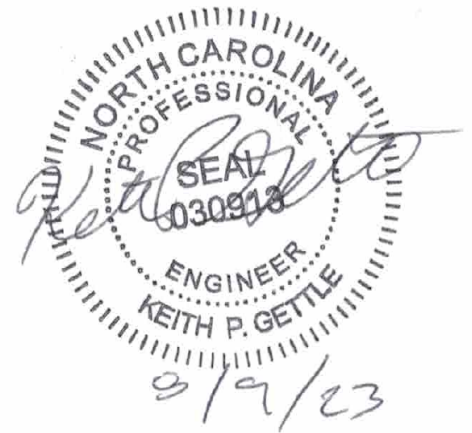


StorageMax
901 Proctor

Zebulon, NC
Wake County

BIORETENTION BMP
OPERATION AND MAINTENANCE
MANUAL

August 11, 2023



Prepared for:

Robert High Development, LLC
324 Greenville Ave.
Wilmington, NC 28403

Project Name: StorageMax
Project Address: 901 Proctor Ave.
Zebulon, NC
Pins: 2706217463
Latitude: 35.840297
Longitude: -78.315683
River Basin: Neuse
Watershed: Buckhorn
HUC: 03020203
Developer: Robert High Development, LLC
324 Greenville Ave.
Wilmington, NC 28403
Telephone: (919) 604-0505
Email: Storit@AOL.com

Site Description

The project consists of a single parcel located at the intersection of Proctor Avenue and Shepard School Road near downtown Zebulon. The lot is approximately 6.50 acres (283,140 sq feet). The parcel is vacant with grassy vegetation and a woods along the property lines. There is 0 sq ft of existing impervious area on the site. The project will consist of a commercial building and the impervious area post development will be 3.64 acres, or approximately 56% of the gross site.

The site is in the Neuse River Basin, Buckhorn Watershed and subject to those rules regarding nutrient management and post storm water runoff.

The parcel is not located within a flood zone as noted per FEMA map 372020600J, Dated May 2, 2006.

Proposed Development

The proposed stormwater facility for the project will consist of one Bioretention device. Drainage from the majority of the property will be collected within the storm pipe system, surface drainage and routed towards the BMP. The device is

designed in accordance with NCDENR DWR's BMP Manual, and will manage the 1, and 10 year, 24-hour storm events as noted below. The post development runoff from the noted storm events is less than the pre-development rates for the site.

The proposed BMP will capture the runoff from the majority of impervious area from the lot. However, a small portion of the site impervious, at the driveway entrance, does not drain towards the device; however, the device has been designed to treat all the impervious area as a part of the WQV. The total impervious associated with the development has been accounted for treatment within the Bioretention device.

Methodology (Peak Flow and Nutrient Management)

The project is located within the Town of Zebulon's / Wake County permitting authority, and within the Neuse River / Buckhorn watershed and the project is subjected to those rules. The Town of Zebulon's stormwater requirements as noted below.

The project is considered a High-Density project.

“(D) Development standards for high-density projects. High-density projects shall implement stormwater control measures that comply with each of the following standards, in addition to the general standards found in § [151.36](#).

(1) The measures shall control and treat runoff from the first inch of rain. Runoff volume drawdown time shall be a minimum of 48 hours, but not more than 120 hours.

(2) All structural stormwater treatment systems used to meet these requirements shall be designed to have a minimum of 85% average annual removal for total suspended solids (TSS).

(3) All development and redevelopment projects shall provide permanent on-site BMPs to lower the nitrogen export amounts as part of the stormwater management plan and accompany the land-disturbing plan submittal. BMPs are to be in accordance with and as specified in the Design Manual.

(4) Structural and non-structural BMPs shall be used to ensure there is no net increase in peak flow leaving the site from the pre-development conditions for the one-year, 24-hour storm. Runoff volume drawdown time shall be a minimum of 48 hours, but not more than 120 hours.

(5) General engineering design criteria for all projects shall be in accordance with 15A NCAC 2H .1008(c), as explained in the Design Manual.

(6) All development and redevelopment shall be located outside the riparian buffer zone and the flood protection zone. These zones shall be in accordance with the following provisions:

(a) Except where other applicable buffer standards are more restrictive, the riparian buffer zone shall extend a minimum of 50 feet landward of all perennial and intermittent surface waters. The most restrictive standards shall apply.

(b) The riparian buffer zone shall remain undisturbed unless otherwise permitted by this section.

(c) The flood protection zone shall extend throughout the FEMA 100-year floodplain as identified on the current Flood Insurance Rate Map (FIRM) published by

FEMA. The flood protection zone shall remain undisturbed unless otherwise permitted by this section.

(d) No development or redevelopment is permitted within the riparian buffer zone or the flood protection zone except for stream bank or shoreline restoration or stabilization, water dependent structures, and public or private projects such as road crossings and installations, utility crossings and installations, and greenways, where no practical alternatives exist.

(e) Permitted activities within the riparian buffer zone and the flood protection zone shall minimize impervious coverage, direct runoff away from surface waters to achieve diffuse flow, and maximize the utilization of non-structural BMPs.

(f) Where the riparian buffer zone and the flood protection zone both are present adjacent to surface waters, the more restrictive shall apply.

(7) The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved project plans. Buffer widths and locations shall be clearly delineated on all plans, final plat, and as-builts.”

Peak flow – The methodology used to determine the runoff is the Rational Method.

Time of Concentration used in the analysis is 5 minutes.

The POI (point of interest) for the project is at the southwest corner of the site

Based on the proposed stormwater management for the project no adverse impact is anticipated on adjacent parcels. The BMP system and drainage point from the project does encroach on another property with new development and grading operations. The impacted property is owned by the same company involved with this project.

Using the Rational Method, the modeling of the BMP at the POI provides the following results in peak flow management.

Total site peak runoff in cfs (noted in the attached Hydraflow report) is as follows.

Storm Event	Pre	Post
Q1	6.2	.81
Q10	22.53	20.60

Operation & Maintenance Agreement

Project Name: StorageMax

Project Location: Zebulon NC

Cover Page

Maintenance records shall be kept on the following SCM(s). This maintenance record shall be kept in a log in a known set location. Any deficient SCM elements noted in the inspection will be corrected, repaired, or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the pollutant removal efficiency of the SCM(s).

The SCM(s) on this project include (check all that apply & corresponding O&M sheets will be added automatically):

Infiltration Basin	Quantity:		Location(s):	
Infiltration Trench	Quantity:		Location(s):	
Bioretention Cell	Quantity:	1	Location(s):	901 Proctor Street
Wet Pond	Quantity:		Location(s):	
Stormwater Wetland	Quantity:		Location(s):	
Permeable Pavement	Quantity:		Location(s):	
Sand Filter	Quantity:		Location(s):	
Rainwater Harvesting	Quantity:		Location(s):	
Green Roof	Quantity:		Location(s):	
Level Spreader - Filter Strip	Quantity:		Location(s):	
Proprietary System	Quantity:		Location(s):	
Treatment Swale	Quantity:		Location(s):	
Dry Pond	Quantity:		Location(s):	
Disconnected Impervious Surface	Present:	No	Location(s):	
User Defined SCM	Present:	No	Location(s):	
Low Density	Present:	No	Type:	

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed for each SCM above, and attached O&M tables. I agree to notify NCDEQ of any problems with the system or prior to any changes to the system or responsible party.

Responsible Party: E. ALLEN MASSEY
 Title & Organization: MEMBER MANAGER - SHEPARD SCHOOL, LLC
 Street address: 2700 BRESHAM LAKE RD
 City, state, zip: RALEIGH NC 27615
 Phone number(s): 919 706 5766
 Email: STORIT@AOL.COM / JANETC@STORAGEMAXNC.COM

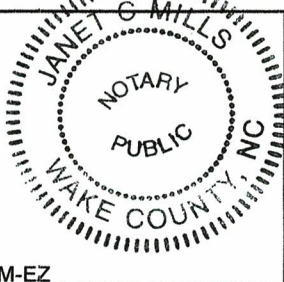
Signature: *E. Allen Massey* Date: 7.06.23

I, JANET C. MILLS, a Notary Public for the State of NORTH CAROLINA
 County of WAKE, do hereby certify that E. ALLEN MASSEY
 personally appeared before me this 6 day of JULY 2023 and

acknowledge the due execution of the Operations and Maintenance Agreement.

Witness my hand and official seal, *Janet Mills*

MY COMMISSION EXPIRES: 4.29.27



Bioretention Maintenance Requirements

Important operation and maintenance procedures:

- Immediately after the bioretention cell is established, the plants will be watered twice weekly if needed until the plants become established (commonly six weeks).
- Snow, mulch or any other material will NEVER be piled on the surface of the bioretention cell.
- Heavy equipment will NEVER be driven over the bioretention cell.
- Special care will be taken to prevent sediment from entering the bioretention cell.
- Once a year, a soil test of the soil media will be conducted.
- Remove top layer of fill media when the pool does not drain quickly. Based on the media specification, the pool should drain within 24 hours.

After the bioretention cell is established, it will be inspected **quarterly and within 24 hours after every storm event greater than 1.0 inches (or 1.5 inches if in a Coastal County)**. Records of operation and maintenance shall be kept in a known set location and shall be available upon request.

Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

SCM element:	Potential problem:	How to remediate the problem:
The entire bioretention cell	Trash/debris is present.	Remove the trash/debris.
The perimeter of the bioretention cell	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, plant ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The flow diversion structure (if applicable)	The structure is clogged.	Unclog the structure and dispose of any sediment off-site.
	The structure is damaged.	Make any necessary repairs or replace if the damage is too much for repair.
The inlet device	The inlet pipe is clogged (if applicable).	Unclog the pipe and dispose of any sediment in a location where it will not cause impacts to streams or the SCM.
	The inlet pipe is cracked or otherwise damaged (if applicable).	Repair or replace the pipe.
	Erosion is occurring in the swale (if applicable).	Regrade the swale if necessary and provide erosion control devices such as reinforced turf matting or riprap to avoid future erosion problems.
	Stone verge is clogged or covered in sediment (if applicable).	Remove sediment and clogged stone and replace with clean stone.
The pretreatment area	Flow is bypassing pretreatment area and/or gullies have formed.	Regrade if necessary to route all flow to the pretreatment area. Restabilize the area after grading.
	Sediment has accumulated to a depth greater than three inches.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the SCM.

Erosion has occurred.

Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.

Weeds are present.

Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.

Bioretention Maintenance Requirements (continued)

SCM element:	Potential problem:	How to remediate the problem:
<p align="center">Bioretention cell vegetation</p>	<p>Best professional practices show that pruning is needed to maintain optimal plant health.</p>	<p>Prune according to best professional practices. Maintain lines of sight between 2'-6'.</p>
	<p>Plants are dead, diseased or dying.</p>	<p>Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application to establish the ground cover if a soil test indicates it is necessary. If sod was used, check to see that it was not grown on clay or impermeable soils. Replace sod if necessary.</p>
	<p>Weeds are present.</p>	<p>Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.</p>
	<p>Tree stakes/wires are present six months after planting.</p>	<p>Remove tree stake/wires (which can kill the tree if not removed).</p>
<p align="center">Bioretention cell mulch and media</p>	<p>Mulch is breaking down or has floated away.</p>	<p>Spot mulch if there are only random void areas. Replace whole mulch layer if necessary. Remove the remaining mulch and replace with triple shredded hard wood mulch at a maximum depth of four inches.</p>
	<p>Soils and/or mulch are clogged with sediment.</p>	<p>Determine the extent of the clogging - remove and replace either just the top layers or the entire media as needed. Dispose of the spoil in an appropriate off-site location. Use triple shredded hard wood mulch at a maximum depth of four inches. Search for the source of the sediment and remedy the problem if possible.</p>
	<p>An annual soil test shows that pH has dropped or heavy metals have accumulated in the soil media.</p>	<p>Dolomitic lime shall be applied as recommended per the soil test and toxic soils shall be removed, disposed of properly and replaced with new planting media.</p>
<p align="center">The underdrain, filter fabric element, and outlet system</p>	<p>Clogging has occurred.</p>	<p>Wash out the underdrain system.</p>
	<p>Clogging has occurred.</p>	<p>Clean out the drop inlet. Dispose of the sediment in a location where it will not cause impacts to streams or the SCM..</p>
	<p>The drop inlet is damaged</p>	<p>Repair or replace the drop inlet.</p>
<p align="center">The receiving water</p>	<p>Erosion or other signs of damage have occurred at the outlet.</p>	<p>Repair the damage and improve the flow dissipation structure.</p>
	<p>Discharges from the bioretention cell are causing erosion or sedimentation in the receiving water.</p>	<p>Contact the local NCDEQ Regional Office.</p>