FUQUAY-VARINA
north carolina

OPERATIONS & MAINTENANCE MANUAL

STORMWATER CONTROL STRUCTURE
BIO-RETENTION AREA

Owner(s): _____
Address: _____
Phone Number: _____
Site/Subdivision Plan # _____
Location: _____
Prepared by: _____
Receiving Water Course: _____
Date: _____
Date Constructed: _____

Contractor: (List below)

Landscape Contractor	
Grading Contractor	

OPERATIONS AND MAINTENANCE MANUAL

PROJECT NAME:_____
BIO-RETENTION AREA

This manual establishes procedures for maintenance and operation of the _____ Bio-retention area (s) in accordance with the Town of Fuquay-Varina's Land Development Ordinance as set forth in Section 9-1405(e) MAINTENANCE.

MAINTENANCE OF BIO-RETENTION AREAS

Vegetation—The drainage areas have a ground cover of warm season grasses or fescue, which if properly maintained will prevent erosion of the embankment and provide an easy surface for inspection. The grass will be most difficult to obtain in the area subject to water level fluctuation.

Re-Seeding—Periodic re-seeding may be required to establish grass on areas where seed did not take or has been destroyed. Before seeding, a one-time fertilizer application (12-12-12) should be applied at a minimum rate of 12 to 15 pounds per 1,000 SF. The seed should be evenly sown at a rate of three pounds per 1,000 SF. The seed should be covered with soil to the depth of approximately ¼". Immediately following the planting, the area should be mulched with straw and tacked.

Trees and Shrubs—Trees, shrubs and other landscape vegetation should be permitted only as shown on the approved planting plan. The vegetation should be kept healthy and vibrant. If a tree or shrub dies it should be removed and replaced with another tree or shrub from the same species (attach plant list).

Mowing—Grass mowing, brush cutting and removal of weed vegetation will be necessary for proper maintenance. All area slopes and vegetation should be mowed when the grass exceeds 8" in height. Acceptable methods include the use of weed whips or power brush cutters and mowers.

Erosion—Erosion occurs when the water concentrates causing failure of the vegetation or when vegetation dies and sets up the environment for rill erosion and eventually gullies from the stormwater runoff. All areas should be inspected. Proper care of vegetative areas that develop erosion is required to prevent more serious damage to the site. Rills and gullies should be filled with suitable soil compacted and then seeded. Methods described earlier on vegetation should be used to properly establish a grass surface. Where eroded areas are detected, the cause of the erosion should be addressed to prevent a continued maintenance problem. Frequently, problems result from the concentration of runoff to one point of the bio-retention area instead of a uniform distribution of runoff usually on slopes and at the inflow points. This can be corrected by reshaping, to more evenly distribute runoff to areas not experiencing erosion problems.

Rodent Control—Generally in an urban environment, rodents are not a problem. Rodents such as groundhogs, muskrats and moles are attracted to moist, wet areas and can be quite dangerous to the structural integrity and proper performance of the earthwork and drainage. Groundhogs and muskrats thrive on burrowing into the manmade earthwork, which become pathways for seepage. In the event that burrows are detected within the bio-retention area, the rodents should be dealt with by removal.

Trash and Debris—Trash acts as a barrier to stormwater infiltration and attracts unwanted pests. The bio-retention area should be kept clear of debris such as loose bottles, cans, food containers and other forms of rubbish. The area should be cleared of debris as needed.

MAINTENANCE OF SPILLWAYS AND CONTROL STRUCTURE

Inspection of Conduits—Conduits should be inspected thoroughly once a year. Conduits should be visually inspected at the joints. Pipes should be inspected for proper alignment (sagging), elongation and displacement at joints, cracks, leaks, surface wear, loss of protective coating, corrosion and blocking. Problems with conduits most often occur at joints and special attention should be given to them during inspection. Joints should be checked for gaps caused by elongation or settlement and loss of joint filler material. Open joints can permit erosion of the earthwork and possibly the piping of soil material through the joints. A depression in the soil surface over the pipe may be signs that soil is being removed from around the pipe. The underdrains should be inspected to ensure that they are functional and allowing the bioretention area to drain.

OPERATION

Record Keeping—Operation of the bio-retention area should include recording of the following:

Annual Inspection Reports—A collection of written inspection reports should be kept on record. Inspection by a qualified professional is required annually. Copies should be provided to the Town of Fuquay-Varina's Engineering Department on the approved form.

Observations—All observations should be recorded.

Maintenance—Written records of maintenance and/or repairs should be recorded.

Other Operational Procedures—The owner should maintain a complete and up-to-date set of plans (as-built drawings) and all changes made to the bio-retention area over time should be recorded on the as-builts. Do not pile snow on top of the bioretention area.

Sedimentation and Dredging—Sedimentation from on-site and off-site soils will eventually result in the clogging of drainage conduits and will have to be removed. The frequency of this sediment removal can be reduced by ensuring that the site areas around the building are stabilized with a vegetative ground cover such that it restrains erosion. Do not drive heavy equipment into the bioretention area. Remove and replace vegetation, sediment, mulch, etc. by hand or have equipment that can reach from the edge of bioretention area.

Example Maintenance Schedule for Bio-retention Areas

Description	Method	Frequency	Time of year
SOIL			
Inspect and repair erosion	Visual	Monthly	All year
ORGANIC LAYER			
Remulch any void area	By hand	As needed	As needed
Remove previous mulch layer before applying new layer (optional)	By hand	Once every 2-3 years	Spring
Any additional mulch added	By hand	As needed	As needed
PLANTS			
Removal and replacement of all dead and diseased vegetation considered beyond treatment	See planting specifications	Twice a year	As directed by landscaper
Treat all diseased trees and shrubs	Mechanical or by hand	N/A	Varies, dependent on insect or disease infestation
Removal of cattails and other invasive species	By hand or through hand application of herbicide	As needed	As needed
Watering of plant material shall take place at the end of each day for fourteen consecutive days and after planting is completed	By hand	Daily	Immediately after completion of project
Remove support stakes and wires within 6 months of establishment	By hand	As needed	As needed

Detail of Planting Guide for each Bio-Retention Basin Included

BIO-RETENTION INSPECTION CHECKLIST

(Project Name): _____ Date: _____
Time: _____

Check/Circle Condition Noted	Observations	Action Repair	Action Monitor	Action Investigative
U/S Slope	**Type:**			
Vegetation/Riprap				
Rodent burrows				
Crest	**Type:**			
Ruts/erosion				
Cracks/settlement				
Poor alignment				
D/S Slope	**Type:**			
Vegetation/erosion				
Rodent burrows				
Sloughs/slides/cracks				
Seepage/wetness				
Pool	**Type:**			
Ground cover				
Sedimentation				
Abutment	**Type:**			
Vegetation/erosion				
Slough/slides/cracks				
Seepage/wetness				

General Comments, Sketches & Field Measurements

PERODIC INSPECTION, OPERATION & MAINTENANCE RECORDS

(Project Name): _____

Date	Time	Rain	Weather Conditions	General Observations or Comments	Recorded By

Date	Maintenance Performed	Comments	Recorded By

Date	Equipment Operated	Comments	Recorded By