

COMPREHENSIVE STORMWATER MANAGEMENT PERMIT

HIGH DENSITY DEVELOPMENT

SECTION 1 – APPROVAL

Having reviewed the application and all supporting materials, the City of Wilmington has determined that the application is complete and the proposed development meets the requirements of the City of Wilmington's Comprehensive Stormwater Ordinance.

PERMIT HOLDER: **Arboretum Village, LLC**
PROJECT: **Village Townhomes**
ADDRESS: **294 Military Cutoff Road**
PERMIT #: **2019054**
DATE: **09/13/2019**

Therefore, the above referenced site is hereby approved and subject to all conditions set forth in Section 2 of this approval and all applicable provisions of the City of Wilmington Comprehensive Stormwater Management Ordinance.

This permit shall be effective from the date of issuance until 09/13/2029 and shall be subject to the following specified conditions and limitations:

Section 2 - CONDITIONS

1. This approval is valid only for the stormwater management system as proposed on the approved stormwater management plans dated 09/13/2019.
2. The project will be limited to the amount and type of built-upon area indicated in Section IV of the Stormwater Management Application Form submitted as part of the approved stormwater permit application package, and per the approved plans.
3. This permit shall become void unless the facilities are constructed in accordance with the approved stormwater management plans, specifications and supporting documentation, including information provided in the application and supplements.
4. The runoff from all built-upon area within any permitted drainage area must be directed into the permitted stormwater control system for that drainage area.
5. The permittee shall submit a revised stormwater management application packet to the City of Wilmington and shall have received approval prior to construction, for any modification to the approved plans, including, but not limited to, those listed below:
 - a. Any revision to any item shown on the approved plans, including the stormwater management measures, built-upon area, details, etc.
 - b. Redesign or addition to the approved amount of built-upon area or to the drainage area.
 - c. Further subdivision, acquisition, lease or sale of any part of the project area.
 - d. Filling in, altering, or piping of any vegetative conveyance shown on the approved plan.
 - e. Construction of any permitted future areas shown on the approved plans.



6. A copy of the approved plans and specifications shall be maintained on file by the Permittee.
7. During construction, erosion shall be kept to a minimum and any eroded areas of the system will be repaired immediately.
8. If the stormwater system was used as an Erosion Control device, it must be restored to design condition prior to operation as a stormwater treatment device, and prior to issuance of any certificate of occupancy for the project.
9. All areas must be maintained in a permanently stabilized condition. If vegetated, permanent seeding requirements must follow the guidelines established in the North Carolina Erosion and Sediment Control Planning and Design Manual unless an alternative is specified and approved by the City of Wilmington.
10. All applicable operation & maintenance agreements and easements pertaining to each stormwater treatment system shall be referenced on the final plat and recorded with the Register of Deeds upon final plat approval. If no plat is recorded for the site the operation and maintenance agreements and easements shall be recorded with the Register of Deeds so as to appear in the chain of title of all subsequent purchasers under generally accepted searching standards.
11. The stormwater management system shall be constructed in its entirety, vegetated and operational for its intended use prior to the construction of any built-upon surface unless prior approval is obtained. City Staff must be notified of any deviation prior to construction of the built-upon surface. Any deviation request shall include justification and must propose an alternative timeline or construction sequence. Notification shall not constitute approval. Any alternative timeline approved by City staff shall become an enforceable component of this permit.
12. The permittee shall at all times provide the operation and maintenance necessary to assure the permitted stormwater system functions at optimum efficiency. The approved Operation and Maintenance Agreement must be followed in its entirety and maintenance must occur at the scheduled intervals including, but not limited to:
 - a. Scheduled inspections (interval noted on the agreement).
 - b. Sediment removal.
 - c. Mowing and revegetation of slopes and the vegetated areas.
 - d. Maintenance of landscape plants, including those within the landscape buffer and on the vegetated shelf.
 - e. Immediate repair of eroded areas, especially slopes.
 - f. Debris removal and unclogging of outlet structure, orifice device, flow spreader, catch basins and/or piping.
 - g. Access to the outlet structure must be available at all times.
13. Records of inspection, maintenance and repair for the permitted stormwater system must be kept by the permittee for at least 5 years from the date of record and made available upon request to authorized personnel of the City of Wilmington. The records will indicate the date, activity, name of person performing the work and what actions were taken.



Public Services

Engineering
212 Operations Center Drive
Wilmington, NC 28412
910 341-7807
910 341-5881 fax
wilmingtonnc.gov
Dial 711 TTY/Voice

14. Upon completion of construction, before a Certificate of Occupancy shall be granted, and prior to operation or intended use of this permitted facility, the applicant shall submit to the City of Wilmington as-built plans for all stormwater management facilities. The plans shall show the final design specifications and the field location, type, depth, invert and planted vegetation of all measures, controls and devices, as-installed. A certification shall be submitted, along with all supporting documentation that specifies, under seal that the as-built stormwater measures, controls and devices are in compliance with the approved stormwater management plans. A final inspection by City of Wilmington personnel will be required prior to issuance of a certificate of occupancy or operation of the permitted facility.
15. This permit is not transferable except after application and approval by the City of Wilmington. In the event of a change of ownership, name change or change of address the permittee must submit a completed Name/Ownership Change form to the City of Wilmington at least 30 days prior to the change. It shall be signed by all applicable parties, and be accompanied by all required supporting documentation. Submittal of a complete application shall not be construed as an approved application. The application will be reviewed on its own merits by the City of Wilmington and may or may not be approved. The project must be in compliance with the terms of this permit in order for the transfer request to be considered. The permittee is responsible for compliance with all permit conditions until such time as the City of Wilmington approves the transfer request. Neither the sale of the project nor the conveyance of common area to a third party should be considered as an approved transfer of the permit.
16. Failure to abide by the conditions and limitations contained in this permit may subject the Permittee to enforcement action by the City of Wilmington, in accordance with Sections 18-52 and 18-53 and any other applicable section of the Land Development Code.
17. The City of Wilmington may notify the permittee when the permitted site does not meet one or more of the minimum requirements of the permit. Within the time frame specified in the notice, the permittee shall submit a written time schedule to the City of Wilmington for modifying the site to meet minimum requirements. The permittee shall provide copies of revised plans and certification in writing to the City of Wilmington that the changes have been made.
18. The issuance of this permit does not preclude the Permittee from complying with any and all statutes, rules, regulations, or ordinances, which may be imposed by other government agencies (local, state, and federal) having jurisdiction.
19. In the event that the facilities fail to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective action, including those as may be required by the City of Wilmington, such as the construction of additional or replacement stormwater management systems.
20. The permittee grants City of Wilmington Staff permission to enter the property during normal business hours for the purpose of inspecting all components of the permitted stormwater management facility.



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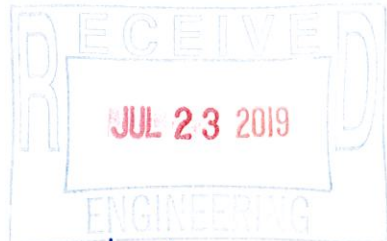
21. The permit issued shall continue in force and effect until revoked or terminated by the City of Wilmington. The permit may be modified, revoked and reissued or terminated for cause. The filing of a request for a permit modification, revocation and re-issuance or termination does not stay any permit condition.
22. The approved stormwater management plans and all documentation submitted as part of the approved stormwater management permit application package for this project are incorporated by reference and are enforceable parts of the permit.
23. The permittee shall submit a renewal request with all required forms and documentation at least 180 days prior to the expiration date of this permit.
24. If any one or more of the conditions of this permit is found to be unenforceable or otherwise invalidated, all remaining conditions shall remain in full effect.

Stormwater Management Permit issued this the 13th day of September, 2019

A handwritten signature in blue ink, appearing to read 'S-500', is written over a horizontal line.

for Sterling Cheatham, City Manager
City of Wilmington

SWP2019054



Public Services
Engineering
212 Operations Center Dr
Wilmington, NC 28412
910 341-7807
910 341-5881 fax
wilmingtonnc.gov
Dial 711 TTY/Voice



*Unless otherwise
Noted

STORMWATER MANAGEMENT PERMIT APPLICATION FORM
(Form SWP 2.2)

I. GENERAL INFORMATION

1. Project Name (subdivision, facility, or establishment name - should be consistent with project name on plans, specifications, letters, operation and maintenance agreements, etc.):

VILLAGE TOWNHOMES

2. Location of Project (street address):

294 MILITARY CUTOFF RD.

City: Wilmington County: New Hanover Zip: 28405

3. Directions to project (from nearest major intersection):

.47 MILES SOUTH OF MILITARY CUTOFF RD. AND MARKET ST. CONNECTION

II. PERMIT INFORMATION

1. Specify the type of project (check one): Low Density High Density
Drains to an Offsite Stormwater System Drainage Plan Other

If the project drains to an Offsite System, list the Stormwater Permit Number(s):

City of Wilmington: _____ State – NCDENR/DWQ: _____

2. Is the project currently covered (whole or in part) by an existing City or State (NCDENR/DWQ) Stormwater Permit? Yes No

If yes, list all applicable Stormwater Permit Numbers:

City of Wilmington: _____ State – NCDENR/DWQ: _____

3. Additional Project Permit Requirements (check all applicable):

CAMA Major Sedimentation/Erosion Control

NPDES Industrial Stormwater 404/401 Permit: Proposed Impacts: _____

If any of these permits have already been acquired please provide the Project Name, Project/Permit Number, issue date and the type of each permit:

III. CONTACT INFORMATION

1. Print Applicant / Signing Official's name and title (specifically the developer, property owner, lessee, designated government official, individual, etc. who owns the project):

Applicant / Organization: ARBORETUM VILLAGE, LLC
Signing Official & Title: MICHAEL MAYNARD, MANAGER

- a. Contact information for Applicant / Signing Official:

Street Address: 10 CARDINAL DR.
City: WILMINGTON State: NC Zip: 28403
Phone: 910 465 4104 Fax: 910-815-0593 Email: michael@tributeproperties.com
Mailing Address (if different than physical address): _____
City: _____ State: _____ Zip: _____

- b. Please check the appropriate box. The applicant listed above is:

The property owner (Skip to item 3)
 Lessee* (Attach a copy of the lease agreement and complete items 2 and 2a below)
 Purchaser* (Attach a copy of the pending sales agreement and complete items 2 and 2a below)
 Developer* (Complete items 2 and 2a below.)

2. Print Property Owner's name and title below, if you are the lessee, purchaser, or developer. (This is the person who owns the property that the project is on.)

Property Owner / Organization: ARBORETUM VILLAGE, LLC
Signing Official & Title: MICHAEL MAYNARD, MANAGER

- a. Contact information for Property Owner:

Street Address: 10 SOUTH CARDINAL DR.
City: WILMINGTON State: NC Zip: 28403
Phone: 910 465 4104 Fax: _____ Email: michael@tributecompanies.com
Mailing Address (if different than physical address): _____
City: _____ State: _____ Zip: _____

3. (Optional) Print the name and title of another contact such as the project's construction supervisor or another person who can answer questions about the project:

Other Contact Person / Organization: _____
Signing Official & Title: _____

a. Contact information for person listed in item 3 above:

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ Email: _____

Mailing Address (if different than physical address): _____

City: _____ State: _____ Zip: _____

IV. PROJECT INFORMATION

1. In the space provided below, briefly summarize how the stormwater runoff will be treated.

STORMWATER RUNOFF WILL BE COLLECTED IN SWALES AND GUTTERS ROUTED TO CATCH BASIN AND DROP INLETS WHERE PIPING WILL CONVEY THE FLOW TO THE FOREBAY OF THE WET DETENTION POND WITH TWO COMPARTMENTS CONNECTED BY A CULVERT THEN DISCHARGED BY OUTLET STRUCTURE TO SAND FILTER TO LEVEL SPREADER TO VEG. FILTER STRIP

- 2. Total Property Area: 372,438 square feet 8.55 ac.
- 3. Total Coastal Wetlands Area: _____ square feet
- 4. Total Surface Water Area: _____ square feet
- 5. Total Property Area (2) – Total Coastal Wetlands Area (3) – Total Surface Water Area (4) = Total Project Area: _____ square feet.
- 6. Existing Impervious Surface within Property Area: 86,369 square feet
- 7. Existing Impervious Surface to be Removed/Demolished: 86,369 square feet
- 8. Existing Impervious Surface to Remain: _____ square feet
- 9. Total Onsite (within property boundary) Newly Constructed Impervious Surface (*in square feet*):

Buildings/Lots		90,338 SF
Impervious Pavement	PARKING	105,135 SF
Pervious Pavement	(adj. total, with % credit applied)	
Impervious Sidewalks		25,393 SF
Pervious Sidewalks	(adj. total, with % credit applied)	
Other (describe)		
Future Development	(Reserve)	9,134 SF
Total Onsite Newly Constructed Impervious Surface		230,000 SF

- 10. Total Onsite Impervious Surface
(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 230,000 square feet
- 11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 61.8 %

12. Total Offsite Newly Constructed Impervious Area (improvements made outside of property boundary, in square feet):

Impervious Pavement	MILITARY CUTOFF DRIVEWAY	3,014 SF
Pervious Pavement	(adj. total, with % credit applied)	
Impervious Sidewalks	MILITARY CUTOFF RIGHT OF WAY	1,927 SF
Pervious Sidewalks	(adj. total, with % credit applied)	
Other (describe)		
Total Offsite Newly Constructed Impervious Surface		4,941 SF

13. Total Newly Constructed Impervious Surface
 (Total Onsite + Offsite Newly Constructed Impervious Surface) = 230,000 ^{234,941} _{SS} square feet

14. Complete the following information for each Stormwater BMP drainage area. If there are more than three drainage areas in the project, attach an additional sheet with the information for each area provided in the same format as below. Low Density projects may omit this section and skip to Section V.

Basin Information	BMP # 1	BMP #	BMP #
Receiving Stream Name	HOWE CREEK		
Receiving Stream Index Number	18-87-23		
Stream Classification	SA;ORW		
Total Drainage Area (sf)	372,438		
On-Site Drainage Area (sf)	372,438		
Off-Site Drainage Area (sf)			
Total Impervious Area (sf)	230,000		
Buildings/Lots (sf)	90,338		
Impervious Pavement (sf)	105,135		
Pervious Pavement (sf)			
Impervious Sidewalks (sf)	25,393		
Pervious Sidewalks (sf)			
Other (sf)			
Future Development (sf)	9,134		
Existing Impervious to remain (sf)			
Offsite (sf)			
Percent Impervious Area (%)	61.8		

15. How was the off-site impervious area listed above determined? Provide documentation:

CAD AREA MEASUREMENT

V. SUBMITTAL REQUIREMENTS

1. Supplemental and Operation & Maintenance Forms - One applicable City of Wilmington Stormwater BMP supplement form and checklist must be submitted for **each** BMP specified for this project. One applicable proposed operation and maintenance (O&M) form must be submitted for **each type** of stormwater BMP. Once approved, the operation and maintenance forms must be referenced on the final plat and recorded with the register of deeds office.
2. Deed Restrictions and Restrictive Covenants - For all subdivisions, outparcels, and future development, the appropriate property restrictions and protective covenants are required to be recorded prior to the sale of any lot. Due to variability in lot sizes or the proposed BUA allocations, a table listing each lot number, lot size, and the allowable built-upon area must be provided as an attachment to the completed and notarized deed restriction form. The appropriate deed restrictions and protective covenants forms can be downloaded at the link listed in section V (3). Download the latest versions for each submittal.

In instances where the applicant is different than the property owner, it is the responsibility of the property owner to sign the deed restrictions and protective covenants form while the applicant is responsible for ensuring that the deed restrictions are recorded.

By the notarized signature(s) below, the permit holder(s) certify that the recorded property restrictions and protective covenants for this project, if required, shall include all the items required in the permit and listed on the forms available on the website, that the covenants will be binding on all parties and persons claiming under them, that they will run with the land, that the required covenants cannot be changed or deleted without concurrence from the City of Wilmington, and that they will be recorded prior to the sale of any lot.

3. Only complete application packages will be accepted and reviewed by the City. A complete package includes all of the items listed on the City Engineering Plan Review Checklist, including the fee. Copies of the Engineering Plan Review Checklist, all Forms, Deed Restrictions as well as detailed instructions on how to complete this application form may be downloaded from:

<http://www.wilmingtonnc.gov/PublicServices/Engineering/PlanReview/StormwaterPermits.aspx>

The complete application package should be submitted to the following address:

City of Wilmington – Engineering
Plan Review Section
212 Operations Center Dr
Wilmington, NC 28412

VI. CONSULTANT INFORMATION AND AUTHORIZATION

1. Applicant: Complete this section if you wish to designate authority to another individual and/or firm (such as a consulting engineer and /or firm) so that they may provide information on your behalf for this project (such as addressing requests for additional information).

Consulting Engineer: James H. Fentress Jr. PE, PLS

Consulting Firm: STROUD ENGINEERING, P.A.

a. Contact information for consultant listed above:

Mailing Address: 102 - D CINEMA DR.

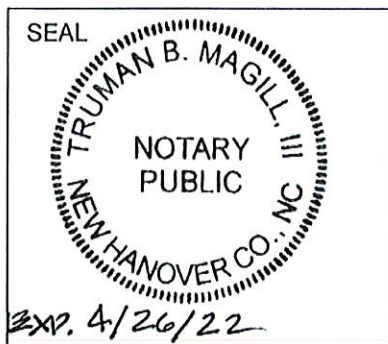
City: WILMINGTON State: NC Zip: 28403

Phone: 910-815-0775 Fax: 910-815-0593 Email: jfentress@stroudengineer.com

VII. PROPERTY OWNER AUTHORIZATION (If Section III(2) has been filled out, complete this section)

I, (*print or type name of person listed in Contact Information, item 2*) Michael P. Maynard, certify that I own the property identified in this permit application, and thus give permission to (*print or type name of person listed in Contact Information, item 1*) _____ with (*print or type name of organization listed in Contact Information, item 1*) _____ to develop the project as currently proposed. A copy of the lease agreement or pending property sales contract has been provided with the submittal, which indicates the party responsible for the operation and maintenance of the stormwater system.

As the legal property owner I acknowledge, understand, and agree by my signature below, that if my designated agent (*entity listed in Contact Information, item 1*) dissolves their company and/or cancels or defaults on their lease agreement, or pending sale, responsibility for compliance with the City of Wilmington Stormwater Permit reverts back to me, the property owner. As the property owner, it is my responsibility to notify the City of Wilmington immediately and submit a completed Name/Ownership Change Form within 30 days; otherwise I will be operating a stormwater treatment facility without a valid permit. I understand that the operation of a stormwater treatment facility without a valid permit is a violation of the City of Wilmington Municipal Code of Ordinances and may result in appropriate enforcement including the assessment of civil penalties.



Signature: *MP Maynard*
Date: 7/13/18

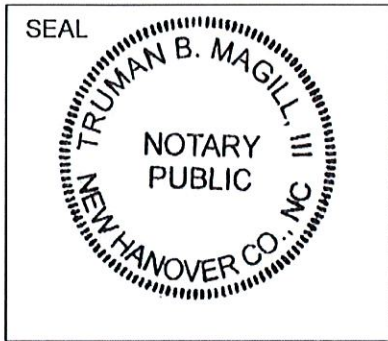
I, TRUMAN B. MAGILL III, a Notary Public for the State of NORTH CAROLINA, County of NEW HANOVER, hereby certify that MICHAEL P. MAYNARD personally appeared before me this day of 7/13/18.

and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

My commission expires: _____

VIII. APPLICANT'S CERTIFICATION

I, (print or type name of person listed in Contact Information, item 1), Michael P. Maynard certify that the information included on this permit application form is, to the best of my knowledge, correct and that the project will be constructed in conformance with the approved plans, that the required deed restrictions and protective covenants will be recorded, and that the proposed project complies with the requirements of the applicable stormwater rules under.



Signature: *Michael P. Maynard*
Date: 7/13/18

I, TRUMAN B. MAGILL III, a Notary Public for the State of NORTH CAROLINA, County of NEW HANOVER, do hereby certify that MICHAEL P. MAYNARD personally appeared before me this day of 7/13/18, and acknowledge the due execution of the application for a stormwater

permit. Witness my hand and official seal,

Truman B. Magill III
My commission expires: 4/26/22



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM
WET DETENTION BASIN SUPPLEMENT

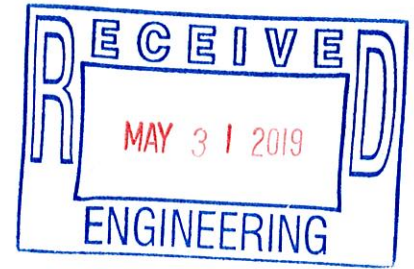
*This form must be filled out, printed and submitted.
 The Required Items Checklist (Part III) must be printed, filled out and submitted along with all of the required information.*

I. PROJECT INFORMATION

Project name	VILLAGE TOWNHOMES
Contact person	MICHAEL MAYNARD
Phone number	910 465 4104
Date	5/29/2019
Drainage area number	1

II. DESIGN INFORMATION

Site Characteristics		
Drainage area	372,438	ft ²
Impervious area, post-development	230,000	ft ²
% impervious	61.8	%
Design rainfall depth	1.5	in
Storage Volume: Non-SA Waters		
Minimum volume required		ft ³
Volume provided		ft ³
Storage Volume: SA Waters		
1.5" runoff volume	28,203	ft ³
Pre-development 1-yr, 24-hr runoff	30,994	ft ³
Post-development 1-yr, 24-hr runoff	72,575	ft ³
Minimum volume required	41,581	ft ³
Volume provided	41,581	ft ³
Peak Flow Calculations		
Is the pre/post control of the 1yr 24hr storm peak flow required?	Y	(Y or N)
1-yr, 24-hr rainfall depth	3.9	in
Rational C, pre-development	0.37	(unitless)
Rational C, post-development	0.66	(unitless)
Rainfall intensity: 1-yr, 24-hr storm	0.16	in/hr OK
Pre-development 1-yr, 24-hr peak flow	0.74	ft ³ /sec
Post-development 1-yr, 24-hr peak flow	1.70	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	0.96	ft ³ /sec
Elevations		
Temporary pool elevation	32.84	fmsl
Permanent pool elevation	31.00	fmsl
SHWT elevation (approx. at the perm. pool elevation)	31.00	fmsl
Top of 10ft vegetated shelf elevation	31.50	fmsl
Bottom of 10ft vegetated shelf elevation	30.50	fmsl
Sediment cleanout, top elevation (bottom of pond)	26.00	fmsl
Sediment cleanout, bottom elevation	24.00	fmsl
Sediment storage provided	1.00 2	ft
Is there additional volume stored above the state-required temp. pool?	N	(Y or N)
Elevation of the top of the additional volume	32.84	fmsl OK



II. DESIGN INFORMATION

Surface Areas

Area, temporary pool	24,281 ft ²	
Area REQUIRED, permanent pool	16,770 ft ²	
SA/DA ratio	4.5 (unitless)	
Area PROVIDED, permanent pool, A _{perm_pool}	18,586 ft ²	OK
Area, bottom of 10ft vegetated shelf, A _{bot_shelf}	14,013 ft ²	
Area, sediment cleanout, top elevation (bottom of pond), A _{bot_pond}	7,649 ft ²	

Volumes

Volume, temporary pool	41,581 ft ³	OK
Volume, permanent pool, V _{perm_pool}	71,454 ft ³	
Volume, forebay (sum of forebays if more than one forebay)	12,867 ft ³	
Forebay % of permanent pool volume	18.0% %	Insufficient forebay volume.

SA/DA Table Data

Design TSS removal	90 %	
Coastal SA/DA Table Used?	Y	(Y or N)
Mountain/Piedmont SA/DA Table Used?	N	(Y or N)
SA/DA ratio	4.5 (unitless)	

Average depth (used in SA/DA table):

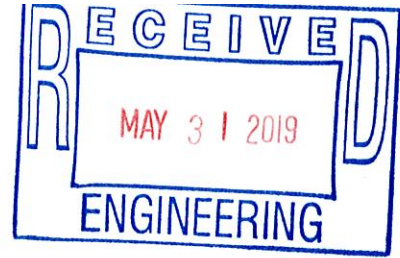
Calculation option 1 used? (See Figure 10-2b)		(Y or N)
Volume, permanent pool, V _{perm_pool}	71,454 ft ³	
Area provided, permanent pool, A _{perm_pool}	18,586 ft ²	
Average depth calculated	3.84 ft	OK
Average depth used in SA/DA, d _{av} , (Round to nearest 0.5ft)	4.0 ft	OK
Calculation option 2 used? (See Figure 10-2b)	N	(Y or N)
Area provided, permanent pool, A _{perm_pool}	18,586 ft ²	
Area, bottom of 10ft vegetated shelf, A _{bot_shelf}	12,372 ft ²	
Area, sediment cleanout, top elevation (bottom of pond), A _{bot_pond}	7,649 ft ²	
"Depth" (distance b/w bottom of 10ft shelf and top of sediment)	5.0 ft	
Average depth calculated	5.22 ft	OK
Average depth used in SA/DA, d _{av} , (Round to nearest 0.5ft)	5.0 ft	OK

Drawdown Calculations

Drawdown through orifice?	Y	(Y or N)	Do not enter data for both an orifice and a weir.
Diameter of orifice (if circular)	3.0 in		
Area of orifice (if-non-circular)		in ²	
Coefficient of discharge (C _D)	0.60 (unitless)		
Driving head (H _o)	0.90 ft		
Drawdown through weir?	N	(Y or N)	Do not enter data for both an orifice and a weir.
Weir type		(unitless)	
Coefficient of discharge (C _w)		(unitless)	
Length of weir (L)		ft	
Driving head (H)		ft	
Pre-development 1-yr, 24-hr peak flow	0.74	ft ³ /sec	
Post-development 1-yr, 24-hr peak flow	1.70	ft ³ /sec	
Storage volume discharge rate (through discharge orifice or weir)	0.23	ft ³ /sec	
Storage volume drawdown time	3.6 days		OK, draws down in 2-5 days.

Additional Information

Vegetated side slopes	3 : 1	OK
Vegetated shelf slope	6 : 1	Insufficient shelf slope.
Vegetated shelf width	6.0 ft	Insufficient shelf length.
Length of flowpath to width ratio	3 : 1	OK
Length to width ratio	3.0 : 1	OK
Trash rack for overflow & orifice?	Y	(Y or N) OK
Freeboard provided	1.0 ft	OK
Vegetated filter provided?	Y	(Y or N) OK
Recorded drainage easement provided?	Y	(Y or N) OK
Captures all runoff at ultimate build-out?	Y	(Y or N) OK
Drain mechanism for maintenance or emergencies is:	MUDHOG PUMP	



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM

LEVEL SPREADER, FILTER STRIP AND RESTORED RIPARIAN BUFFER SUPPLEMENT

This form must be completely filled out, printed and submitted.

I. PROJECT INFORMATION

Project name	VILLAGE TOWNHOMES
Contact name	MICHAEL MAYNARD
Phone number	910 465 4104
Date	5/29/19
Drainage area number	1

II. DESIGN INFORMATION

For Level Spreaders Receiving Flow From a BMP

Type of BMP	LEVEL SPREADER WITH FILTER STRIP	
Drawdown flow from the BMP	1.7	cfs

For Level Spreaders Receiving Flow from the Drainage Area

Drainage area	372,438.00	ft ²
Impervious surface area	230,000.00	ft ²
Percent impervious	61.8	%
Rational C coefficient	0.66	
Peak flow from the 1 in/hr storm	1.7	cfs
Time of concentration	20.37	min
Rainfall intensity, 10-yr storm	7.32	in/hr
Peak flow from the 10-yr storm	4.65	cfs

Where Does the Level Spreader *Discharge*?

To a grassed bioretention cell?		(Y or N)
To a mulched bioretention cell?		(Y or N)
To a wetland?		(Y or N)
To a filter strip or riparian buffer?		(Y or N)
Other (specify)	ROADSIDE DITCH	

Filter Strip or Riparian Buffer Characterization (if applicable)

Width of grass	30.00	ft	
Width of dense ground cover	30.00	ft	
Width of wooded vegetation		ft	
Total width	30.00	ft	
Elevation at downslope base of level lip	30.00	fmsl	
Elevation at top of bank of the receiving water	29.00	fmsl	
Slope (from level lip to to top of bank)	3.33	%	OK
Are any draws present?	N	(Y or N)	OK

Level Spreader Design

Forebay surface area		sq ft	No forebay is needed.
Feet of level lip needed per cfs		ft/cfs	
Answer "Y" to one of the following:			
Length based on the 1 in/hr storm?	N	(Y or N)	
Length based on the 10-yr storm?	Y	(Y or N)	
Length based on the BMP discharge rate?	Y	(Y or N)	
Design flow	1.7	cfs	
Is a bypass device provided?	Y	(Y or N)	A bypass device is not needed.
Length of the level lip	30.00	ft	
Are level spreaders in series?	N	(Y or N)	

Bypass Channel Design (if applicable)

Does the bypass discharge through a wetland?

Does the channel enter the stream at an angle?

Dimensions of the channel (see diagram below):

M

B

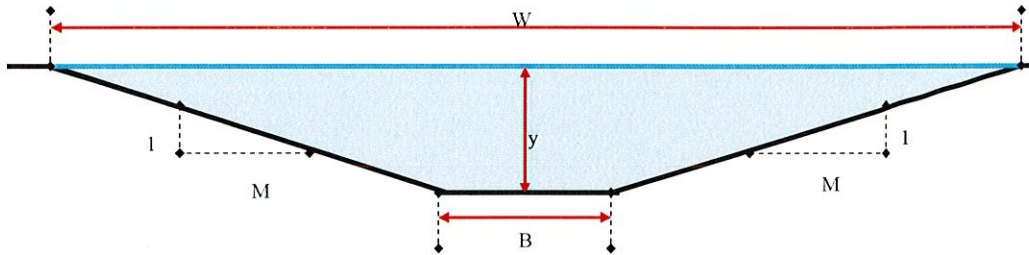
W

y

Peak velocity in the channel during the 10-yr storm

Channel lining material

N	(Y or N)
Y	(Y or N)
1.00	ft
30.00	ft
32.00	ft
1.00	ft
4.66	cfs
VEGETATED	





STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM
SAND FILTER SUPPLEMENT

*This form must be filled out on line, printed and submitted with all of the required information.
 Make sure to also fill out and submit the Required Items Checklist (Section III) and the I&M Agreement (Section IV)*

I. PROJECT INFORMATION

Project name	VILLAGE TOWNHOMES
Contact name	MICHAEL MAYNARD
Phone number	910 465 4104
Date	5/29/19
Drainage area number	1

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	372,438 ft ²	OK
Impervious area	230,000 ft ²	
% Impervious (I_A)	61.8% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth	3.86 in	
1-yr, 24-hr intensity	0.16 in/hr	
Pre-development 1-yr, 24-hr runoff	0.74 ft ³ /sec	
Post-development 1-yr, 24-hr runoff	1.7 ft ³ /sec	
Pre/Post 1-yr, 24-hr peak control	0.96 ft ³ /sec	
Storage Volume		
Design volume (WQV)	28,203 ft ³	
Adjusted water quality volume (WQV _{Adj})	41,581 ft ³	Insufficient. The adjusted water quality volume can not be contained. Increase area of filter and/or sed. Basin.
Volume contained in the sedimentation basin and on top of the sand filter		
Top of sand filter/grate elevation	29.75 ft amsl	
Weir elevation (between chambers)	30.5 ft amsl	
Maximum head on the sedimentation basin and sand filter ($h_{MaxFilter}$)	0.75 ft	Insufficient depth.
Average head on the sedimentation basin and sand filter (h_A)	0.38 ft	Ensure that the average is half of the max.
Runoff Coefficient (R_v)	0.65 (unitless)	
Type of Sand Filter		
Open sand filter?	N	Y or N
SHWT elevation		ft amsl
Bottom of the sand filter elevation		ft amsl
Clearance (d_{SHWT})		
Closed/pre-cast sand filter?	Y	Y or N
SHWT elevation	26.00	ft amsl
Bottom of the sand filter elevation	28.25	ft amsl
Clearance (d_{SHWT})	2.25	
If this is a closed, underground closed sand filter: The clearance between the surface of the sand filter and the bottom of the roof of the underground structure (d_{Space})	2.25	ft

Sedimentation Basin

Surface area of sedimentation basin (A_S)	18,586.00 ft ²
Sedimentation basin/chamber depth	6.00 ft

OK. Meets minimum, but may need to be increased to contain the required volume if error under Storage

Sand Filter

Surface area of sand filter (A_F)	66.00 ft ²
Top of sand media filter bed elevation	29.75 ft amsl
Bottom of sand media filter bed/drain elevation	28.25 ft amsl
Depth of the sand media filter bed (d_F)	1.50 ft
Coefficient of permeability for the sand filter (k)	6.00 (ft/day)
Outlet diameter	2.75 in
Outlet discharge/flowrate	0.20 ft ³ /sec
Time to drain the sand filter (t)	61.97 hours
Time to drain the sand filter (t)	2.58 days

Increase surface area. This will also increase the customer's ability to contain the adjusted water quality.

Insufficient drainage time.

Additional Information

Does volume in excess of the design volume bypass the sand filter?	Y	Y or N	OK
Is an off-line flow-splitting device used?	Y	Y or N	OK
If draining to SA waters: Does volume in excess of the design volume flow evenly distributed through a vegetated filter?	Y	Y or N	OK
What is the length of the vegetated filter?	30 ft		
Does the design use a level spreader to evenly distribute flow?	Y	Y or N	OK
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
If not a closed bottom, is BMP located at least 100ft from water supply wells?		Y or N	
Are the vegetated side slopes equal to or less than 3:1	Y	Y or N	OK
Is the BMP located in a recorded drainage easement with a recorded access easement to a public Right of Way (ROW)?	Y	Y or N	OK
What is the width of the sedimentation chamber/forebay (W_{Sed})?	2.00 ft		OK
What is the depth of sand over the outlet pipe (d_{pipe})?	1.50 ft		OK

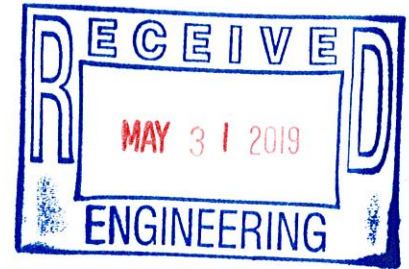


Figure 1: Open Sand Filter

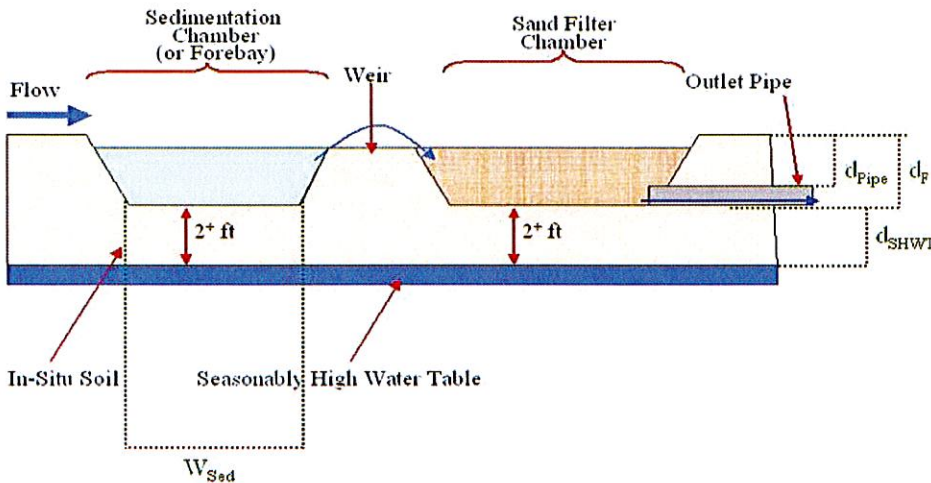
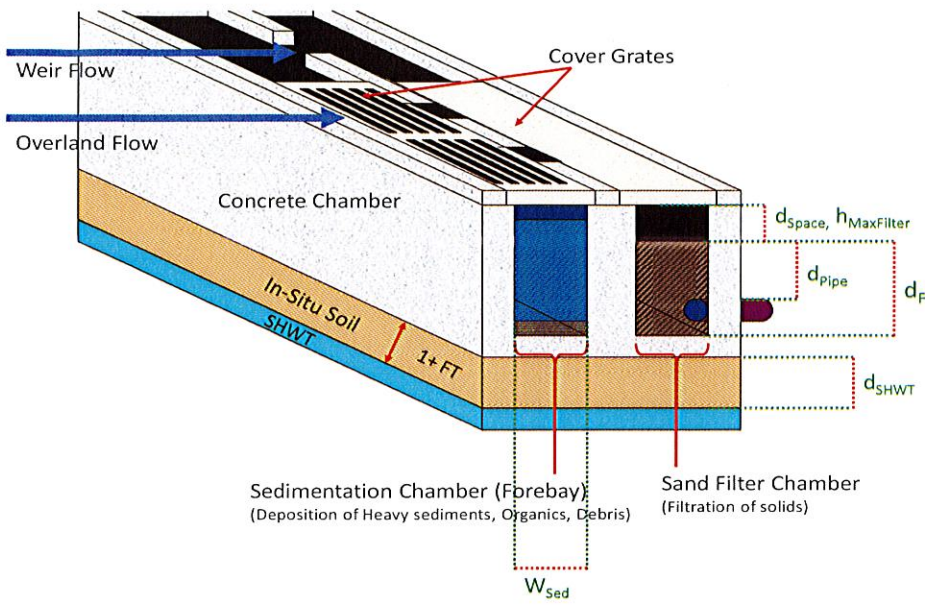


Figure 2: Closed Sand Filter





Wet Detention Basin Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP 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 removal efficiency of the BMP.

The wet detention basin system is defined as the wet detention basin, pretreatment including forebays and the vegetated filter if one is provided.

This system (check one):

does **does not** **incorporate a vegetated filter at the outlet.**

This system (check one):

does **does not** **incorporate pretreatment other than a forebay.**

Important maintenance procedures:

- Immediately after the wet detention basin is established, the plants on the vegetated shelf and perimeter of the basin should be watered twice weekly if needed, until the plants become established (commonly six weeks).
- No portion of the wet detention pond should be fertilized after the first initial fertilization that is required to establish the plants on the vegetated shelf.
- Stable groundcover should be maintained in the drainage area to reduce the sediment load to the wet detention basin.
- If the basin must be drained for an emergency or to perform maintenance, the flushing of sediment through the emergency drain should be minimized to the maximum extent practical.
- Once a year, a dam safety expert should inspect the embankment.

After the wet detention pond is established, it should be inspected **once a month and within 24 hours after every storm event greater than 1.5 inches**. Records of operation and maintenance should be kept in a known set location and must be available upon request. Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

BMP element:	Potential problem:	How I will remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The side slopes of the wet detention basin	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
	Vegetation is too short or too long.	Maintain vegetation at a height of approximately six inches.



BMP element:	Potential problem:	How I will remediate the problem:
The inlet device: pipe or swale	The pipe is clogged.	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged.	Replace the pipe.
	Erosion is occurring in the swale.	Regrade the swale if necessary to smooth it over and provide erosion control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
The forebay	Sediment has accumulated to a depth greater than the original design depth for sediment storage.	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 BMP.
	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.
The vegetated shelf	Best professional practices show that pruning is needed to maintain optimal plant health.	Prune according to best professional practices
	The plant community and coverage is significantly (>25%) different from approved landscape plan.	Restore plant vegetation to approved condition. If landscape plan needs to be adjusted to specify vegetation more appropriate for site conditions, contact City Stormwater or Engineering Staff.
	Cattails or other invasive plants cover >25% of the veg't shelf. A monoculture of plants must be avoided)	Remove all invasives by physical removal or by wiping them with pesticide (do not spray) - consult a professional.
	Plants are dead, diseased or dying.	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.
The main treatment area	Sediment has accumulated to a depth greater than the original design sediment storage depth.	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 BMP.

BMP element:	Potential problem:	How I will remediate the problem:
The main treatment area (continued)	Algal growth covers over 25% of the area.	Consult a professional to remove and control the algal growth.
	Cattails or other invasive plants cover >25% of the veg't shelf. A monoculture of plants must be avoided)	Remove all invasives by physical removal or by wiping them with pesticide (do not spray) - consult a professional.
The embankment	Shrubs have started to grow on the embankment.	Remove shrubs immediately.
	Evidence of muskrat or beaver activity is present.	Use traps to remove muskrats and consult a professional to remove beavers.
	A tree has started to grow on the embankment.	Consult a dam safety specialist to remove the tree.
	An annual inspection by an appropriate professional shows that the embankment needs repair. (if applicable)	Make all needed repairs.
The outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment off-site.
	The outlet device is damaged	Repair or replace the outlet device.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the local NC Division of Water Quality Regional Office, or the 401 Oversight Unit at 919-733-1786.

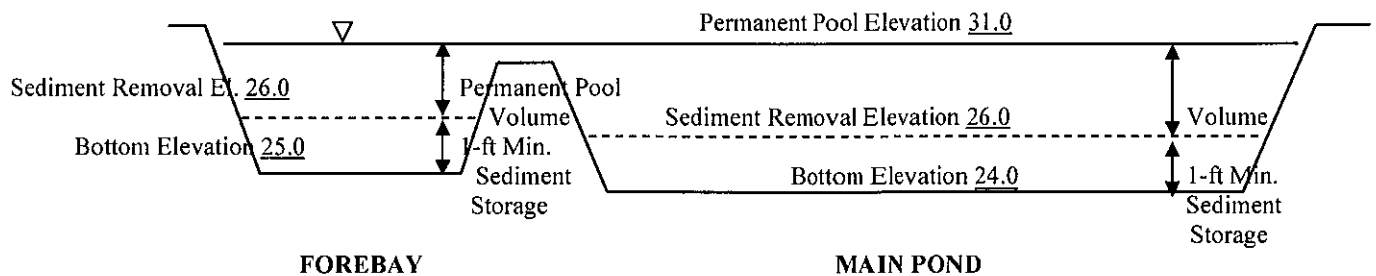
The measuring device used to determine the sediment elevation shall be such that it will give an accurate depth reading and not readily penetrate into accumulated sediments.

When the permanent pool depth reads 5 feet in the main pond, the sediment shall be removed.

When the permanent pool depth reads 5 feet in the forebay, the sediment shall be removed.

BASIN DIAGRAM

(fill in the blanks)



Permit Number: 2019054
(to be provided by City of Wilmington)

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed above. I agree to notify the City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: Village Townhomes

BMP drainage basin number: 1

Print name: Michael Maynard

Title: Manager

Address: 10 Cardinal Drive, Wilmington, NC 28403

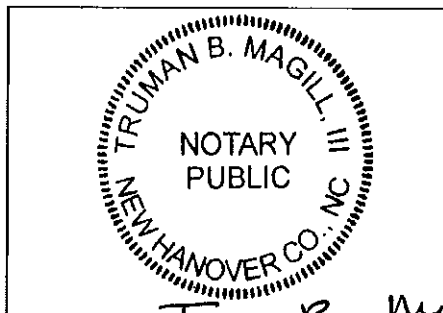
Phone: 910 465 4104

Signature: [Handwritten Signature]

Date: 5-29-19

Note: The legally responsible party should not be a homeowners association unless more than 50% of the lots have been sold and a resident of the subdivision has been named the president.

I, TRUMAN B. MAGILL, III, a Notary Public for the State of NORTH CAROLINA, County of NEW HANOVER, do hereby certify that MICHAEL MAYNARD personally appeared before me this 29th day of MAY, 2019, and acknowledge the due execution of the forgoing wet detention basin maintenance requirements. Witness my hand and official seal,



SEAL T. B. Magill, III

My commission expires 4/26/22

Filter Strip, Restored Riparian Buffer and Level Spreader Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP 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 removal efficiency of the BMP.

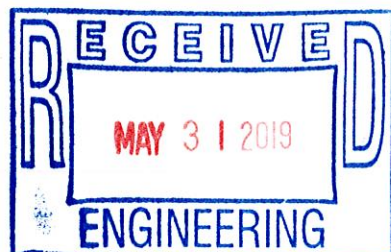
Important maintenance procedures:

- Immediately after the filter strip is established, any newly planted vegetation will be watered twice weekly if needed until the plants become established (commonly six weeks).
- Once a year, the filter strip will be reseeded to maintain a dense growth of vegetation
- Stable groundcover will be maintained in the drainage area to reduce the sediment load to the vegetation.
- Two to three times a year, grass filter strips will be mowed and the clippings harvested to promote the growth of thick vegetation with optimum pollutant removal efficiency. Turf grass should not be cut shorter than 3 to 5 inches and may be allowed to grow as tall as 12 inches depending on aesthetic requirements (NIPC, 1993). Forested filter strips do not require this type of maintenance.
- Once a year, the soil will be aerated if necessary.
- Once a year, soil pH will be tested and lime will be added if necessary.

After the filter strip is established, it will be inspected **quarterly and within 24 hours after every storm event greater than 1.5 inches**. Records of operation and maintenance will be kept in a known set location and will be available upon request.

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

BMP element:	Potential problem:	How I will remediate the problem:
The entire filter strip system	Trash/debris is present.	Remove the trash/debris.
The flow splitter device (if applicable)	The flow splitter device is clogged.	Unclog the conveyance and dispose of any sediment off-site.
	The flow splitter device is damaged.	Make any necessary repairs or replace if damage is too large for repair.



BMP element:	Potential problem:	How I will remediate the problem:
The swale and the level lip	The swale is clogged with sediment.	Remove the sediment and dispose of it off-site.
	The level lip is cracked, settled, undercut, eroded or otherwise damaged.	Repair or replace lip.
	There is erosion around the end of the level spreader that shows stormwater has bypassed it.	Regrade the soil to create a berm that is higher than the level lip, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
	Trees or shrubs have begun to grow on the swale or just downslope of the level lip.	Remove them.
The bypass channel	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then reestablish proper erosion control.
	Turf reinforcement is damaged or ripap is rolling downhill.	Study the site to see if a larger bypass channel is needed (enlarge if necessary). After this, reestablish the erosion control material.
The filter strip	Grass is too short or too long (if applicable).	Maintain grass at a height of approximately three to six inches.
	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
	Sediment is building up on the filter strip.	Remove the sediment and restabilize the soil with vegetation if necessary. Provide lime and a one-time fertilizer application.
	Plants are desiccated.	Provide additional irrigation and fertilizer as needed.
	Plants are dead, diseased or dying.	Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application.
	Nuisance vegetation is choking out desirable species.	Remove vegetation by hand if possible. If pesticide is used, do not allow it to get into the receiving water.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the NC Division of Water Quality local Regional Office, or the 401 Oversight Unit at 919-733-1786.

Permit Number: 2019054
(to be provided by City of Wilmington)

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed above. I agree to notify the City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: Village Townhomes

BMP drainage basin number: 1

Print name: Michael Maynard

Title: Manager

Address: 10 Cardinal Drive, Wilmington, NC 28403

Phone: 910 465 4104

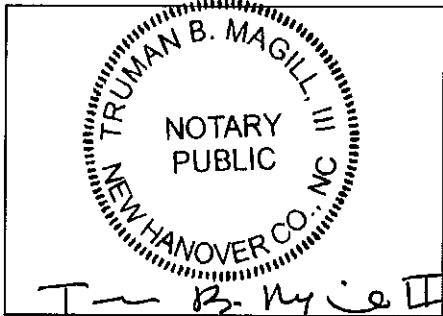
Signature: [Handwritten Signature]

Date: 5-29-19

Note: The legally responsible party should not be a homeowners association unless more than 50% of the lots have been sold and a resident of the subdivision has been named the president.

I, TRUMAN B. MAGILL III, a Notary Public for the State of NORTH CAROLINA, County of NEW HANOVER, do hereby certify that MICHAEL MAYNARD personally appeared before me this 29th day of MAY, 2019, and acknowledge the due execution of the forgoing filter strip, riparian buffer, and/or level spreader maintenance requirements.

Witness my hand and official seal,



My commission expires 4/26/22

Permit Number: 2019054
 (to be provided by City of Wilmington)

BMP Drainage Basin #: 1

Sand Filter Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP 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 removal efficiency of the BMP.

Important maintenance procedures:

- The drainage area will be carefully managed to reduce the sediment load to the sand filter.
- The sedimentation chamber or forebay will be cleaned out whenever sediment depth exceeds six inches.
- Once a year, sand media will be skimmed.
- The sand filter media will be replaced whenever it fails to function properly after maintenance.

The sand filter will be inspected **quarterly and within 24 hours after every storm event greater than 1.5 inches**. Records of operation and maintenance will be kept in a known set location and will be available upon request.

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

BMP element:	Potential problem:	How I will remediate the problem:
Entire BMP	Trash/debris is present.	Remove the trash/debris.
Adjacent pavement (if applicable)	Sediment is present on the pavement surface.	Sweep or vacuum the sediment as soon as possible.
Perimeter of sand filter	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
	Vegetation is too short or too long.	Maintain vegetation at an appropriate height.
Flow diversion structure	The structure is clogged.	Unclog the conveyance and dispose of any sediment offsite.
	The structure is damaged.	Make any necessary repairs or replace if damage is too large for repair.
Forebay or pretreatment area	Sediment has accumulated to a depth of greater than six inches.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and stabilize or dispose of it in a location where it will not cause impacts to streams or the BMP.
	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 a pesticide is used, wipe it on the plants rather than spraying.



BMP element:	Potential problem:	How I will remediate the problem:
Filter bed and underdrain collection system	Water is ponding on the surface for more than 24 hours after a storm.	Check to see if the collector system is clogged and flush if necessary. If water still ponds, remove the top few inches of filter bed media and replace. If water still ponds, then consult an expert.
Outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment offsite.
	The outlet device is damaged	Repair or replace the outlet device.
Receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the NC Division of Water Quality 401 Oversight Unit at 919-733-1786.

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed above. I agree to notify the City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: Village Townhomes

BMP drainage basin number: 1

Print name: ^{MARIE L.}Michael P. Maynard, Sr.

Title: Manager

Address: 10 South Cardinal Drive

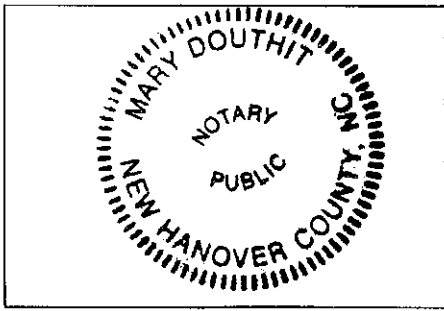
Phone: 910 465 4104

Signature: *[Handwritten Signature]*

Date: 7/23/19

Note: The legally responsible party should not be a homeowners association unless more than 50% of the lots have been sold and a resident of the subdivision has been named the president.

I, Mary Douthit, a Notary Public for the State of North Carolina, County of New Hanover, do hereby certify that Mark Maynard personally appeared before me this 23 day of July, 2019, and acknowledge the due execution of the forgoing sand filter maintenance requirements. Witness my hand and official seal, Mary Douthit



SEAL

My commission expires 7-1-2020