ENGINEERING AND ENVIRONMENTAL SERVICES

Stormwater Division

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BIORETENTION AREA DESIGN SUMMARY

Stormwater Management Construction Plan Review:

A complete Stormwater management construction plan submittal includes a design summary for each Stormwater BMP, design calculations, plans and specifications showing BMP, inlet and outlet structure details.

I. PROJECT INFORMATION

For projects with multiple SCMs, specify which SCM this worksheet applies to:

Project Name: _____ Phase: _____

PIN: _____ Case #: _____

Legal Name of Owner: _____

Owner Contact: _____ Phone: _____

Owner Address: _____

Design Contact Person: _____ Phone: _____

Drainage area	ac	*(on-site drainage to the SCM)*
Impervious area	ac	*(on-site impervious area draining to the SCM)*
Design runoff	cfs	
Design treatment volume	ft^3	

II. GENERAL MINIMUM DESIGN CRITERIA FOR ALL SCMs *(Revised 1/3/2017)*

GENERAL MDC 1: SIZING

Design storm depth	ft	*(One year, 24 hour storm event)*
Design runoff volume	ft^3	*(Minimum calculation of entire drainage area)*

GENERAL MDC 2: CONTAMINATED SOILS

Contaminated soils within footprint?	Y / N	*(Brownfield location?)*

GENERAL MDC 3: SIDE SLOPES

Maximum vegetated side slopes	: 1	*(Maximum 3:1 vegetated slopes)*

GENERAL MDC 4: EROSION PROTECTION

10 year storm outlet discharge	cfs	*(Must be non-erosive)*

GENERAL MDC 5: EXCESS FLOW

Emergency outlet elevation	ft
Emergency spillway width	ft
Emergency spillway side slopes	: 1
Emergency spillway slope	%

GENERAL MDC 6: DEWATERING

Dewatering method		
Drawdown orifice size	in	*(If applicable)*

GENERAL MDC 7: CLEAN OUT AFTER CONSTRUCTION

Every SCM impacted by sediment and erosion control during the construction phase shall be cleaned out and converted to its approved design state
In addition, installed SCM's should be inspected and cleaned after each heavy rainfall

GENERAL MDC 8: MAINTENANCE ACCESS

Maintenance access width	ft	*(Minimum width of 10 feet)*
Side slopes within maintenance access	: 1	*(Maximum 3:1)*
Access extend to public right of way	Y / N	

GENERAL MDC 9: EASEMENTS

All SCMs and associated maintenance accesses located in permanent recorded easement? (shown and labeled in easement)	Y / N	*(Does not include single family residential lots)*
Maintenance access width around SCM	ft	*(Minimum width of 10 feet)*

GENERAL MDC 10: SINGLE FAMILY RESIDENTIAL LOTS

Plats for residential lots that contain an SCM shall include:

(a) The specific location of the SCM on the lot
(b) A typical detail for the SCM to be used
(c) A note that the SCM on the property has been required to meet stormwater regulations and that the property owner may be subject to enforcement actions if the SCM is removed, relocated, or altered without prior approval

GENERAL MDC 11: OPERATION AND MAINTENANCE AGREEMENT

Acknowledgement that the association shall continuously operate and maintain the stormwater control and management facilities	☐	(*Check box when completed*)
Establishment of an escrow account which can be spent solely for sediment removal, structural, biological or vegetative replacement, major repair, or construction of the SCM	☐	

GENERAL MDC 12: OPERATION AND MAINTENANCE PLAN

Specify all operation and maintenance work necessary for the function of all SCM components	☐	(*Check box when completed*)
Specify methods to be used to maintain or restore the SCMs to design specifications in the event of failure	☐	
O&M plan shall be signed by the owner and notarized	☐	

III. BIORETENTION MINIMUM DESIGN CRITERIA *(Revised 1/19/18)*

BIORETENTION MDC 1: SEPARATION FROM THE SHWT

SHWT elevation	ft	*(Determined through soil tests)*
Bottom elevation of media	ft	
SHWT separation	ft	*(SHWT elevation minus bottom elev.)*

BIORETENTION MDC 2: MAXIMUM PONDING DEPTH FOR DESIGN VOLUME

Planting soil top elevation	ft	*(Elevation of top of soil)*
Design volume ponding elevation	ft	*(Maximum elevation of design storm)*
Design volume ponding depth	in	*(Maximum 12 inches)*
Required treatment volume	ft^3	
Required surface area	ft^2	*(Required volume divided by ponding depth)*

BIORETENTION MDC 3: PEAK ATTENUATION VOLUME

Peak attenuation volume depth	in	*(Max. 24" above planting surface elev.)*
Peak attenuation outlet elevation	ft	*(Max. 18" above planting surface elev.)*

BIORETENTION MDC 4: UNDERDRAIN

Internal Water Storage included?	Y / N	*(Min. 18 inches below planting surface)*
Top elevation of IWS	ft	*(Min. 18 inches)*
IWS and planting surface separation	in	*(Min. 2 in/hr to exclude underdrain)*
In-situ soil infiltration rate	in/hr	

BIORETENTION MDC 5: MEDIA DEPTH

Does cell have shrubs or trees?	Y / N	*(Min. depth 36" with trees and shrubs)*
Media depth	ft	*(Min. depth 24" with no IWS, 30" with IWS and no trees and shrubs)*
IWS and planting surface separation	ft	

BIORETENTION MDC 6: MEDIA MIX

Medium to coarse washed sand	%	*(75 to 85 percent required)*
Fines (silt and clay)	%	*(8 to 15 percent required)*
Organic matter	%	*(5 to 10 percent required)*
Volume of total media	ft^3	

BIORETENTION MDC 7: MEDIA P-INDEX

Phosphorous Index		*(Less than 30 in NSW waters, less than 50 elsewhere)*

BIORETENTION MDC 8: MECHANICAL COMPACTION

The media shall not be mechanically compacted	*(Water it or walk on it as it is placed)*

BIORETENTION MDC 9: MAINTENANCE OF MEDIA

Bioretention cell shall be maintained in manner that results in drawdown of at least 1" per hour at the planting surface

BIORETENTION MDC 10: PLANTING PLAN

Sod used?	Y / N	*(Must be non-clumping, deep rooted)*
Planned percent plant coverage at five years after planting?	%	*(Minimum 75%, for bioretention cells with veg. other than sod)*
Planned coverage with tree or shrub canopy at five years after planting?	%	*(Maximum 50%)*

IV. BIORETENTION DESIGN CHARACTERISTICS

Size of cell area	_____ ft^2
Inflow sheet flow velocity	_____ fps
Mulch layer top elevation	_____ ft
Media top elevation	_____ ft
Bottom elevation of cell	_____ ft
Perforated Pipe length	_____ ft
Space between pipe runs	_____ ft
Longitudinal slope	_____ ft/ft
Diameter of pipe	_____ ft

Emergency Spillway Information

Emergency Outlet Elev. _____ ft (invert of emergency overflow weir)

Emergency Spillway width _____ ft side slopes ___:1 slope _____%

V. REQUIRED ITEMS CHECKLIST

The following checklist outlines design requirements. Initial in the space provided to indicate the following design requirements have been met and supporting documentation is attached.

Applicant's Initials

_____ a. The lowest point of the bioretention cell shall be a minimum of 2 feet above the SHWT. This separation is to ensure that the media does not become saturated and unable to function effectively.

_____ b. The maximum ponding depth for design volume shall be 12 inches above the planting surface.

_____ c. The surface area of the bioretention cell is equal to the required treatment volume divided by the ponding depth.

_____ d. Plan specifies how all slopes draining to the bioretention area will be stabilized. Note that the slopes must be stabilized before the installation of the underdrain system.

_____ e. An underdrain with internal water storage (set to minimum of 18 inches below planting surface) shall be installed unless it is demonstrated that the in-situ infiltration rate is two inches per hour or greater immediately prior to the initial placement of the media.

_____ f. The cell depth of (a) all cells with trees and shrubs is 36 inches to accommodate plant roots; (b) all cells without trees and shrubs with no internal water storage is 24 inches, or with internal storage is 30 inches.

_____ g. Runoff from landscaped areas and other non-impervious areas has been directed away from the bioretention area to the maximum extent practical.

_____ h. Construction sequencing shall be considered and a note added to the plan that states: “All sediment and erosion control practices shall be in place and the slopes draining to the bioretention area shall be stabilized before construction of the bioretention area begins.”

_____ i. No side slopes draining to bioretention area greater than 3:1 (promote sheet flow through the grass filter strip.)

_____ j. Riprap outlet protection, if provided, reduces flow to non-erosive velocities (provide calculations).

_____ k. A recorded drainage easement is provided for each cell including access to the nearest right-of-way and is graded per Section 8.3, Stormwater Control Facilities.

_____ l. A plan view of the bioretention area with grading shown is provided.

_____ m. A profile through the bioretention area and emergency spillway is provided.

_____ n. Geotextile fabric is placed at the bottom of the excavated cell to prevent soil from migrating into the underdrain system.

_____ o. The underdrain system is wrapped in a gravel jacket and a geotextile fabric is placed between the bottom of the sand bed or planting soil and the top of the gravel jacket.

_____ p. The pipe for the underdrain system shall be perforated Schedule 40 PVC.

_____ q. The underdrain system shall connect to the outflow system at a point at least 1 foot inside the bioretention cell wall.

_____ r. A non-perforated Sch. 40 PVC piping system is connected to the underdrain piping and extends to the surface of the planting soil for cleanouts with screw on cleanout.

_____ s. Cleanouts are to be provided at the beginning of each pipe run and at all intersections.

_____ t. A planting soil mixture specification and a soil characteristics table are provided.

_____ u. The hydraulic conductivity for the planting mixture is to be 1-inch to 2-inches per hour.

_____ v. Mulch layer specification is provided; mulch is to be a 2 to 4-inch layer of triple shredded mulch with re-application rate specified.

_____ w. Soil with a P index of less than or equal to 30 in NSW waters, less than 50 elsewhere, specified on plan.

_____ x. A bioretention area landscape plan is provided including the preparation of the planting pit, fertilization, installation of the plant material, type and number of plantings (note that there shall be a minimum of three species of trees and three species of shrubs selected to ensure diversity, their planting locations, Operation and Maintenance checklist for owner.

_____ y. Note on plans: “The media shall not be mechanically compacted.”

NOTE: Executed Stormwater Facility Operations and Maintenance Permit Agreement and payment of surety are required prior to Stormwater Permit issuance.