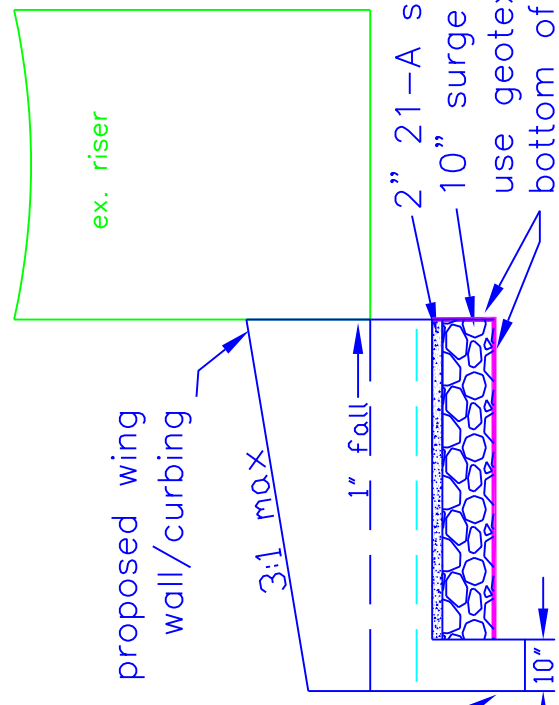


BMP ORIFICE

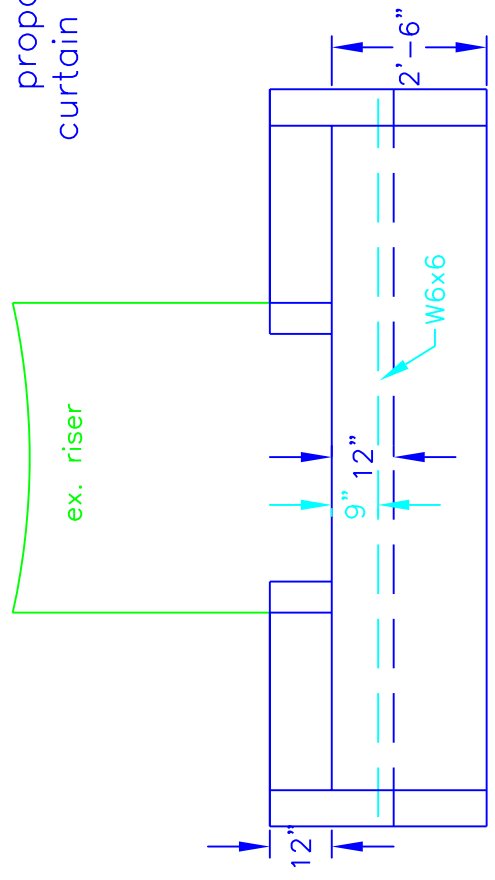
- note: 1) each wingwall shall include two 3" diameter weep holes to relieve hydrostatic pressure
- 2) wingwalls shall be reinforced with #4 steel and shall be dowelled into existing riser structure



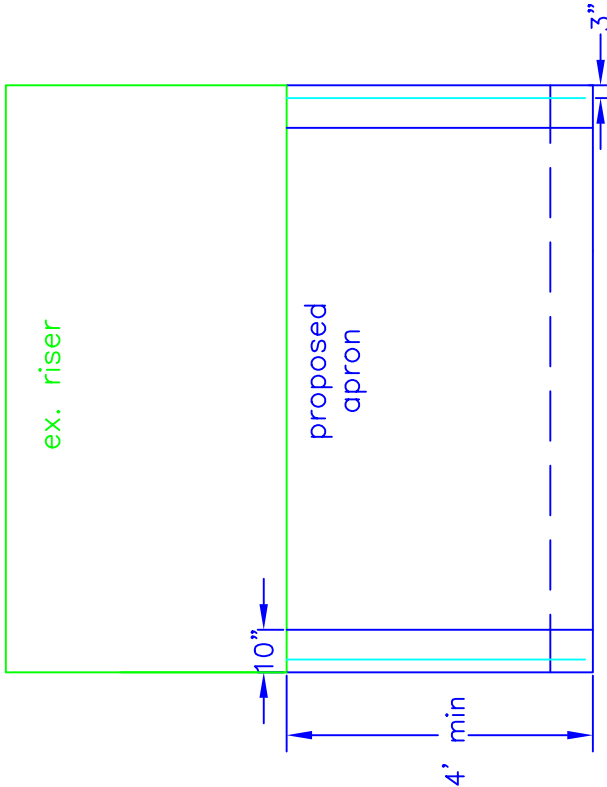
PLAN VIEW



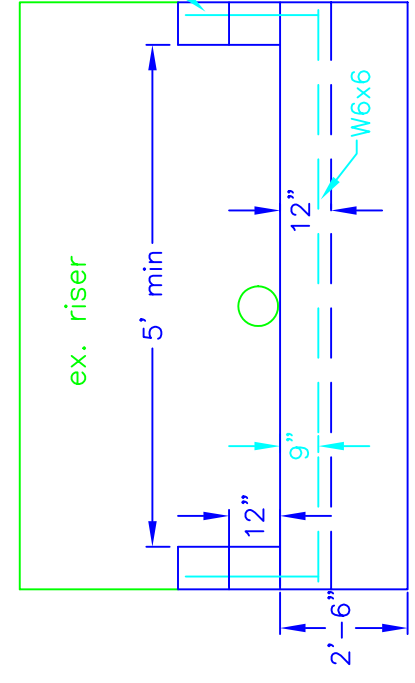
SIDE ELEVATION



FRONT ELEVATION

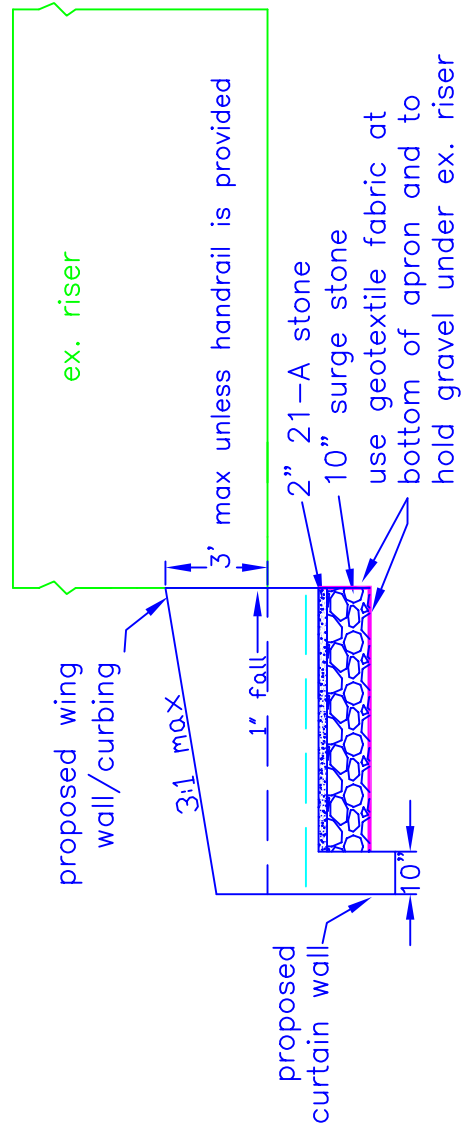


PLAN VIEW



FRONT ELEVATION

- note: 1) each wingwall shall include two 3" diameter weep holes to relieve hydrostatic pressure  
 2) wingwalls shall be reinforced with #4 steel and shall be dowelled into existing riser structure



SIDE ELEVATION

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.09 Constructed Stormwater Wetlands

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Constructed stormwater wetlands are manmade shallow pools that create growing conditions suitable for both emergent and aquatic vegetation. Constructed wetlands are intentionally installed on non-wetland sites to enhance the quality of stormwater runoff. In contrast, *created* wetlands also are intentionally installed on non-wetland sites, but are designed to produce or replace natural functional wetlands and wetland habitats (e.g. for compensatory mitigation projects). For a natural or *created* wetland, pre-treatment BMPs, such as erosion controls, presettling basins, biofilters, etc., are used to reduce pollutants entering the wetland to prevent its degradation and clogging. The primary function of a constructed wetland, on the other hand, is to provide those same types of pre-treatment functions within the wetland itself. The constructed wetland, therefore, will require maintenance to assure long-term pollutant removal.

Phosphorus Removal Efficiency      30%

Maintenance Responsibility

Acceptable for Private Maintenance only

Siting Considerations

Not permitted in residential areas unless there are no other reasonable options available for compliance with water quality requirements (PFM 6-0301.4).

Constructed wetlands shall be located off-line. If an on-line facility is desired, use the enhanced extended detention design that includes a shallow wetland.

Design standards

Fairfax County Public Facilities Manual for basic pond design, maintenance access, dam embankment design, and outlet structure design.

Virginia Stormwater Management Handbook Standard and Specification 3.09 (Constructed Wetlands) for shallow marsh design and marsh volume, Standard and Specification 3.04 (Sediment Forebay) for sediment forebay design, and Standard and Specification 3.05 (Landscaping) for plant selection and planting specifications.

*Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999) for plantings in areas outside of the shallow marsh and sediment forebay(s).

## Special Design Considerations

Sediment forebays with maintenance access stabilized to provide for passage of heavy equipment must be provided at all discharge points into the facility which account for more than 10% of the drainage area to the facility. Sediment forebays shall be excavated to the extent feasible. If sufficient volume cannot be created by excavation, a rock or gabion berm keyed into the sides of the pond no higher than 2 feet may be used. The top of the berm shall be at or below the permanent pool elevation of the marsh. When constructed in this manner, an overflow section is not required. The volume of the sediment forebay shall be a minimum of 0.1 inch per impervious acre.

Although an onsite area designated for sediment dewatering and disposal is desirable, it is not a requirement.

Treated as a wet pond for dam safety purposes and embankment design.

This constructed wetland design is only for water quality control. If detention is to be included in the same facility with the constructed wetland, use the enhanced extended detention design that includes a shallow wetland.

The marsh areas and sediment forebay(s) shall be planted with a minimum of two different species of wetland plants for each water depth zone. The density of wetland plants shall be 18 inches or less on center.

The areas outside of the shallow marsh and sediment forebay(s) shall be planted in accordance with the *Interim Policy Regarding Tree Preservation & Planting in and Around Stormwater Management Ponds* (Adopted by the Fairfax County Board of Supervisors on March 8, 1999).

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.11 Bioretention Basin (Rain Garden)

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Bioretention basins (Rain Gardens) are planting areas installed in shallow basins in which stormwater runoff is treated by filtering through the bed components, biological and biochemical reactions within the soil matrix and around the root zones of the plants, and infiltration into the underlying soil strata. Properly constructed bioretention areas replicate the ecosystem of an upland forest floor through the use of specific shrubs, trees, ground covers, mulches and deep, rich soils.

#### Phosphorus Removal Efficiency

50% (Capture and treatment volume equal to 0.5 inches of runoff from the impervious area.)

65% (Capture and treatment volume equal to 1.0 inches of runoff from the impervious area.)

#### Maintenance

Acceptable for Private Maintenance only

#### Location

Not permitted in high visibility areas or residential areas except that facilities are permitted to be located on individual buildable single family detached lots for non-bonded lot grading plans.

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Facilities shall be located off-line.

#### Design standards

Fairfax County Public Facilities Manual for maintenance access for facilities constructed to satisfy Subdivision Ordinance or Site Plan regulations.

Virginia Stormwater Management Handbook Standard and Specification 3.11 (Bioretention) for overall design and sizing.

#### Special Design Considerations



Infiltration test required. A minimum of one soil boring log and infiltration test is required for every 50 feet of basin length with a minimum of two infiltration tests per facility except that facilities located on individual buildable single family detached lots for non-bonded lot grading plans in areas of SCS hydrologic soils groups A & B may be constructed without an infiltration test.

May not be used where a Bioretention Filter (3.11A) equipped with an underdrain system can be connected to a storm sewer system or daylighted except for individual buildable single family detached lots for non-bonded lot grading plans.

As performance of the system relies on eventual infiltration into the underlying soil, one observation well is required for every 50 feet of basin length. The observation well(s) shall consist of perforated PVC pipe, 4 to 6 inches in diameter. The observation well(s) shall be placed in the center of the basin and capped to prevent vandalism.

Use of the Upflow Inlet for Bioretention Basin illustrated in Figure 3.11-6 of the Virginia Stormwater Management Handbook is not permitted. This is actually an example of a Rock-Plant Stormwater Filter and not a Bioretention Basin. Design parameters for Rock-Plant Stormwater Filters are not provided in the Virginia Stormwater Management Handbook and have not been evaluated for use in Fairfax County.

Berms used to create the basin shall not be greater than two feet in height measured from the downstream toe-of-slope to the top of the berm and will not be subject to compliance with the dam standards. However, a trapezoidal overflow weir shall be constructed in the berm to carry the 100-year storm without overtopping the berm.

Pretreatment and level spreaders shall be provided where inflow to the facility is concentrated in accordance with the Virginia Stormwater Management Handbook.

Precise grading of the basin is critical to capturing the water quality volume and operation of the facility. The construction plan shall have a contour interval of no more than one foot, and spot elevations shall be shown throughout the basin. The perimeter contour elevation shall contain the design storm without overtopping anywhere except at the outflow structure.

All facilities shall include signage indicating they are water quality management areas, may pond water after a storm, and are not to be disturbed except for required maintenance activities.

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.11A Bioretention Filters (Rain Garden)

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Bioretention Filters (Rain Gardens) are planting areas installed in shallow basins in which stormwater runoff is treated by filtering through the bed components, biological and biochemical reactions within the soil matrix and around the root zones of the plants, and infiltration into the underlying soil strata. Properly constructed bioretention areas replicate the ecosystem of an upland forest floor through the use of specific shrubs, trees, ground covers, mulches and deep, rich soils. Bioretention filters are essentially bioretention basins with an underdrain connected to a storm sewer system or daylighted.

#### Phosphorus Removal Efficiency

50% (Capture and treatment volume equal to 0.5 inches of runoff from the impervious area.)

65% (Capture and treatment volume equal to 1.0 inches of runoff from the impervious area.)

#### Maintenance

Acceptable for Private Maintenance only

#### Location

Facilities constructed to satisfy Subdivision Ordinance or Site Plan regulations shall not be located on individual buildable single family detached or attached lots or any part thereof (See PFM 6-0303.9 for additional details). The grass buffer strip which provides filtering of coarse sediments is an integral part of the facility and subject to this requirement. Facilities are permitted to be located on individual buildable single family detached lots for non-bonded lot grading plans.

Facilities shall be located off-line.

#### Design standards

Fairfax County Public Facilities Manual for maintenance access.

Virginia Stormwater Management Handbook Standard and Specification 3.11A (Bioretention) for overall design and sizing.

#### Special Design Considerations

Use of the Upflow Inlet for Bioretention Basin illustrated in Figure 3.11-6 of the Virginia Stormwater Management Handbook is not permitted. This is actually an example of a Rock-Plant Stormwater Filter and not a Bioretention Filter. Design parameters for Rock-Plant Stormwater Filters are not provided in the Virginia Stormwater Management Handbook and have not been evaluated for use in Fairfax County.

Berms used to create the basin shall not be greater than two feet in height measured from the downstream toe-of-slope to the top of the berm and will not be subject to compliance with the dam standards. However, a trapezoidal overflow weir shall be constructed in the berm to carry the 100-year storm without overtopping the berm.

Pretreatment and level spreaders shall be provided where inflow to the facility is concentrated in accordance with the Virginia Stormwater Management Handbook.

Precise grading of the basin is critical to capturing the water quality volume and operation of the facility. The construction plan shall have a contour interval of no more than one foot, and spot elevations shall be shown throughout the basin. The perimeter contour elevation shall contain the design storm without overtopping anywhere except at the outflow structure.

All facilities shall include signage indicating they are water quality management areas and are not to be disturbed except for required maintenance activities.

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.13 Grassed Swale/Water Quality Swale

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A grassed swale is a broad and shallow earthen channel vegetated with erosion resistant and flood tolerant grasses. Check dams are strategically placed in the swale to encourage ponding behind them.

A water quality swale is a broad and shallow earthen channel vegetated with erosion resistant and flood tolerant grasses, and underlain by an engineered soil mixture.

Phosphorus Removal Efficiency      Grassed Swale 15%

Water Quality Swale 35%

#### Maintenance

Acceptable for Private Maintenance only. Grassed swales and water quality swales shall be accessible for maintenance. Proposed maintenance access shall be shown on plans and shall not be through individual residential lots unless access easements are granted to the HOA or other entity responsible for maintenance.

#### Location

Facilities constructed to satisfy Subdivision Ordinance or Site Plan regulations shall not be located on individual buildable single family detached or attached lots or any part thereof (See PFM 6-0303.9 for additional details). Facilities are permitted to be located on individual buildable single family detached lots for non-bonded lot grading plans.

#### Design standards

Virginia Stormwater Management Handbook Standard and Specification 3.13 for overall design and sizing.

#### Special Design Considerations

VDOT No. 57 Open Graded Coarse Aggregate may be used in place of VDOT No. 8 Coarse Graded Aggregate.

In the absence of a permeability test demonstrating a permeability of 0.27 inches per hour or greater, only SCS hydrologic group A and B soils may be used for grassed swales.

Grassed swales and water quality swales may not be located in the VDOT R/W or County easements.

All facilities shall include signage indicating they are water quality management areas and the check dams are not to be removed.

Check dams or CMP weirs shall not be placed at the upstream entrance to culverts including driveway culverts and the backwater from check dams shall not extend into culverts including driveway culverts.

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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.14 Vegetated Filter Strip

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A vegetated filter strip is a densely vegetated strip of land engineered to accept runoff from upstream development as overland sheet flow. It may adopt any naturally vegetated form, from grassy meadow to small forest.

Phosphorus Removal Efficiency      10%

#### Maintenance

Acceptable for Private Maintenance only. Vegetated Filter Strips shall be accessible for maintenance. Proposed maintenance access shall be shown on plans and shall not be through individual residential lots unless access easements are granted to the HOA or other entity responsible for maintenance.

#### Location

Facilities constructed to satisfy Subdivision Ordinance or Site Plan regulations shall not be located on individual buildable single family detached or attached lots or any part thereof (See PFM 6-0303.9 for additional details). Facilities are permitted to be located on individual buildable single family detached lots for non-bonded lot grading plans.

#### Design standards

Virginia Stormwater Management Handbook Standard and Specification 3.14 for overall design and sizing.

#### Special Design Considerations

All facilities shall include signage indicating they are water quality management areas and are not to be disturbed except for required maintenance.

Grass used in the filter strip shall be kept at a height of 6-12 inches.

In the absence of a permeability test demonstrating a permeability of 0.54 inches per hour or greater, only SCS hydrologic group A and B soils may be used. The use of a berm along the lower edge of the filter strip to create temporary ponding conditions is not permitted.

Slope of the filter in the direction of flow must be 5% or less.

Level spreaders are required for all filter strips.



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## INNOVATIVE BMPS STANDARDS AND SPECIFICATIONS

### 3.15 Manufactured BMP Systems

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#### Phosphorus Removal Efficiency

Hydrodynamic Structures 15%  
(Stormceptor, Vortechs, Downstream Defender, BaySaver)

Filtering Structures 50%  
(StormFilter, StormTreat System)

#### Maintenance Responsibility

Acceptable for Private Maintenance only

#### Siting

Not permitted in residential areas.

#### Design standards

Fairfax County Public Facilities Manual for maintenance access.

#### Special Design Considerations

##### Stormfilter

Use of leaf mulch for Stormfilter cartridges not permitted.

The sizing of the Stormfilter shall be based on the manufacturer's recommendation for a flow-based system (24-hour 0.88 inch storm using a Type 2 SCS rainfall distribution with a peak flow generated by the Santa Barbara Urban Hydrograph).



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**MAINTENANCE SPECIFICATIONS FOR INNOVATIVE BMPS TO BE ATTACHED  
TO STANDARD PRIVATE DETENTION AGREEMENTS**

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## ATTACHMENT A

### RETENTION BASIN III (Wet Pond with Sediment Forebay and Aquatic Bench) MAINTENANCE SPECIFICATIONS

- 1) Retention Basin(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Retention Basin(s) and appurtenances shall be privately owned and maintained.
- 3) Retention Basin(s) and appurtenances shall be inspected annually by a qualified individual to ensure that they operate in good working condition acceptable to the County. Inspections shall be performed following a mowing and brush removal operation. Items in need of repair shall be promptly addressed. Detailed inspections shall include the following items:
  - Settling of the dam embankment or evidence of movement within the dam embankment or at the abutments
  - Signs of seepage or piping on the downstream face of the dam embankment
  - Condition of grass cover on the dam embankment, emergency spillway and perimeter
  - Growth of trees or underbrush on the dam embankment or in the emergency spillway
  - Evidence of heavy pedestrian and/or vehicular traffic on the dam embankment or emergency spillway
  - Animal burrows or wave action damage along the dam embankment
  - Riprap displacement or failure
  - Principal and emergency spillway meet design plans for operation
  - Outlet controls, debris racks and mechanical and electrical equipment
  - Outlet channel conditions
  - Inlet pipe conditions
  - Safety features of the facility
  - Access for maintenance equipment
  - Sediment accumulation
  - Debris and trash accumulation
  - Erosion of the dam embankment or side slopes
  - Disturbance of any areas within conservation easements which are intended to be left “natural” or in an undisturbed condition
  - Species distribution/survival for wetland plantings and other vegetation shown on the design plans essential to the pollutant removal capability of the facility.

The dam inspection checklist provided by the Virginia Division of Soil and Water Conservation in the publication entitled “Safety Evaluation of Small Dams” or an inspection checklist approved by the County (Maintenance and Stormwater Management Division) also shall be used when making annual dam inspections.

- 4) The dam embankment and emergency spillway (including the entry and exit channels) shall be mowed at least twice during the Spring, at least once during the Summer, and at least twice during the Fall to discourage woody growth with the last cutting occurring at the end of the growing season. The grass should not be cut less than 6 to 8 inches in height.
- 5) If necessary, the dam embankment and emergency spillway shall be limed, fertilized and seeded in the fall, after the growing season. Lime and fertilizer application rates shall be based on soil test results. The type of seed shall be consistent with that originally specified on the construction plans.
- 6) All erosion gullies noted during the growing season shall be backfilled with topsoil, reseeded and protected (mulched) until vegetation is established.
- 7) All bare areas and pathways on the dam embankment shall be promptly seeded and protected (mulched) or otherwise stabilized to eliminate the potential for erosion.

- 8) All animal burrows shall be backfilled and compacted. Measures shall be taken to remove the animals from the area.
- 9) All trees, woody vegetation and other deep-rooted growth, including stumps and associated root systems, shall be removed from the dam embankment and adjacent areas extending to at least 10 feet beyond the embankment toe and abutment contacts. The root systems shall be extracted and the excavated volume replaced and compacted with material similar to the surrounding area. All seedlings shall be removed at the first opportunity. Similarly, any vine cover and brush shall be removed from the dam embankment to allow for proper and complete inspections.
- 13) Debris and litter that accumulates near the inflow points and around the outlet control structure shall be removed periodically and whenever there is significant blockage of the outlet control structure.
- 14) Concrete spillway structures such as outlet conduits, risers, weir structures, etc., shall be inspected during low water conditions to determine if water is passing through any joints or other structure contacts. Concrete spillway structures shall be checked for cracks, spalling, and broken or loose sections. Any cracked, spalled, broken or loose sections shall be cleaned and refilled with an appropriate concrete patching material. A professional engineer shall be consulted for repair of extensive leakage, spalls or fractures and his recommendations shall be followed. Any repairs made to the principal spillway riser or outlet conduit other than routine maintenance (e.g. cleaning, parging, etc.) shall be inspected by a professional engineer. Vertical trenching to expose the outlet conduit shall not be allowed under any circumstances. The trench side slopes shall be stepped back at a minimum 2:1 slope.
- 15) Stilling basins and discharge channels shall be cleared of brush at least once per year.
- 16) Trash racks and locking mechanisms shall be inspected and tested at least once per year to make sure they are intact and operative.
- 17) After any flow has passed through the emergency spillway, the spillway crest (control section) and exit channel shall be inspected for erosion. All eroded areas shall be repaired and stabilized.
- 18) All sluice gates (or other types of gates or valves used to drain an impoundment) shall be operated at least once per year to insure proper function. The gate and stem shall be lubricated at least once per year and all exposed metal shall be painted to protect it from corrosion.
- 19) Toe drains or other internal drainage outlets shall be cleared of debris, brush, and silt at least once per year to allow and ensure the free flow of water.
- 20) Areas designated for maintenance access shall be kept free of plantings, fences, or other obstructions except for standard access road gates to prevent unauthorized vehicular access.
- 21) Accumulated sediment shall be removed from the sediment forebay(s) every 3 to 5 years, or when 6 to 12 inches have accumulated, whichever comes first. Sediment forebay(s) shall be restored to their original volume. The volume of accumulated sediment in the main cells of the pond shall be measured once every ten years. Accumulated sediment shall be removed from the main cells of the pond when the original volume has been reduced by 30%. The main cells of the pond shall be restored to their original volume. To clean the forebay and the main cells of the pond, draining or pumping and a possible temporary partial drawdown of the pool area may be required. Sediment removal, pumping of standing water and dewatering of dredged sediments shall be performed in a manner which protects water quality and in accordance with Virginia Department of Conservation and Recreation regulations and County requirements.
- 22) Whenever sediment has been removed from the forebay(s), the forebay(s) shall be replanted in accordance with the original construction specifications.
- 23) A reinforcement planting for the wetland plantings and other vegetation shown on the design plans, essential to the pollutant removal capability of the facility, shall be scheduled at the onset of the second growing season after construction and at the onset of the second growing season

after removal of sediment from the forebay(s). The size and species for the reinforcement plantings shall be based on an inspection of the growth and survival of the plantings at the end of the first growing season.

24) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### EXTENDED DETENTION DRY POND (with Sediment Trap) MAINTENANCE SPECIFICATIONS

- 1) Extended Detention Dry Pond(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Extended Detention Dry Pond(s) and appurtenances shall be privately owned and maintained.
- 3) Extended Detention Dry Pond(s) and appurtenances shall be inspected annually by a qualified individual to ensure that they operate in good working condition acceptable to the County. Inspections shall be performed following a mowing and brush removal operation. Items in need of repair shall be promptly addressed. Detailed inspections shall include the following items:
  - Settling of the dam embankment or evidence of movement within the dam embankment or at the abutments
  - Signs of seepage or piping on the downstream face of the dam embankment
  - Condition of grass cover on the dam embankment, emergency spillway, basin floor, and perimeter
  - Growth of trees or underbrush on the dam embankment or in the emergency spillway
  - Evidence of heavy pedestrian and/or vehicular traffic on the dam embankment or emergency spillway
  - Animal burrows or wave action damage along the dam embankment
  - Riprap displacement or failure
  - Principal and emergency spillway meet design plans for operation
  - Outlet controls, debris racks and mechanical and electrical equipment
  - Outlet channel conditions
  - Inlet pipe conditions
  - Safety features of the facility
  - Access for maintenance equipment
  - Sediment accumulation
  - Debris and trash accumulation
  - Erosion of the dam embankment or side slopes
  - Disturbance of any areas within conservation easements which are intended to be left “natural” or in an undisturbed condition
  - Species distribution/survival for wetland plantings and other vegetation shown on the design plans essential to the pollutant removal capability of the facility
  - Filter stone for the sediment trap.

The dam inspection checklist provided by the Virginia Division of Soil and Water Conservation in the publication entitled “Safety Evaluation of Small Dams” or an inspection checklist approved by the County (Maintenance and Stormwater Management Division) also shall be used when making annual dam inspections.

- 4) The dam embankment and emergency spillway (including the entry and exit channels) shall be mowed at least twice during the Spring, at least once during the Summer, and at least twice during the Fall to discourage woody growth with the last cutting occurring at the end of the growing season. The grass should not be cut less than 6 to 8 inches in height.
- 5) If necessary, the dam embankment and emergency spillway shall be limed, fertilized and seeded in the fall, after the growing season. Lime and fertilizer application rates shall be based on soil test results. The type of seed shall be consistent with that originally specified on the construction plans.
- 6) All erosion gullies noted during the growing season shall be backfilled with topsoil, reseeded and protected (mulched) until vegetation is established.

- 7) All bare areas and pathways on the dam embankment shall be promptly seeded and protected (mulched) or otherwise stabilized to eliminate the potential for erosion.
- 8) All animal burrows shall be backfilled and compacted. Measures shall be taken to remove the animals from the area.
- 9) All trees, woody vegetation and other deep-rooted growth, including stumps and associated root systems, shall be removed from the dam embankment and adjacent areas extending to at least 10 feet beyond the embankment toe and abutment contacts. The root systems shall be extracted and the excavated volume replaced and compacted with material similar to the surrounding area. All seedlings shall be removed at the first opportunity. Similarly, any vine cover and brush shall be removed from the dam embankment to allow for proper and complete inspections.
- 13) Debris and litter that accumulates near the inflow points and around the outlet control structure shall be removed periodically and whenever there is significant blockage of the outlet control structure.
- 14) Concrete spillway structures such as outlet conduits, risers, weir structures, etc., shall be inspected during low water conditions to determine if water is passing through any joints or other structure contacts. Concrete spillway structures shall be checked for cracks, spalling, and broken or loose sections. Any cracked, spalled, broken or loose sections shall be cleaned and refilled with an appropriate concrete patching material. A professional engineer shall be consulted for repair of extensive leakage, spalls or fractures and his recommendations shall be followed. Any repairs made to the principal spillway riser or outlet conduit other than routine maintenance (e.g. cleaning, parging, etc.) shall be inspected by a professional engineer. Vertical trenching to expose the outlet conduit shall not be allowed under any circumstances. The trench side slopes shall be stepped back at a minimum 2:1 slope.
- 15) Stilling basins and discharge channels shall be cleared of brush at least once per year.
- 16) Trash racks and locking mechanisms shall be inspected and tested at least once per year to make sure they are intact and operative.
- 17) After any flow has passed through the emergency spillway, the spillway crest (control section) and exit channel shall be inspected for erosion. All eroded areas shall be repaired and stabilized.
- 18) Toe drains or other internal drainage outlets shall be cleared of debris, brush, and silt at least once per year to allow and ensure the free flow of water.
- 19) Areas designated for maintenance access shall be kept free of plantings, fences, or other obstructions except for standard access road gates to prevent unauthorized vehicular access.
- 20) Accumulated sediment shall be removed and the sediment trap(s) restored to its original dimensions every 3 to 5 years, or when sediment has accumulated to one half the design volume of the wet storage, whichever comes first. To clean the sediment trap(s), draining or pumping and a possible temporary partial drawdown of the pool area may be required. Sediment removal, pumping of standing water and dewatering of dredged sediments shall be performed in a manner which protects water quality and in accordance with Virginia Department of Conservation and Recreation regulations and County requirements.
- 21) Whenever sediment has been removed from the sediment trap(s), the sediment trap(s) shall be replanted in accordance with the original construction specifications.
- 22) A reinforcement planting for the wetland plantings and other vegetation shown on the design plans, essential to the pollutant removal capability of the facility, shall be scheduled at the onset of the second growing season after construction and at the onset of the second growing season after removal of sediment from the trap(s). The size and species for the reinforcement plantings shall be based on an inspection of the growth and survival of the plantings at the end of the first growing season.

23) The filter stone of the sediment trap(s) shall be checked to ensure that filtration performance is maintained. Stone choked with sediment shall be removed and cleaned or replaced.

24) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### ENHANCED EXTENDED DETENTION DRY POND (with Sediment Forebay and Shallow Marsh) MAINTENANCE SPECIFICATIONS

- 1) Enhanced Extended Detention Dry Pond(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Enhanced Extended Detention Dry Pond(s) and appurtenances shall be privately owned and maintained.
- 3) Enhanced Extended Detention Dry Pond(s) and appurtenances shall be inspected annually by a qualified individual to ensure that they operate in good working condition acceptable to the County. Items in need of repair shall be promptly addressed. Detailed inspections shall include the following items:
  - Settling of the dam embankment or evidence of movement within the dam embankment or at the abutments
  - Signs of seepage or piping on the downstream face of the dam embankment
  - Condition of grass cover on the dam embankment, emergency spillway, and perimeter
  - Growth of trees or underbrush on the dam embankment or in the emergency spillway
  - Evidence of heavy pedestrian and/or vehicular traffic on the dam embankment or emergency spillway
  - Animal burrows or wave action damage along the dam embankment
  - Riprap displacement or failure
  - Principal and emergency spillway meet design plans for operation
  - Outlet controls, debris racks and mechanical and electrical equipment
  - Outlet channel conditions
  - Inlet pipe conditions
  - Safety features of the facility
  - Access for maintenance equipment
  - Sediment accumulation
  - Debris and trash accumulation
  - Erosion of the dam embankment or side slopes
  - Disturbance of any areas within conservation easements which are intended to be left “natural” or in an undisturbed condition
  - Species distribution/survival for wetland plantings and other vegetation shown on the design plans essential to the pollutant removal capability of the facility
  - Filter stone for the sediment trap.

The dam inspection checklist provided by the Virginia Division of Soil and Water Conservation in the publication entitled “Safety Evaluation of Small Dams” or an inspection checklist approved by the County (Maintenance and Stormwater Management Division) also shall be used when making annual dam inspections.

- 4) The dam embankment and emergency spillway (including the entry and exit channels) shall be mowed at least twice during the Spring, at least once during the Summer, and at least twice during the Fall to discourage woody growth with the last cutting occurring at the end of the growing season. The grass should not be cut less than 6 to 8 inches in height.
- 5) If necessary, the dam embankment and emergency spillway shall be limed, fertilized and seeded in the fall, after the growing season. Lime and fertilizer application rates shall be based on soil test results. The type of seed shall be consistent with that originally specified on the construction plans.
- 6) All erosion gullies noted during the growing season shall be backfilled with topsoil, reseeded and protected (mulched) until vegetation is established.
- 7) All bare areas and pathways on the dam embankment shall be promptly seeded and protected (mulched) or otherwise stabilized to eliminate the potential for erosion.



8) All animal burrows shall be backfilled and compacted. Measures shall be taken to remove the animals from the area.

9) All trees, woody vegetation and other deep-rooted growth, including stumps and associated root systems, shall be removed from the dam embankment and adjacent areas extending to at least 10 feet beyond the embankment toe and abutment contacts. The root systems shall be extracted and the excavated volume replaced and compacted with material similar to the surrounding area. All seedlings shall be removed at the first opportunity. Similarly, any vine cover and brush shall be removed from the dam embankment to allow for proper and complete inspections.

13) Debris and litter that accumulates near the inflow points and around the outlet control structure shall be removed periodically and whenever there is significant blockage of the outlet control structure.

14) Concrete spillway structures such as outlet conduits, risers, weir structures, etc., shall be inspected during low water conditions to determine if water is passing through any joints or other structure contacts. Concrete spillway structures shall be checked for cracks, spalling, and broken or loose sections. Any cracked, spalled, broken or loose sections shall be cleaned and refilled with an appropriate concrete patching material. A professional engineer shall be consulted for repair of extensive leakage, spalls or fractures and his recommendations shall be followed. Any repairs made to the principal spillway riser or outlet conduit other than routine maintenance (e.g. cleaning, parging, etc.) shall be inspected by a professional engineer. Vertical trenching to expose the outlet conduit shall not be allowed under any circumstances. The trench side slopes shall be stepped back at a minimum 2:1 slope.

15) Stilling basins and discharge channels shall be cleared of brush at least once per year.

16) Trash racks and locking mechanisms shall be inspected and tested at least once per year to make sure they are intact and operative.

17) After any flow has passed through the emergency spillway, the spillway crest (control section) and exit channel shall be inspected for erosion. All eroded areas shall be repaired and stabilized.

18) All sluice gates (or other types of gates or valves used to drain an impoundment) shall be operated at least once per year to insure proper function. The gate and stem shall be lubricated at least once per year and all exposed metal shall be painted to protect it from corrosion.

19) Toe drains or other internal drainage outlets shall be cleared of debris, brush, and silt at least once per year to allow and ensure the free flow of water.

20) Areas designated for maintenance access shall be kept free of plantings, fences, or other obstructions except for standard access road gates to prevent unauthorized vehicular access.

21) Accumulated sediment shall be removed from the sediment forebay(s) every 3 to 5 years, or when 6 to 12 inches have accumulated, whichever comes first. Sediment forebay(s) shall be restored to their original volume. The volume of accumulated sediment in the main cells of the wetland shall be measured once every ten years. Accumulated sediment shall be removed from the main cells of the wetland when the original volume has been reduced by 30%. The main cells of the wetland shall be restored to their original volume. To clean the forebay and the main cells of the wetland, draining or pumping and a possible temporary partial drawdown of the pool area may be required. Sediment removal, pumping of standing water and dewatering of dredged sediments shall be performed in a manner which protects water quality and in accordance with Virginia Department of Conservation and Recreation regulations and County requirements.

22) Whenever sediment has been removed from the sediment forebay(s) or wetland cell(s), the sediment forebay(s) and wetland cell(s) shall be replanted in accordance with the original construction specifications.

23) A reinforcement planting for the wetland plantings and other vegetation shown on the design plans, essential to the pollutant removal capability of the facility, shall be scheduled at the onset of the second growing season after construction and at the onset of the second growing season after removal of sediment from the forebay(s) or wetland cell(s). The size and species for the reinforcement plantings shall be based on an inspection of the growth and survival of the plantings at the end of the first growing season.

24) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### CONSTRUCTED WETLANDS MAINTENANCE SPECIFICATIONS

1) Constructed Wetland(s) and appurtenances shall be maintained in good working condition acceptable to the County.

2) The Constructed Wetland(s) and appurtenances shall be privately owned and maintained.

3) Constructed Wetland(s) and appurtenances shall be inspected annually by a qualified individual to ensure that they operate in good working condition acceptable to the County. Items in need of repair shall be promptly addressed. Detailed inspections shall include the following items:

- Settling of the dam embankment or evidence of movement within the dam embankment or at the abutments
- Signs of seepage or piping on the downstream face of the dam embankment
- Condition of grass cover on the dam embankment, emergency spillway, and perimeter
- Growth of trees or underbrush on the dam embankment or in the emergency spillway
- Evidence of heavy pedestrian and/or vehicular traffic on the dam embankment or emergency spillway
- Animal burrows or wave action damage along the dam embankment
- Riprap displacement or failure
- Principal and emergency spillway meet design plans for operation
- Outlet controls, debris racks and mechanical and electrical equipment
- Outlet channel conditions
- Inlet pipe conditions
- Safety features of the facility
- Access for maintenance equipment
- Sediment accumulation
- Debris and trash accumulation
- Erosion of the dam embankment or side slopes
- Disturbance of any areas within conservation easements which are intended to be left “natural” or in an undisturbed condition
- Species distribution/survival for wetland plantings and other vegetation shown on the design plans essential to the pollutant removal capability of the facility
- Filter stone for the sediment trap.

The dam inspection checklist provided by the Virginia Division of Soil and Water Conservation in the publication entitled “Safety Evaluation of Small Dams” or an inspection checklist approved by the County (Maintenance and Stormwater Management Division) also shall be used when making annual dam inspections.

4) The dam embankment and emergency spillway (including the entry and exit channels) shall be mowed at least twice during the Spring, at least once during the Summer, and at least twice during the Fall to discourage woody growth with the last cutting occurring at the end of the growing season. The grass should not be cut less than 6 to 8 inches in height.

5) If necessary, the dam embankment and emergency spillway shall be limed, fertilized and seeded in the fall, after the growing season. Lime and fertilizer application rates shall be based on soil test results. The type of seed shall be consistent with that originally specified on the construction plans.

6) All erosion gullies noted during the growing season shall be backfilled with topsoil, reseeded and protected (mulched) until vegetation is established.

7) All bare areas and pathways on the dam embankment shall be promptly seeded and protected (mulched) or otherwise stabilized to eliminate the potential for erosion.

- 8) All animal burrows shall be backfilled and compacted. Measures shall be taken to remove the animals from the area.
- 9) All trees, woody vegetation and other deep-rooted growth, including stumps and associated root systems, shall be removed from the dam embankment and adjacent areas extending to at least 10 feet beyond the embankment toe and abutment contacts. The root systems shall be extracted and the excavated volume replaced and compacted with material similar to the surrounding area. All seedlings shall be removed at the first opportunity. Similarly, any vine cover and brush shall be removed from the dam embankment to allow for proper and complete inspections.
- 13) Debris and litter that accumulates near the inflow points and around the outlet control structure shall be removed periodically and whenever there is significant blockage of the outlet control structure.
- 14) Concrete spillway structures such as outlet conduits, risers, weir structures, etc., shall be inspected during low water conditions to determine if water is passing through any joints or other structure contacts. Concrete spillway structures shall be checked for cracks, spalling, and broken or loose sections. Any cracked, spalled, broken or loose sections shall be cleaned and refilled with an appropriate concrete patching material. A professional engineer shall be consulted for repair of extensive leakage, spalls or fractures and his recommendations shall be followed. Any repairs made to the principal spillway riser or outlet conduit other than routine maintenance (e.g. cleaning, parging, etc.) shall be inspected by a professional engineer. Vertical trenching to expose the outlet conduit shall not be allowed under any circumstances. The trench side slopes shall be stepped back at a minimum 2:1 slope.
- 15) Stilling basins and discharge channels shall be cleared of brush at least once per year.
- 16) Trash racks and locking mechanisms shall be inspected and tested at least once per year to make sure they are intact and operative.
- 17) After any flow has passed through the emergency spillway, the spillway crest (control section) and exit channel shall be inspected for erosion. All eroded areas shall be repaired and stabilized.
- 18) All sluice gates (or other types of gates or valves used to drain an impoundment) shall be operated at least once per year to insure proper function. The gate and stem shall be lubricated at least once per year and all exposed metal shall be painted to protect it from corrosion.
- 19) Toe drains or other internal drainage outlets shall be cleared of debris, brush, and silt at least once per year to allow and ensure the free flow of water.
- 20) Areas designated for maintenance access shall be kept free of plantings, fences, or other obstructions except for standard access road gates to prevent unauthorized vehicular access.
- 21) Accumulated sediment shall be removed from the sediment forebay(s) every 3 to 5 years, or when 6 to 12 inches have accumulated, whichever comes first. Sediment forebay(s) shall be restored to their original volume. The volume of accumulated sediment in the main cells of the wetland shall be measured once every ten years. Accumulated sediment shall be removed from the main cells of the wetland when the original volume has been reduced by 30%. The main cells of the wetland shall be restored to their original volume. To clean the forebay and the main cells of the wetland, draining or pumping and a possible temporary partial drawdown of the pool area may be required. Sediment removal, pumping of standing water and dewatering of dredged sediments shall be performed in a manner which protects water quality and in accordance with Virginia Department of Conservation and Recreation regulations and County requirements.
- 22) Whenever sediment has been removed from the sediment forebay(s) or wetland cell(s), the sediment forebay(s) or wetland cell(s) shall be replanted in accordance with the original construction specifications.
- 23) A reinforcement planting for the wetland plantings and other vegetation shown on the design plans, essential to the pollutant removal capability of the facility, shall be scheduled at the onset

of the second growing season after construction and at the onset of the second growing season after removal of sediment from the forebay(s) or wetland cell(s). The size and species for the reinforcement plantings shall be based on an inspection of the growth and survival of the plantings at the end of the first growing season.

24) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### BIORETENTION BASIN (Rain Garden) MAINTENANCE SPECIFICATIONS

1) Bioretention Basin(s) and appurtenances shall be maintained in good working condition acceptable to the County.

2) The Bioretention Basin(s) and appurtenances shall be privately owned and maintained.

3) Bioretention Basin(s) and appurtenances shall be inspected in accordance with the following schedule by a qualified individual to ensure that they operate in good working condition acceptable to the County. Items in need of repair shall be promptly addressed.

- Embankment settling, woody growth, and signs of piping (annually)
- Signs of seepage on the downstream face of the embankment (annually)
- Condition of grass cover on the embankment and perimeter (annually)
- Riprap displacement or failure (annually)
- Outlet (annually)
- Outlet channel conditions (annually)
- Inlet pipe conditions (annually)
- Safety features of the facility (annually)
- Access for maintenance equipment (annually)
- Sediment accumulation (monthly)
- Debris and trash accumulation (monthly)
- Erosion in bioretention area and on the embankment (monthly)
- Species distribution/survival for plantings shown on the design plans essential to the pollutant removal capability of the facility (twice per year)
- Condition of mulch (monthly)
- Condition of grass buffer

4) The pH of the soil shall be tested annually. The pH level of the soil shall be maintained as neutral (within a pH range of 6.5 to 7.5). Limestone shall be spread over the bioretention facility if the soil pH is less than 6.5.

5) The mulch layer and soils shall be examined for evidence of hydrocarbons or other deleterious materials if the plant community experiences unsatisfactory growth or mortality. Any contaminated mulch shall be removed and replaced with clean mulch. In the event of persistent unsatisfactory growth, the soils shall be tested as needed for hydrocarbons or other toxic substances. If excess levels of these toxic substances are encountered, then the soils, plants and mulch shall be replaced as needed in conformance with the approved construction plans.

6) Trees and shrubs shall be mulched to a minimum thickness of 2 inches. Mulch shall be removed and replaced every two to three years. Ground cover specified as plugs shall be installed after the area has been mulched. Ground cover established by seeding and/or consisting of grass shall not be covered with mulch.

7) Watering of plant material shall be performed as needed to ensure survival.

8) The basin's embankment and overflow spillway shall be mowed at least twice during the Spring, at least once during the Summer, and at least twice during the Fall to discourage woody growth with the last cutting occurring at the end of the growing season. The grass should not be cut to less than 6 to 8 inches in height.

9) If necessary, the embankment shall be limed, fertilized and seeded in the fall, after the growing season. Lime and fertilizer application rates shall be based on soil test results. The type of seed should be consistent with that originally specified on the construction plans.

10) All erosion gullies noted during the growing season shall be backfilled with topsoil, reseeded and protected (mulched) until vegetation is established.

11) All bare areas and pathways on the embankment shall be promptly seeded and protected (mulched) or otherwise stabilized to eliminate the potential for erosion.

12) All animal burrows shall be backfilled and compacted and burrowing animals shall be removed from the area.

13) All trees, woody vegetation and other deep-rooted growth, including stumps and associated root systems, shall be removed from the embankment. The root systems shall be extracted and the excavated volume replaced and compacted with material similar to the surrounding area. All seedlings shall be removed at the first opportunity. Similarly, any vine cover and brush shall be removed from the embankment to allow for inspections.

14) Grass buffer strips shall be maintained at a height of 6 to 12 inches.

15) A reinforcement planting for the vegetation shown on the design plans, essential to the pollutant removal capability of the facility, shall be scheduled at the onset of the second growing season after construction. The size and species for the reinforcement plantings shall be based on an inspection of the growth and survival of the plantings at the end of the first growing season.

16) Water shall not be allowed to pond on the surface of the basin for more than 48 hours after a storm. Water ponding more than 48 hours after a storm is an indication that the underlying soil interface is clogged. Any evidence of clogging of the underlying soil interface shall be investigated and promptly addressed.

17) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### BIORETENTION FILTER (Rain Garden) MAINTENANCE SPECIFICATIONS

1) Bioretention Filter(s) and appurtenances shall be maintained in good working condition acceptable to the County.

2) The Bioretention Filter(s) and appurtenances shall be privately owned and maintained.

3) Bioretention Filter(s) and appurtenances shall be inspected in accordance with the following schedule by a qualified individual to ensure that they operate in good working condition acceptable to the County. Items in need of repair shall be promptly addressed.

- Embankment settling, woody growth, and signs of piping (annually)
- Signs of seepage on the downstream face of the embankment (annually)
- Condition of grass cover on the embankment and perimeter (annually)
- Riprap displacement or failure (annually)
- Outlet (annually)
- Outlet channel conditions (annually)
- Inlet pipe conditions (annually)
- Safety features of the facility (annually)
- Access for maintenance equipment (annually)
- Sediment accumulation (monthly)
- Debris and trash accumulation (monthly)
- Erosion in bioretention area and on the embankment (monthly)
- Species distribution/survival for plantings shown on the design plans essential to the pollutant removal capability of the facility (twice per year)
- Condition of mulch (monthly)
- Condition of grass buffer
- Underdrain system condition
- Clearwell valve operable

4) The pH of the soil shall be tested annually. The pH level of the soil shall be maintained as neutral (within a pH range of 6.5 to 7.5). Limestone shall be spread over the bioretention facility if the soil pH is less than 6.5.

5) The mulch layer and soils shall be examined for evidence of hydrocarbons or other deleterious materials if the plant community experiences unsatisfactory growth or mortality. Any contaminated mulch shall be removed and replaced with clean mulch. In the event of persistent unsatisfactory growth, the soils shall be tested as needed for hydrocarbons or other toxic substances. If excess levels of these toxic substances are encountered, then the soils, plants and mulch shall be replaced as needed in conformance with the approved construction plans.

6) Trees and shrubs shall be mulched to a minimum thickness of 2 inches. Mulch shall be removed and replaced every two to three years. Ground cover specified as plugs shall be installed after the area has been mulched. Ground cover established by seeding and/or consisting of grass shall not be covered with mulch.

7) Watering of plant material shall be performed as needed to ensure survival.

8) The filter's embankment and overflow spillway shall be mowed at least twice during the Spring, at least once during the Summer, and at least twice during the Fall to discourage woody growth with the last cutting occurring at the end of the growing season. The grass should not be cut to less than 6 to 8 inches in height.

9) If necessary, the embankment shall be limed, fertilized and seeded in the fall, after the growing season. Lime and fertilizer application rates shall be based on soil test results. The type of seed should be consistent with that originally specified on the construction plans.



- 10) All erosion gullies noted during the growing season shall be backfilled with topsoil, reseeded and protected (mulched) until vegetation is established.
- 11) All bare areas and pathways on the embankment shall be promptly seeded and protected (mulched) or otherwise stabilized to eliminate the potential for erosion.
- 12) All animal burrows shall be backfilled and compacted and burrowing animals shall be removed from the area.
- 13) All trees, woody vegetation and other deep-rooted growth, including stumps and associated root systems, shall be removed from the embankment. The root systems shall be extracted and the excavated volume replaced and compacted with material similar to the surrounding area. All seedlings shall be removed at the first opportunity. Similarly, any vine cover and brush shall be removed from the embankment to allow for inspections.
- 14) Grass buffer strips shall be maintained at a height of 6 to 12 inches.
- 15) A reinforcement planting for the vegetation shown on the design plans, essential to the pollutant removal capability of the facility, shall be scheduled at the onset of the second growing season after construction. The size and species for the reinforcement plantings shall be based on an inspection of the growth and survival of the plantings at the end of the first growing season.
- 16) Water shall not be allowed to pond on the surface of the basin for more than 48 hours after a storm. Water ponding more than 48 hours after a storm is an indication that the underdrain system is clogged or that the valve in the clearwell needs to be adjusted. Any evidence of clogging of the underdrain system shall be investigated and promptly addressed.
- 17) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## **ATTACHMENT A**

### **GRASSED SWALE/WATER QUALITY SWALE MAINTENANCE SPECIFICATIONS**

- 1) Grassed Swale(s)/Water Quality Swales(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Grassed Swale(s)/Water Quality Swales(s) and appurtenances shall be privately owned and maintained.
- 3) A dense and vigorous grass cover shall be maintained. The swale(s) shall be mowed periodically to keep the grass at a height of 3 to 6 inches. The grass shall not be cut to a height below 3 inches. Stabilization and reseeding of bare spots shall be performed as needed.
- 4) The swale(s) shall be kept free of debris (including trash, grass clippings, leaves, etc.).
- 5) Sediment which accumulates within the swale(s) shall be manually removed and the vegetation reestablished. If accumulated sediment has clogged the surface pores of the swale, reducing or eliminating the infiltration capacity, then the surface shall be tilled and restabilized. Drilling or punching small holes into the surface layer can be used instead of tilling, if desired.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## **ATTACHMENT A**

### **VEGETATED FILTER STRIP MAINTENANCE SPECIFICATIONS**

- 1) Vegetated Filter Strip(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) Vegetated Filter Strip(s) and appurtenances shall be privately owned and maintained.
- 3) Vegetated Filter Strip(s) shall be inspected quarterly for gully erosion, density of vegetation, damage from foot or vehicular traffic, and evidence of concentrated flows circumventing the strip. The level spreader shall also be inspected to verify that it is functioning as intended.
- 4) Inspections are critical during the first few years to ensure that the strip becomes adequately established. Maintenance is especially important during this time and shall include watering, fertilizing, re-seeding or planting as needed.
- 5) Once a Vegetated Filter Strip is well established and functioning properly, periodic maintenance, such as watering, fertilizing and spot repair, may still be necessary. However, fertilization efforts shall be kept to a minimized. Natural selection allows certain species (usually native plants) to thrive while others decline. Excessive fertilization and watering to maintain individual plantings may prove costly, especially in abnormally dry or hot seasons. Overseeding and replanting shall be limited to those species which have exhibited the ability to thrive.
- 6) At least once annually, deposited sediment shall be manually removed, especially from the upstream edge, to maintain the original contours and grading and the vegetation reestablished.
- 7) Grass used in the filter strip shall be kept at a height of 6 to 12 inches.
- 8) Vegetation shall be reestablished in eroded areas.
- 9) Invasive species and weeds shall be periodically removed.
- 10) Woody vegetation shall be periodically pruned to stimulate growth.
- 11) The Vegetated Filter Strip(s) shall be kept free of debris (including trash, grass clippings, etc.).
- 12) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### STORMCEPTOR™ MAINTENANCE SPECIFICATIONS

- 1) Stormceptor™(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Stormceptor™(s) and appurtenances shall be privately owned and maintained.
- 3) The Landowner shall enter into an agreement with a responsible third party to clean the Stormceptor™(s) in accordance with the following specifications:
  - During the first year of operation, inspections of the accumulated sediment volume shall be made one time each in January, February, March, Spring, Summer and Fall. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. After the first year, the inspection schedule should be reviewed and may be modified with the approval of the County.
  - Stormceptor™(s) shall be cleaned a minimum of once per year or when 15% of the unit volume is filled with sediment (approximately 1 foot of sediment depth) or immediately in the event of a spill. This determination can only be made by probing the sump with a stadia rod or similar measuring device. Two measurements shall be taken: water depth (water surface to the bottom), and water surface to the top of the sediment. The difference between the two measurements is the sediment depth. To avoid underestimating the volume of sediment in the chamber, the measuring rod must be lowered to the top of the sediment pile carefully. Finer silt particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.
  - Cleanout of the Stormceptor™(s) with a vacuum truck is generally the most effective and convenient method. For inline Stormceptor™(s), remove oil and sediment through the 24 inch diameter outlet riser pipe; alternatively, floatables and hydrocarbons may be removed through the 6 inch oil inspection port. For inlet Stormceptor™(s), the inlet drop pipe has a tapered insert connected to a handle. Once the handle is removed, remove the oil and sediment from the 12 inch diameter inlet drop pipe. For submerged Stormceptor™(s), remove oil and sediment through the 24 inch diameter outlet riser pipe; alternatively, floatables and hydrocarbons may be removed through the 6 inch oil inspection port.
- 4) The Landowner shall maintain a copy of a valid current agreement on file with DPWES at all times.
- 5) The qualifications of the maintenance operator are subject to review and approval by DPWES.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### VORTECHS™ STORMWATER TREATMENT SYSTEM MAINTENANCE SPECIFICATIONS

- 1) Vortechs™ Stormwater Treatment System(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Vortechs™ Stormwater Treatment System(s) and appurtenances shall be privately owned and maintained.
- 3) The Landowner shall enter into an agreement with a responsible third party to clean the Vortechs™ Stormwater Treatment System(s) in accordance with the following specifications:
  - During the first year of operation, inspections of the accumulated sediment volume in the aluminum grit chamber shall be made one time each in January, February, March, Spring, Summer and Fall. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. After the first year, the inspection schedule should be reviewed and may be modified with the approval of the County.
  - Vortechs™ Stormwater Treatment System(s) shall be cleaned a minimum of once per year or when inspection reveals that it is nearly full; specifically when sediment depth has accumulated to approximately 2 feet (or within one foot below dry-weather water level) or immediately in the event of a spill. Since the depth of the grit chamber sump is 3 feet, this determination can only be made by probing the sump with a stadia rod or similar measuring device. Two measurements shall be taken: water depth (water surface to the bottom), and water surface to the top of the sediment. The difference between the two measurements is the sediment depth. To avoid underestimating the volume of sediment in the chamber, the measuring rod must be lowered to the top of the sediment pile carefully. Finer silt particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.
  - Cleanout of the Vortechs™ Stormwater Treatment System(s) with a vacuum truck is generally the most effective and convenient method. Only the manhole cover above the grit chamber (nearest to system inlet) need be opened to remove water and contaminants.
  - An important maintenance feature is that floatables remain trapped after cleaning. In the Vortechs™ Stormwater Treatment System(s), a pocket of water between the grit chamber and the outlet panel keeps the bottom of the baffle submerged so that all floatables remain trapped when the system begins to fill up again. To preserve this feature, it is important that only the grit chamber portion of the Vortechs™ Stormwater Treatment System(s) be pumped out. Manhole covers should be securely seated following cleaning activities, to insure that surface runoff does not leak into the unit from above.
- 4) The Landowner shall maintain a copy of a valid current agreement on file with DPWES at all times.
- 5) The qualifications of the maintenance operator are subject to review and approval by DPWES.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### DOWNSTREAM DEFENDER™ MAINTENANCE SPECIFICATIONS

- 1) Downstream Defender™(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The Downstream Defender™(s) and appurtenances shall be privately owned and maintained.
- 3) The Landowner shall enter into an agreement with a responsible third party to clean the Downstream Defender™(s) in accordance with the following specifications:
  - During the first year of operation, inspections of the accumulated sediment volume shall be made one time each in January, February, March, Spring, Summer and Fall. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. After the first year, the inspection schedule should be reviewed and may be modified with the approval of the County.
  - Downstream Defender™(s) shall be cleaned a minimum of twice per year or when 15% of the unit volume is filled with sediment or immediately in the event of a spill. This determination can only be made by probing the sump with a stadia rod or similar measuring device. Two measurements shall be taken: water depth (water surface to the bottom), and water surface to the top of the sediment. The difference between the two measurements is the sediment depth. To avoid underestimating the volume of sediment in the chamber, the measuring rod must be lowered to the top of the sediment pile carefully. Finer silt particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.
  - Cleanout of the Downstream Defender™(s) with a vacuum truck is generally the most effective and convenient method. A standard septic tank hose is not appropriate for the clean-out procedure. A Vacall with a 6 inch, or larger, hydraulic hose is required. The Vacall is capable of loosening compacted solids by reversing the vacuum pump prior to the sum vac procedure. Floatables shall be removed prior to emptying the collection facility. The floatables access port is located between the concrete vessel wall and the dip plate. The collection facility access port is located directly over the center shaft.
- 4) The Landowner shall maintain a copy of a valid current agreement on file with DPWES at all times.
- 5) The qualifications of the maintenance operator are subject to review and approval by DPWES.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### STORMTREAT™ SYSTEM MAINTENANCE SPECIFICATIONS

- 1) StormTreat™ System(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The StormTreat™ System(s) and appurtenances shall be privately owned and maintained.
- 3) The Landowner shall enter into an agreement with a responsible third party to clean the StormTreat™ System(s) in accordance with the following specifications:
  - During the first year of operation, inspections shall be performed and the accumulated sediment volume shall be measured on a quarterly basis. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. After the first year, the inspection schedule should be reviewed and may be modified with the approval of the County.
  - Visually inspect influent pipe and clean out debris, if necessary.
  - Remove debris filter sack and attach replacement.
  - Visually inspect skimmers to ensure that the flexible hoses are undamaged and tightly connected to the skimmer and the bulkhead. Replace damaged hoses as needed.
  - Collect debris out of wetland and trim dead growth of wetland plants.
  - Rake and tidy up area around systems.
  - Following a storm event, measure discharge flow rate and adjust to 0.25- 0.50 gallons per minute per tank. Reset outlet control, if necessary. Close and lock valve cover.
  - StormTreat™ System(s) shall be cleaned a minimum of twice per year or when 15% of the unit volume is filled with sediment or immediately in the event of a spill. This determination can only be made by probing the sump with a stadia rod or similar measuring device. Two measurements shall be taken: water depth (water surface to the bottom), and water surface to the top of the sediment. The difference between the two measurements is the sediment depth. To avoid underestimating the volume of sediment in the chamber, the measuring rod must be lowered to the top of the sediment pile carefully. Finer silt particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.
  - Cleanout of the StormTreat™ System(s) with a standard vacuum pump truck is generally the most effective and convenient method. Spray down the all sediment in the tank and pump the tank clean. Make sure that exit pipes to the wetland are clean as well as flexible hoses and skimmers.
- 4) The Landowner shall maintain a copy of a valid current agreement on file with DPWES at all times.
- 5) The qualifications of the maintenance operator are subject to review and approval by DPWES.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.

## ATTACHMENT A

### STORMFILTER™ SYSTEM MAINTENANCE SPECIFICATIONS

- 1) StormFilter™(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The StormFilter™(s) and appurtenances shall be privately owned and maintained.
- 3) The Landowner shall enter into an agreement with a responsible third party to clean the StormFilter™(s) in accordance with the following specifications:
  - Inspections shall be performed on a semiannual basis. Core samples shall be taken at this time to determine proper disposal methods.
  - The level of required maintenance shall be determined at this time.
  - Damage to any internal components shall be noted at this time for correction during maintenance activities.
  - Standing water over the top of cartridges for a period exceeding 24 hours from the last rainfall is an indication of required cartridge changeout. Other indicators include a predominant scumline at the overflow level and heavy uniform distribution of sediment on the tops of the cartridges.
  - Cartridge changeout and sediment removal shall be performed to manufacturer's specifications.
- 4) The Landowner shall maintain a copy of a valid current agreement on file with DPWES at all times.
- 5) The qualifications of the maintenance operator are subject to review and approval by DPWES.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.



## ATTACHMENT A

### BAYSAVER™ MAINTENANCE SPECIFICATIONS

- 1) BaySaver™(s) and appurtenances shall be maintained in good working condition acceptable to the County.
- 2) The BaySaver™(s) and appurtenances shall be privately owned and maintained.
- 3) The Landowner shall enter into an agreement with a responsible third party to clean the BaySaver™(s) in accordance with the following specifications:
  - During the first year of operation, inspections of the accumulated sediment volume shall be made one time each in January, February, March, Spring, Summer and Fall. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. After the first year, the inspection schedule should be reviewed and may be modified with the approval of the County.
  - BaySaver™(s) shall be cleaned a minimum of once per year or when 15% of the unit volume is filled with sediment (approximately 1 foot of sediment depth) or immediately in the event of a spill. This determination can only be made by probing the sump with a stadia rod or similar measuring device. Two measurements shall be taken: water depth (water surface to the bottom), and water surface to the top of the sediment. The difference between the two measurements is the sediment depth. To avoid underestimating the volume of sediment in the chamber, the measuring rod must be lowered to the top of the sediment pile carefully. Finer silt particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.
  - Cleanout of the BaySaver™(s) with a vacuum truck is generally the most effective and convenient method.
- 4) The Landowner shall maintain a copy of a valid current agreement on file with DPWES at all times.
- 5) The qualifications of the maintenance operator are subject to review and approval by DPWES.
- 6) The owner shall provide an annual report of inspections and maintenance activities including a fiscal summary of budgeted and actual expenditures to the County (Maintenance and Stormwater Management Division) within 45 days of the end of the calendar year. The annual report shall include the names, addresses, telephone numbers, and other available means of contact (FAX numbers and email addresses) of the current owner(s) and the individual(s) responsible for maintenance of the facility. Inspection and maintenance records also shall be kept on-site or at a location that is readily accessible and shall be made available to County officials upon request.