FUQUAY-VARINA
north carolina

OPERATIONS & MAINTENANCE MANUAL

STORMWATER CONTROL STRUCTURE
CONSTRUCTED WETLANDS

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

OPERATIONS AND MAINTENANCE MANUAL

PROJECT NAME:_____
Constructed Wetlands

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

Contractor: (List below)

Impoundment & Dam	
Spillway	

MAINTENANCE OF CONSTRUCTED WETLAND AREAS

Vegetation—The drainage areas have a ground cover of wetland plantings outside of the ponding area, 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, and has been planted above the inundated areas. Wetland plants are located within all water level fluctuation areas. Check vegetation conditions within the constructed wetland area and replace if necessary any damaged plant materials

Re-Seeding—Periodic re-seeding may be required to establish grass on areas where seed did not take or have been destroyed. Before seeding, fertilizer (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.

Mowing—Grass mowing, brush cutting and removal of weed vegetation will be necessary for the proper maintenance of the areas. 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. The 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 the 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 constructed wetland area instead of a uniform distribution of runoff. This can be corrected by reshaping, to more evenly distribute the runoff to areas not experiencing erosion problems.

Rodent Control—Generally in this 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 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 constructed wetland 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 constructed wetland 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, but no less than twice a year.

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.

OPERATION

Drainpipes—Drainpipes should always be operable so that the water can be drawn down in the event of severe rain or for repairs or maintenance.

Record Keeping—Operation of constructed wetland area should include recording of the following:

Annual Inspection Reports—A collection of written inspection reports should be kept on record in Section IV of this manual. Inspection should be conducted annually. Copies should be provided to the Town of Cary Stormwater Management Section of the Engineering Department.

Observations—All observations should be recorded. Where periodic inspections are performed following significant rainfall, these inspections should be logged into the Periodic Inspection, Operations and Maintenance Form in Section IV of this manual.

Maintenance—Written records of maintenance and/or repairs should be recorded on the Periodic Inspection, Operation and Maintenance Form in Section IV of this manual.

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 constructed wetland area over time should be recorded on the as-builts.

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 be stabilized with a vegetative ground cover such that it restrains erosion. This would include a periodic application of fertilizer and/or other treatment necessary to promote a stable ground cover and minimize sedimentation to the pond. The removed material should be hauled offsite to a suitable landfill site or mounded somewhere on site and stabilized with a ground cover sufficient to restrain erosion.

Example Maintenance Schedule for constructed wetland Areas

Description	**Method**	**Frequency**	**Time of year**
SOIL			
Inspect and repair erosion	Visual	Monthly	All year
PLANTS			
Removal and replacement of all dead and diseased vegetation considered beyond treatment	See planting specifications	Twice a year	As directed by landscaper
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
POND AREA			
Sediment in forebay has accumulated	Visual	Annual	During inspection
Algae Cover	Visual	Annual	Summer months
Permanent Pool Elevation returns to normal < 5-days after large storm			

IV. INSPECTION, OPERATION AND MAINTENANCE CHECKLISTS

WETLAND INSPECTION CHECKLIST Date_____ Time_____				
Constructed Wetland Pond Fuquay-Vaina, NC INSPECTORS_____				
SPILLWAYS ● DRAINS ● OUTLETS		ACTION		
CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	REPAIRS	MONITOR	INVESTIGATIVE
Principal Spillway	Type:			
trash rack/debris				
cracks/deterioration				
improper alignment				
cracks/deterioration				
joint deterioration				
seepage/piping				
Undercutting				
Erosion				
Debris				
Lake Drain/Other Outlets	Type:			
Gate/valves				
Operability				

DATE	TIME	RAIN	POOL LEVEL	WEATHER CONDITIONS	GENERAL OBSERVATIONS OR COMMENTS	RECORDED BY

DATE	MAINTENANCE PERFORMED	COMMENTS	RECORDED BY

DATE	EQUIPEMENT OPERATED	COMMENTS	RECORDED BY

WETLAND INSPECTION CHECKLIST
Date_____
Time_____

Constructed Wetland Pond
Fuquay-Varina, NC

INSPECTORS_____

EMBANKMENT ● POOL		ACTION		
CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	REPAIRS	MONITOR	INVESTIGATIVE
U/S SLOPE				
vegetation				
beaching/slides/cracks				
undermining/erosion				
rodent burrows				
CREST				
ruts/erosion				
cracks/settlement				
poor alignment				
D/S SLOPE				
vegetation/erosion				
rodent burrows				
slough/slides/cracks				
seepage/wetness				
POOL				
erosion/ground cover				
sedimentation				
water quality				
ABUTMENT				
vegetation/erosion				
slough/slides/cracks				
seepage/wetness				

GENERAL COMMENTS, SKETCHES & FIELD MEASUREMENTS