



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: **Centre Pointe, LLC**
PROJECT: **Center Point**
ADDRESS: **1541 Eastwood Road**
PERMIT #: **2022037**
DATE: **12/08/2022**

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 12/08/2030 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 12/01/2022.
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.



Public Services

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

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.



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.



Public Services

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

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 8th day of December, 2022

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

for Anthony Caudle, City Manager
City of Wilmington



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

STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 (Form SWP 2.3)

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.):

CenterPoint

2. Location of Project (street address):

East of Eastwood Road and Cavalier Drive Intersection

1541 Eastwood Road

City: Wilmington

County: New Hanover

Zip: 28405

II. PERMIT INFORMATION

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

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

City of Wilmington: _____

State – NCDEQ/DEMLR: _____

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

If yes, list all applicable Stormwater Permit Numbers:

City of Wilmington: _____

State – NCDEQ/DEMLR: _____

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

CAMA Major

Sedimentation/Erosion Control

404/401 Permit

III. CONTACT INFORMATION

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

Applicant / Organization: Centre Pointe, LLC

Signing Official & Title: Jason Swain, Signing Agent

a. Contact information for Applicant / Signing Official:

Address: 1131-B Military Cutoff Road

City: Wilmington State: NC Zip: 28405

Phone: (910)239-5590 Email: jason@swainassociates.com

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

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

2. Print Property Owner's name and title (if different from the applicant).

Property Owner / Organization: _____

Signing Official & Title: _____

a. Contact information for Property Owner:

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Email: _____

3. (Optional) Other Contact name and title (such as a construction supervisor) who would like to be copied on all correspondence:

Other Contact Person / Organization: Claude Arnold

Signing Official & Title: Development Manager

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

Street Address: 1131-B Military Cutoff Road

City: Wilmington State: NC Zip: 28405

Phone: (910)239-5590 Email: claudio@swainassociates.com

4. Agent Authorization: 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: Kathryn Espinoza, PE

Consulting Firm: McKim & Creed, Inc.

a. Contact information for consultant listed above:

Mailing Address: 243 N. Front St

City: Wilmington State: NC Zip: 28401

Phone: (910)343-1048 Email: kespinoza@mckimcreed.com

IV. PROJECT INFORMATION

1. Total Property Area: 851,876 square feet
2. Total Coastal Wetlands Area: 0 square feet
3. Total Surface Water Area: 0 square feet
4. Total Property Area (1) – Total Coastal Wetlands Area (2) – Total Surface Water Area (3) = Total Project Area: 851,876 square feet.
5. Existing Impervious Surface within Project Area: 25,008 square feet
6. Existing Impervious Surface to be Removed/Demolished: 25,008 square feet
7. Existing Impervious Surface to Remain: 0 square feet
8. Total Onsite (within property boundary) Newly Constructed Impervious Surface (in square feet):

Buildings/Lots	295,835
Impervious Pavement	198,808
Pervious Pavement (total area / adjusted area w credit applied)	30,842 / 0
Impervious Sidewalks	96,017
Pervious Sidewalks (total area / adjusted area w credit applied)	23,610 / 0
Other Multi-Family Courtyard - Calypso Drive	1,400
Future Development	0
Total Onsite Newly Constructed Impervious Surface	592,060

9. Total Onsite Impervious Surface
(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) 592,060 square feet
10. Net Change in Onsite Impervious Surface (+ for net increase, - for net decrease) +567,052 square feet
11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 66.57 %
12. Total Offsite Newly Constructed Impervious Area (in square feet):

Impervious Pavement	
Pervious Pavement (total area / adjusted area w credit applied)	/
Impervious Sidewalks	8,795
Pervious Sidewalks (total area / adjusted area w credit applied)	/
Other Roundabout + Offsite Turnlanes	11,237
Total Offsite Newly Constructed Impervious Surface	20,032

13. Complete the following information for each Stormwater SCM drainage area. Low Density and Drainage Plan projects (with no permeable pavements) may omit this section and skip to Section V.

Basin Information	Stormfilter SCM # 1	Stormfilter SCM # 2	Stormfilter SCM # 3
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW	SC;HQW	SC;HQW
Total Drainage Area (sf)	89,217	61,032	113,655
On-Site Drainage Area (sf)	89,217	61,032	113,655
Off-Site Drainage Area (sf)	0	0	0
Buildings/Lots (sf)	36,267	22,809	73,019
Impervious Pavement (sf)	28,290	17,472	18,107
Pervious Pavement (total / adjusted) (sf)	8,469 / 0	5,582 / 0	7,718 / 0
Impervious Sidewalks (sf)	5,708	7,227	25,825
Pervious Sidewalks (total / adjusted) (sf)	0 / 0	0 / 0	0 / 0
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	70,265	47,508	100,310
Percent Impervious Area (%)	78.76%	77.84%	88.26%

Basin Information		Stormfilter SCM # 5	Stormfilter SCM # 7
Receiving Stream Name		Bradley Creek	Bradley Creek
Receiving Stream Index Number		18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification		SC;HQW	SC;HQW
Total Drainage Area (sf)		204,256	13,923
On-Site Drainage Area (sf)		204,256	13,923
Off-Site Drainage Area (sf)		0	0
Buildings/Lots (sf)		50,916	13,427
Impervious Pavement (sf)		79,175	0
Pervious Pavement (total / adjusted) (sf)	0 / 0	9,073 / 9,073	0 / 0
Impervious Sidewalks (sf)		30,375	496
Pervious Sidewalks (total / adjusted) (sf)	0 / 0	0 / 0	0 / 0
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)		161,866	13,923
Percent Impervious Area (%)		79.25%	100.00%

13. Complete the following information for each Stormwater SCM drainage area. Low Density and Drainage Plan projects (with no permeable pavements) may omit this section and skip to Section V.

Basin Information	Stormfilter SCM # 8	Stormfilter SCM # 9	Stormfilter SCM # 10
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW	SC;HQW	SC;HQW
Total Drainage Area (sf)	14,586	33,241	77,440
On-Site Drainage Area (sf)	14,586	33,241	77,440
Off-Site Drainage Area (sf)	0	0	0
Buildings/Lots (sf)	13,029	33,241	53,127
Impervious Pavement (sf)	0	0	14,852
Pervious Pavement (total / adjusted) (sf)	0 / 0	0 / 0	0 / 0
Impervious Sidewalks (sf)	758	0	5,858
Pervious Sidewalks (total / adjusted) (sf)	0 / 0	0 / 0	1,912 / 1,912
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	13,787	33,241	71,925
Percent Impervious Area (%)	94.52%	100%	95.35%

Basin Information	Filterra SCM #11	Filterra SCM #12	Filterra SCM #13
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW	SC;HQW	SC;HQW
Total Drainage Area (sf)	7,181	5,913	4,378
On-Site Drainage Area (sf)	7,181	5,913	4,378
Off-Site Drainage Area (sf)	0	0	0
Buildings/Lots (sf)	0	0	0
Impervious Pavement (sf)	3,002	2,808	2,136
Pervious Pavement (total / adjusted) (sf)	/	/	/
Impervious Sidewalks (sf)	2,527	2,212	1,490
Pervious Sidewalks (total / adjusted) (sf)	/	/	/
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	5,529	5,020	3,626
Percent Impervious Area (%)	76.99%	84.9%	82.82%

13. Complete the following information for each Stormwater SCM drainage area. Low Density and Drainage Plan projects (with no permeable pavements) may omit this section and skip to Section V.

Basin Information	Fillerra SCM # 14	Fillerra SCM # 15	Fillerra SCM # 16
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW	SC;HQW	SC;HQW
Total Drainage Area (sf)	4,827	6,340	7,047
On-Site Drainage Area (sf)	4,827	6,340	7,047
Off-Site Drainage Area (sf)	0	0	0
Buildings/Lots (sf)	0	0	0
Impervious Pavement (sf)	1,979	3,157	3,466
Pervious Pavement (total / adjusted) (sf)	/ 0	0 / 0	0 / 0
Impervious Sidewalks (sf)	2,228	1,965	2,787
Pervious Sidewalks (total / adjusted) (sf)	0 / 0	0 / 0	/
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	4,827	5,112	6,253
Percent Impervious Area (%)	87.16%	80.79%	88.73%

Basin Information	Fillerra SCM #17	Fillerra SCM #18	Fillerra SCM #19
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW	SC;HQW	SC;HQW
Total Drainage Area (sf)	3,832	4,423	11,814
On-Site Drainage Area (sf)	3,832	4,423	11,814
Off-Site Drainage Area (sf)	0	0	0
Buildings/Lots (sf)	0	0	0
Impervious Pavement (sf)	1,473	1,613	5,093
Pervious Pavement (total / adjusted) (sf)	/	/	/
Impervious Sidewalks (sf)	1,101	1,755	4,428
Pervious Sidewalks (total / adjusted) (sf)	/	/	/
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	2,574	3,368	9,521
Percent Impervious Area (%)	67.17%	76.15%	80.59%

13. Complete the following information for each Stormwater SCM drainage area. Low Density and Drainage Plan projects (with no permeable pavements) may omit this section and skip to Section V.

Basin Information	Filterra SCM # 20	Filterra SCM # 21	Filterra SCM # 22
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW	SC;HQW	SC;HQW
Total Drainage Area (sf)	6,445	13,057	10,054
On-Site Drainage Area (sf)	6,445	13,057	10,054
Off-Site Drainage Area (sf)	0	0	0
Buildings/Lots (sf)	0	0	0
Impervious Pavement (sf)	2,853	7,452	4,487
Pervious Pavement (total / adjusted) (sf)	/	0 / 0	0 / 0
Impervious Sidewalks (sf)	2,451	992	1,198
Pervious Sidewalks (total / adjusted) (sf)	0 / 0	0 / 0	/
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	5,304	8,444	5,685
Percent Impervious Area (%)	82.30%	64.67%	56.54%

Basin Information	DRAINING OFFSITE SCM #	SCM #	SCM #
Receiving Stream Name	Bradley Creek		
Receiving Stream Index Number	18-87-24-4-(1)		
Stream Classification	SC;HQW		
Total Drainage Area (sf)			
On-Site Drainage Area (sf)			
Off-Site Drainage Area (sf)			
Buildings/Lots (sf)	0		
Impervious Pavement (sf)	1,393		
Pervious Pavement (total / adjusted) (sf)	21,698 / 0	/	/
Impervious Sidewalks (sf)	11,277		
Pervious Sidewalks (total / adjusted) (sf)	/	/	/
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Total Impervious Area (sf)	12,670		
Percent Impervious Area (%)			

V. SUBMITTAL REQUIREMENTS

Only complete application packages will be accepted and reviewed by the City. A complete package includes all of the items listed below. Copies of forms, deed restrictions, checklists as well as detailed instructions on how to complete this application form may be downloaded from the City of Wilmington Plan Review website below:

<https://www.wilmingtonnc.gov/departments/engineering/plan-review/stormwater-permits>

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

Please indicate that the following required information have been provided by initialing in the space provided for each item.

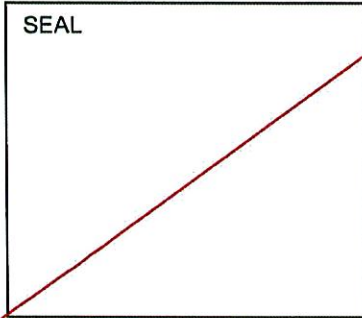
- | | Initials |
|--|------------|
| 1. One completed Stormwater Management Permit Application Form. | <u>Emc</u> |
| 2. One completed Supplement Form for each SCM proposed (signed, sealed and dated). | <u>Emc</u> |
| 3. One completed Operation & Maintenance agreement for each <u>type</u> of SCM. | <u>Emc</u> |
| 4. Proposed Deed Restrictions and Restrictive Covenants (for all subdivisions) | <u>N/A</u> |
| 5. Appropriate stormwater permit review fee. | <u>Emc</u> |
| 6. Minimum requirements identified on the Engineering Plan Review Checklist have been addressed. | <u>Emc</u> |
| 7. One set of calculations (sealed, signed and dated). | <u>Emc</u> |
| 8. A detailed narrative (one to two pages) describing the stormwater treatment/management system for the project. | <u>Emc</u> |
| 9. A USGS map identifying the site location. If the receiving stream is reported as class SA or the receiving stream drains to class SA waters within 1/2 mile of the site boundary, include the 1/2 mile radius on the map. | <u>Emc</u> |
| 10. A copy of the soils report, if applicable. Must meet NCDEQ SCM Manual and MDC requirements for the type of SCM proposed. The report must include boring logs and a map of boring locations. | <u>Emc</u> |
| 11. One full set of plans <u>folded to 8.5" x 14"</u> . electronic submittal | <u>N/A</u> |
| 12. A map delineating and labeling the drainage area for each SCM proposed. | <u>Emc</u> |
| 13. A map delineating and labeling the drainage area for each inlet and conveyance proposed. | <u>Emc</u> |
| 14. A digital copy of the entire submittal package (can be submitted via flash drive, CD, email, dropbox or other file sharing system). electronic submittal | <u>Emc</u> |

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

I, _____, certify that I own the property identified in this permit application, and thus give permission to _____ with _____ 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 _____ 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: _____ Date: _____



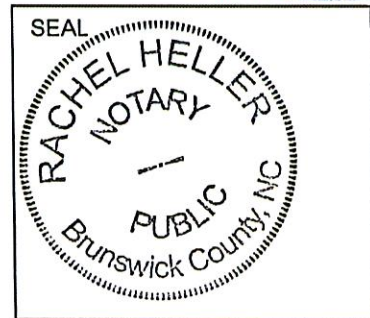
I, _____, a Notary Public for the State of _____, County of _____, do hereby certify that _____ personally appeared before me this day of _____, _____, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

My commission expires: _____

VII. APPLICANT'S CERTIFICATION

I, Jason D. Swain, 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 rules under the City's Comprehensive Stormwater Ordinance.

Signature: _____ Date: 4-28-21



I, Rachel Heller, a Notary Public for the State of North Carolina, County of New Hanover, do hereby certify that Jason D Swain personally appeared before me this day of 28, April, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

Rachel Heller
My commission expires: 1-30-2024



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

CONTECH ENGINEERED SOLUTIONS **STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION	
Project name	CenterPoint SCM-1
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 20, 2022
Drainage area number	1

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	89,217.00 ft ²	OK
Impervious area	70,265.00 ft ²	
Impervious area	1.61 acres	
% Impervious (I_A)	78.8% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth	_____ in	
1-yr, 24-hr intensity	_____ in/hr	
Pre-development 1-yr, 24-hr runoff	_____ ft ³ /sec	
Post-development 1-yr, 24-hr runoff	_____ ft ³ /sec	
Pre/Post 1-yr, 24-hr peak control	_____ ft ³ /sec	
Storage Volume		
Design volume (WQV)	8,462.42 ft ³	
Adjusted water quality volume (WQV _{Adj})	6,346.81 ft ³	OK
Volume contained before filter	34,736.00 ft ³	
Runoff Coefficient (R_v)	0.76 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	90.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	294492.1725 ft ³	=P*Ad*Rv*(43560/12)*%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	1286.14 lbs	=EMC* V_i *(28.3*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	27.00 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	21.20 ft amsl	
Bottom of the StormFilter vault elevation	16.23 ft amsl	
Clearance (d_{SHWT})	-4.97	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	385.84 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{pass1}	900.30 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.86	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	771.68 lbs	=Mpass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	54.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	15.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.25	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.25
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	15.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM

CNTECH ENGINEERED SOLUTIONS **STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION

Project name	CenterPoint SCM-2
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 20, 2022
Drainage area number	2

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	61,032.00 ft ²	OK
Impervious area	47,508.00 ft ²	
Impervious area	1.09 acres	
% Impervious (I_a)	77.8% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth		
1-yr, 24-hr intensity		
Pre-development 1-yr, 24-hr runoff		
Post-development 1-yr, 24-hr runoff		
Pre/Post 1-yr, 24-hr peak control		
Storage Volume		
Design volume (WQV)	5,726.10 ft ³	
Adjusted water quality volume (WQV _{Adj})	4,294.58 ft ³	OK
Volume contained before filter	23,789.00 ft ³	
Runoff Coefficient (R_v)	0.75 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	90.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	199268.28 ft ³	=P*Ad*Rv*(43560/12)*%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	870.27 lbs	=EMC*Vi*(28.3)*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	LD 18 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	18.96 ft amsl	
Bottom of the StormFilter vault elevation	16.80 ft amsl	
Clearance (d_{S-HWT})	-2.16	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	261.08 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{mass1}	609.19 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.86	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	522.16 lbs	=Mmass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	36.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	15.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.25	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.25
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	15.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION	
Project name	CenterPoint SCM-3
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 21, 2022
Drainage area number	3

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	113,655.00 ft ²	OK
Impervious area	100,310.00 ft ²	
Impervious area	2.30 acres	
% Impervious (I_a)	88.3% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth		
1-yr, 24-hr intensity		
Pre-development 1-yr, 24-hr runoff		
Post-development 1-yr, 24-hr runoff		
Pre/Post 1-yr, 24-hr peak control		
Storage Volume		
Design volume (WQV)	11,995.22 ft ³	
Adjusted water quality volume (WQV _{Adj})	8,996.41 ft ³	OK
Volume contained before filter	22,325.00 ft ³	
Runoff Coefficient (R_v)	0.84 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	90.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	417433.6125 ft ³	=P*Ad*Rv*(43560/12)*%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	1823.06 lbs	=EMC* V_i *(28.3)*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	LD 18 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	18.25 ft amsl	
Bottom of the StormFilter vault elevation	15.53 ft amsl	
Clearance (d_{S-HWT})	-2.72	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	546.92 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{mass1}	1276.14 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.86	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	1093.84 lbs	=Mmass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	36.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	31.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.52	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.52
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	31.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION

Project name	CenterPoint SCM-5
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 21, 2022
Drainage area number	5

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	204,256.00 ft ²	OK
Impervious area	161,866.00 ft ²	
Impervious area	3.72 acres	
% Impervious (I_A)	79.2% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth		in
1-yr, 24-hr intensity		in/hr
Pre-development 1-yr, 24-hr runoff		ft ³ /sec
Post-development 1-yr, 24-hr runoff		ft ³ /sec
Pre/Post 1-yr, 24-hr peak control		ft ³ /sec
Storage Volume		
Design volume (WQV)	19,486.53 ft ³	
Adjusted water quality volume (WQV _{Adj})	14,614.89 ft ³	OK
Volume contained before filter	54,310.00 ft ³	
Runoff Coefficient (R_v)	0.76 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	90.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	678131.07 ft ³	=P*Ad*Rv*(43560/12)*%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	2961.61 lbs	=EMC* V_i *(28.3)*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	18.00 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	21.67 ft amsl	
Bottom of the StormFilter vault elevation	16.69 ft amsl	
Clearance (d_{S+WT})	-4.98	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	888.48 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{mass1}	2073.13 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.86	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	1776.97 lbs	=Mmass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	36.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	50.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.84	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.84
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	50.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION	
Project name	CenterPoint SCM-7
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 21, 2022
Drainage area number	7

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	13,923.00 ft ²	OK
Impervious area	13,923.00 ft ²	
Impervious area	0.32 acres	
% Impervious (I_A)	100.0% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth		
1-yr, 24-hr intensity		
Pre-development 1-yr, 24-hr runoff		
Post-development 1-yr, 24-hr runoff		
Pre/Post 1-yr, 24-hr peak control		
Storage Volume		
Design volume (WQV)	1,653.36 ft ³	
Adjusted water quality volume (WQV _{Adj})	1,240.02 ft ³	OK
Volume contained before filter	1,773.00 ft ³	
Runoff Coefficient (R_v)	0.95 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	85.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	57536.7975 ft ³	=P*Ad*Rv*(43560/12)**%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	251.28 lbs	=EMC*V _i *(28.3)*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	LD 18 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	22.00 ft amsl	
Bottom of the StormFilter vault elevation	17.73 ft amsl	
Clearance (d_{SHWT})	-4.27	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	75.38 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{mass1}	175.90 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.79	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	138.20 lbs	=Mmass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	36.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	4.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.07	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.07
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	4.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM



STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION

Project name	CenterPoint SCM-8
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 21, 2022
Drainage area number	8

II. DESIGN INFORMATION

Site Characteristics		
Drainage area (A_D)	14,586.00 ft ²	OK
Impervious area	13,787.00 ft ²	
Impervious area	0.32 acres	
% Impervious (I_A)	94.5% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth		in
1-yr, 24-hr intensity		in/hr
Pre-development 1-yr, 24-hr runoff		ft ³ /sec
Post-development 1-yr, 24-hr runoff		ft ³ /sec
Pre/Post 1-yr, 24-hr peak control		ft ³ /sec
Storage Volume		
Design volume (WQV)	1,642.20 ft ³	
Adjusted water quality volume (WQV _{Adj})	1,231.65 ft ³	OK
Volume contained before filter	1,769.00 ft ³	
Runoff Coefficient (R_v)	0.90 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	85.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	57148.56 ft ³	=P*Ad*Rv*(43560/12)*%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	249.59 lbs	=EMC*V _i *(28.3)*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	LD 18 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	22.00 ft amsl	
Bottom of the StormFilter vault elevation	16.76 ft amsl	
Clearance (d_{SHWT})	-5.24	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	74.88 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{pass1}	174.71 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.79	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	137.27 lbs	=Mpass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	36.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	4.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.07	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.07
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	4.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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


 STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION	
Project name	CenterPoint SCM-9
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 21, 2022
Drainage area number	9

II. DESIGN INFORMATION	
------------------------	--

Site Characteristics		
Drainage area (A_D)	33,241.00 ft ²	OK
Impervious area	33,241.00 ft ²	
Impervious area	0.76 acres	
% Impervious (I_A)	100.0% %	
Design rainfall depth (R_D)	1.50 in	
Peak Flow Calculations		
1-yr, 24-hr runoff depth		
1-yr, 24-hr intensity		
Pre-development 1-yr, 24-hr runoff		
Post-development 1-yr, 24-hr runoff		
Pre/Post 1-yr, 24-hr peak control		
Storage Volume		
Design volume (WQV)	3,947.37 ft ³	
Adjusted water quality volume (WQV _{Adj})	2,960.53 ft ³	OK
Volume contained before filter	7,198.00 ft ³	
Runoff Coefficient (R_v)	0.95 (unitless)	
Pretreatment credit (estimated or calculated), %pre	30.00%	
Mass loading calculations		
Mean Annual Rainfall, P	58.00 in	
Agency required % removal	90.00%	
Percent Runoff Capture (% capture)	90.00%	
Mean Annual Runoff, V_i	137368.4325 ft ³	=P*Ad*Rv*(43560/12)*%capture
Event Mean Concentration of Pollutant, EMC	70.00 mg/l	(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
Annual Mass Load, M_{total}	599.93 lbs	=EMC* V_i *(28.3)*(0.000001)*(2.2046)
Filter System		
Filtration brand	StormFilter	
Cartridge height	27.00 in	
Specific Flow Rate, q	1.00 gpm/ft ²	
SHWT elevation	22.28 ft amsl	
Bottom of the StormFilter vault elevation	17.38 ft amsl	
Clearance (d_{SHWT})	-4.90	
Time to drain the StormFilter (t)	48.00 hours	OK. Submit drainage calculations.
Time to drain the StormFilter (t)	2.00 days	
Cartridge Quantity Calculation		
Mass removed by pretreatment system, M_{pre}	179.98 lbs	=Mtotal * %removal
Mass load to filters after pretreatment, M_{mass1}	419.95 lbs	=Mtotal - Mpre
Estimate the required filter efficiency, E_{filter}	0.86	=1+(%removal - 1)/(1 - %pre)
Mass to be captured by filters, M_{filter}	359.96 lbs	=Mmass1 * Efilter
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm	=q * (7.5 ft ² /cartridge)
Mass load per cartridge, M_{cart} (lbs)	54.00 lbs	=lookup mass load per cartridge
Number of Cartridges required, N_{mass}	7.00	=ROUNDUP(Mfilter/Mcart,0)
Maximum Treatment Capacity	0.12	=Nmass*(Qcart/449)

SUMMARY

Maximum Treatment Flow Rate, cfs	0.12
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	7.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM



STORMFILTER 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 O&M Agreement (Section IV)*

I. PROJECT INFORMATION	
Project name	CenterPoint SCM-10
Contact name	Kathryn Espinoza, PE
Phone number	910-343-1048
Date	June 21, 2022
Drainage area number	10

II. DESIGN INFORMATION	
------------------------	--

Site Characteristics	
Drainage area (A_D)	77,440.00 ft ² OK
Impervious area	73,837.00 ft ²
Impervious area	1.70 acres
% Impervious (I_A)	95.3% %
Design rainfall depth (R_D)	1.50 in
Peak Flow Calculations	
1-yr, 24-hr runoff depth	in
1-yr, 24-hr intensity	in/hr
Pre-development 1-yr, 24-hr runoff	ft ³ /sec
Post-development 1-yr, 24-hr runoff	ft ³ /sec
Pre/Post 1-yr, 24-hr peak control	ft ³ /sec
Storage Volume	
Design volume (WQV)	8,790.66 ft ³
Adjusted water quality volume (WQV _{Adj})	6,593.00 ft ³ OK
Volume contained before filter	17,938.00 ft ³
Runoff Coefficient (R_v)	0.91 (unitless)
Pretreatment credit (estimated or calculated), %pre	30.00%
Mass loading calculations	
Mean Annual Rainfall, P	58.00 in
Agency required % removal	85.00%
Percent Runoff Capture (% capture)	90.00%
Mean Annual Runoff, V_r	305915.055 ft ³
Event Mean Concentration of Pollutant, EMC	70.00 mg/l
Annual Mass Load, M_{total}	1336.03 lbs
Filter System	
Filtration brand	StormFilter
Cartridge height	18.00 in
Specific Flow Rate, q	1.00 gpm/ft ²
SHWT elevation	22.28 ft amsl
Bottom of the StormFilter vault elevation	17.00 ft amsl
Clearance (d_{SHWT})	-5.28
Time to drain the StormFilter (t)	48.00 hours
Time to drain the StormFilter (t)	2.00 days
Cartridge Quantity Calculation	
Mass removed by pretreatment system, M_{pre}	400.81 lbs
Mass load to filters after pretreatment, M_{pass1}	935.22 lbs
Estimate the required filter efficiency, E_{filter}	0.79
Mass to be captured by filters, M_{filter}	734.81 lbs
Maximum Cartridge Flow rate, Q_{cart}	7.50 gpm
Mass load per cartridge, M_{cart} (lbs)	36.00 lbs
Number of Cartridges required, N_{mass}	21.00
Maximum Treatment Capacity	0.35

=P*Ad*Rv*(43560/12)*%capture
(Suggestion: Use 60 for residential, 70 for Commercial, 100 for Industrial)
=EMC*Vr*(28.3*(0.000001)*(2.2046)
=Mtotal * %removal
=Mtotal - Mpre
=1+(%removal - 1)/(1 - %pre)
=Mpass1 * Efilter
=q * (7.5 ft²/cartridge)
=lookup mass load per cartridge
=ROUNDUP(Mfilter/Mcart,0)
=Nmass*(Qcart/449)

OK. Submit drainage calculations.

SUMMARY

Maximum Treatment Flow Rate, cfs	0.35
Cartridge Flow Rate, gpm	7.50
Number of Cartridges	21.00

Additional Information

Does volume in excess of the design volume bypass the 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 or N	
What is the length of the vegetated filter?		ft	
Does the design use a level spreader to evenly distribute flow?		Y or N	
Is the BMP located at least 30ft from surface waters (50ft if SA waters)?	Y	Y or N	OK
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

FILTERRA BIORETENTION

	11	12	13	14	15	16
1 Drainage area number	845	602	435	503	616	748
2 Minimum required treatment volume (cu ft)						
GENERAL MDC FROM 02H_1050						
3 Is the SCM sized to treat the SW from all surfaces at build-out?	Yes	Yes	Yes	Yes	Yes	Yes
4 Is the SCM located away from contaminated soils?	Yes	Yes	Yes	Yes	Yes	Yes
5 What are the side slopes of the SCM (H:V)?						
6 Does the SCM have retaining walls, gabion walls or other engineered side slopes?						
7 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	Yes	Yes	Yes	Yes	Yes
8 Is there an overflow or bypass for inflow volume in excess of the design volume?	Yes	Yes	Yes	Yes	Yes	Yes
9 What is the method for dewatering the SCM for maintenance?						
10 If applicable, will the SCM be cleaned out after construction?	Yes	Yes	Yes	Yes	Yes	Yes
11 Does the maintenance access comply with General MDC (8)?	Yes	Yes	Yes	Yes	Yes	Yes
12 Does the drainage easement comply with General MDC (9)?	Yes	Yes	Yes	Yes	Yes	Yes
13 If the SCM is on a single family lot, does (will?) the plat comply with General MDC (10)?	N/A	N/A	N/A	N/A	N/A	N/A
14 Is there an O&M Agreement that complies with General MDC (11)?	Yes	Yes	Yes	Yes	Yes	Yes
15 Is there an O&M Plan that complies with General MDC (12)?	Yes	Yes	Yes	Yes	Yes	Yes
16 Does the SCM follow the device specific MDC?	Yes	Yes	Yes	Yes	Yes	Yes
17 Was the SCM designed by an NC licensed professional?	Yes	Yes	Yes	Yes	Yes	Yes
FILTERRA BIORETENTION MDC FROM THE STORMWATER DESIGN MANUAL						
18 Type of pretreatment that will be used	weir wall	weir wall	weir wall	weir wall	weir wall	weir wall
19 Depth of storage above the filter media surface (in)	12.7 in	12.7 in	12.7 in	12.7 in	12.7 in	12.7 in
20 Surface area of the Filterra Bioretention system (sq ft)	32 sf	24 sf	24 sf	24 sf	24 sf	32 sf
21 Method of flow distribution over the media	sheet	sheet	sheet	sheet	sheet	sheet
22 Infiltration rate of engineered media (inch/hour)	140.0 in/hr	140.0 in/hr	140.0 in/hr	140.0 in/hr	140.0 in/hr	140.0 in/hr
23 Diameter of the underdrain pipes (if applicable)	4 in	4 in	4 in	4 in	4 in	4 in
24 Does the design include Internal Water Storage (IWS)?	Yes	Yes	Yes	Yes	Yes	Yes
25 If so, elevation of the top of the IWS (fmsl)	23.54	23.32	23.56	23.51	22.21	22.21
26 Elevation of the planting surface (fmsl)	23	22.78	23.02	22.97	21.67	21.67
27 Species of tree(s) that will be planted	by Contech	by Contech	by Contech	by Contech	by Contech	by Contech
28 Media depth (inches)	21 in	21 in	21 in	21 in	21 in	21 in
29 Number of clean out pipes	1	1	1	1	1	1
30 Will maintenance be performed per the Filterra Operations and Maintenance Manual?	Yes	Yes	Yes	Yes	Yes	Yes
ADDITIONAL INFORMATION						
31 Please use this space to provide any additional information about the Filterra Unit(s):						
Filtterra Details provided by Contech are included in the design plans.						

FILTERRA BIORETENTION

1	Drainage area number	17	18	19	20	21	22
2	Minimum required treatment volume (cu ft)	314	407	1145	637	1032	702
GENERAL MDC FROM 02H_1050							
3	Is the SCM sized to treat the SW from all surfaces at build-out?	Yes	Yes	Yes	Yes	Yes	Yes
4	Is the SCM located away from contaminated soils?	Yes	Yes	Yes	Yes	Yes	Yes
5	What are the side slopes of the SCM (H:V)?						
6	Does the SCM have retaining walls, gabion walls or other engineered side slopes?						
7	Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	Yes	Yes	Yes	Yes	Yes
8	Is there an overflow or bypass for inflow volume in excess of the design volume?	Yes	Yes	Yes	Yes	Yes	Yes
9	What is the method for dewatering the SCM for maintenance?						
10	If applicable, will the SCM be cleaned out after construction?	Yes	Yes	Yes	Yes	Yes	Yes
11	Does the maintenance access comply with General MDC (8)?	Yes	Yes	Yes	Yes	Yes	Yes
12	Does the drainage easement comply with General MDC (9)?	Yes	Yes	Yes	Yes	Yes	Yes
13	If the SCM is on a single family lot, does (will?) the plat comply with General MDC (10)?	N/A	N/A	N/A	N/A	N/A	N/A
14	Is there an O&M Agreement that complies with General MDC (11)?	Yes	Yes	Yes	Yes	Yes	Yes
15	Is there an O&M Plan that complies with General MDC (12)?	Yes	Yes	Yes	Yes	Yes	Yes
16	Does the SCM follow the device specific MDC?	Yes	Yes	Yes	Yes	Yes	Yes
17	Was the SCM designed by an NC licensed professional?	Yes	Yes	Yes	Yes	Yes	Yes
FILTERRA BIORETENTION MDC FROM THE STORMWATER DESIGN MANUAL							
18	Type of pretreatment that will be used	weir wall	weir wall	weir wall/sump	weir wall	weir wall/sump	weir wall/sump
19	Depth of storage above the filter media surface (in)	12.7 in	12.7 in	19.2 in	12.7 in	13.2 in	13.2 in
20	Surface area of the Filterra Bioretention system (sq ft)	16 sf	16 sf	48 sf	24 sf	48 sf	32 sf
21	Method of flow distribution over the media	sheet	sheet	sheet/pipe	sheet	sheet/pipe	sheet/pipe
22	Infiltration rate of engineered media (inch/hour)	140.0 in/hr	140.0 in/hr	140.0 in/hr	140.0 in/hr	140.0 in/hr	140.0 in/hr
23	Diameter of the underdrain pipes (if applicable)	4 in	4 in	4 in	4 in	4 in	4 in
24	Does the design include Internal Water Storage (IWS)?	Yes	Yes	Yes	Yes	Yes	Yes
25	if so, elevation of the top of the IWS (fmsl)	21.77	21.77	22.59	23.25	20.42	20.42
26	Elevation of the planting surface (fmsl)	21.23	21.23	22.01	22.71	19.84	19.84
27	Species of tree(s) that will be planted	by Cortech	by Cortech	by Cortech	by Cortech	by Cortech	by Cortech
28	Media depth (inches)	21 in	21 in	21 in	21 in	21 in	21 in
29	Number of clean out pipes	1	1	1	1	1	1
30	Will maintenance be performed per the Filterra Operations and Maintenance Manual?	Yes	Yes	Yes	Yes	Yes	Yes
ADDITIONAL INFORMATION							
31	Please use this space to provide any additional information about the Filterra Unit(s):						
Filtterra Details provided by Cortech are included in the design plans.							



Filterra Sizing in North Carolina

Design Engineer:
Date

TKM
6/20/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CenterPoint SCM #11
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.17 ac
Impervious Area, Ai	0.13 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.04
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	76%
Weighted Runoff Coefficient, Cw	0.76

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	25 ft²	

Filterra System

Filterra Configuration	Peak Diversion
Filterra Model ID	FTP6 6x6



Filterra Sizing in North Carolina

Design Engineer:
Date

JAK
11/10/2021

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	Centre Point SCM #12
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.14 ac
Impervious Area, Ai	0.12 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.02
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	86%
Weighted Runoff Coefficient, Cw	0.81

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	22 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x6 / 6x4



Filterra Sizing in North Carolina

Design Engineer:
Date

TKM
6/4/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CenterPoint SCM #13
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.10 ac
Impervious Area, Ai	0.08 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.02
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	80%
Weighted Runoff Coefficient, Cw	0.78

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	15 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x4



Filterra Sizing in North Carolina

Design Engineer:
Date

TKM
6/4/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CenterPoint SCM #14
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.11 ac
Impervious Area, Ai	0.10 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.01
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	91%
Weighted Runoff Coefficient, Cw	0.85

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	18 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x6 / 6x4



Filterra Sizing in North Carolina

Design Engineer:
Date

JAK
11/10/2021

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	Centre Point SCM #15
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.15 ac
Impervious Area, Ai	0.12 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.03
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	80%
Weighted Runoff Coefficient, Cw	0.78

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	22 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x6 / 6x4



Filterra Sizing in North Carolina

Design Engineer:
Date

JAK
11/10/2021

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	Centre Point SCM #16
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.16 ac
Impervious Area, Ai	0.14 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.02
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	88%
Weighted Runoff Coefficient, Cw	0.83

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	25 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x8 / 8x4



Filterra Sizing in North Carolina

Design Engineer:
Date

JAK
11/10/2021

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	Centre Point SCM #17
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.09 ac
Impervious Area, Ai	0.06 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.03
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	67%
Weighted Runoff Coefficient, Cw	0.70

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	12 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x4



Filterra Sizing in North Carolina

Design Engineer:
Date

JAK
11/10/2021

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	Centre Point SCM #18
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.10 ac
Impervious Area, Ai	0.08 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.02
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	80%
Weighted Runoff Coefficient, Cw	0.78

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	15 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x4



Filterra Sizing in North Carolina

Design Engineer:
Date

LH
2/9/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CENTERPOINT SCM19
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.27 ac
Impervious Area, Ai	0.22 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.05
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	81%
Weighted Runoff Coefficient, Cw	0.79

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	40 ft ²	

Filterra System

Filterra Configuration	Peak Diversion
Filterra Model ID	FTP6 6x8



Filterra Sizing in North Carolina

Design Engineer:
Date

LH
2/9/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CENTERPOINT SCM20
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.15 ac
Impervious Area, Ai	0.12 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.03
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	80%
Weighted Runoff Coefficient, Cw	0.78

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	22 ft²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x6 / 6x4



Filterra Sizing in North Carolina

Design Engineer:
Date

LH
2/9/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CENTERPOINT SCM21
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.30 ac
Impervious Area, Ai	0.19 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.11
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	63%
Weighted Runoff Coefficient, Cw	0.68

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	39 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 6x8 / 8x6



Filterra Sizing in North Carolina

Design Engineer:
Date

LH
2/9/2022

Blue Cells = Input
Black Cells = Calculation

Site Information

Project Name	CENTERPOINT SCM 22,
Project State	North Carolina
Project Location	Wilmington
Drainage Area, Ad	0.23 ac
Impervious Area, Ai	0.13 ac
Impervious Runoff Coefficient, Ci	0.90
Pervious Area, Ap	0.10
Pervious Area Runoff Coefficient, Cp	0.30
% Impervious	57%
Weighted Runoff Coefficient, Cw	0.64

Filterra Sizing Calculations

Filter Surface Area / Drainage Area Ratio	0.39%	Per NCDEQ Manual, Chapter D.3, Table 1
Required Filterra Media Surface Area,	28 ft ²	

Filterra System

Filterra Configuration	Offline
Filterra Model ID	FT 4x8 / 8x4

Proprietary System Operation and Maintenance Agreement

I will keep a maintenance record on this SCM. This maintenance record will 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.

Important operation and maintenance procedures:

- The drainage area will be carefully managed to reduce the sediment load to the StormFilter.
- The sedimentation chamber or forebay will be cleaned out whenever sediment depth exceeds six inches.

The StormFilter system will be inspected **quarterly**. 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.

SCM element:	Potential problem:	How to remediate the problem:
Adjacent pavement (if applicable)	Trash/debris is present.	Remove the trash/debris.
Flow diversion structure	Sediment is present on the pavement surface.	Sweep or vacuum the sediment as soon as possible.
StormFilter Cartridges	The structure is clogged.	Unclog the conveyance and dispose of any sediment off-site.
	The structure is damaged.	Make any necessary repairs or replace if damage is too large for repair.
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.
Receiving water	Erosion or other signs of damage have occurred at the outlet	Contact the 401 Oversight Unit at 919-733-1786.

Permit Number: 2022037
(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: CenterPoint

SCM drainage basin number: 1-2-3-4-5-6-7-8-9-10

Print name: Jason Swain

Title: Registered Agent

Address: 1131-B Military Cutoff Road, Wilmington NC 28405

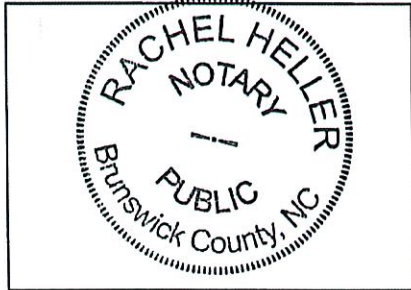
Phone: 910-239-5590

Signature: [Signature]

Date: 4-28-2021

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, Rachel Heller, a Notary Public for the State of North Carolina, County of New Hanover, do hereby certify that Jason D Swain personally appeared before me this 28 day of April, 2021, and acknowledge the due execution of the forgoing bioretention maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires 1-30-2024

Filtterra 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 Filtterra System.
- Contech includes a 1-year maintenance plan with each system purchase.
- Owners must promptly notify the (maintenance) supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology.

The Filtterra System will be inspected quarterly. Records of operation and maintenance will be kept in a known set location and will be available upon request.

Inspection shall be performed as recommended in the most current version of the Filtterra Owner's Manual available from the manufacturer. Corrective action shall be taken immediately to repair deficiencies or problems with the installed Filtterra system.

Permit Number: 2022037
(to be provided by DWQ) City

All other operation and maintenance activities should be in accordance with Contech's Filterra Inspection and Maintenance Procedures document. Any problems that are found shall be repaired immediately. I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed above and have received and understand Contech's Filterra Inspection and Maintenance Procedures document. I agree to notify DWQ of any problems with the system or prior to any changes to the system or responsible party. City

Project Name: CenterPoint Partners of Wilmington, LLC

BMP drainage area number: SCM 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 & 22

Print name: Alan G. McMahon

Title: Authorized Agent

Address: 320 Broad Street, Suite 600, Charleston, SC 29401

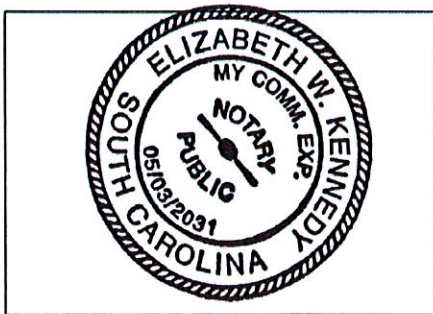
Phone: 843-277-3026

Signature: *Alan G. McMahon*

Date: December 2, 2021

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, ELIZABETH W. KENNEDY, a Notary Public for the State of SOUTH CAROLINA, County of CHARLESTON, do hereby certify that ALAN G. MCMAHON personally appeared before me this 2nd day of DECEMBER, 2021, and acknowledge the due execution of the forgoing Filterra maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires MAY 3, 2031

Permeable Pavement Operation and Maintenance Agreement

I will keep a maintenance record on this SCM. This maintenance record will 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).

Important maintenance procedures:

At all times, the permeable pavement shall be kept free of:

- Debris and particulate matter through frequent blowing that removes such debris, particularly during the fall and spring.
- Piles of soil, sand, mulch, building materials or other materials that could deposit particulates on the permeable pavement.
- Piles of snow and ice.
- Chemicals of all kinds, including deicers.

The permeable pavement will be inspected **once a quarter**. 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.

SCM element:	Potential problem:	How to remediate the problem:
The entire SCM	Trash/debris is present.	Remove the trash/debris.
The perimeter of the permeable pavement	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary, to remove the gully, then plant ground cover and water until established.
	A vegetated area drains toward the pavement.	Regrade the area so that it drains away from the pavement, then plant ground cover and water until established.
The inlet device	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.
	Stone verge is clogged or covered in sediment (if applicable).	Remove sediment and replace with clean stone.

SCM element	Potential problem	How to remediate the problem
The surface of the permeable pavement	Trash/debris present.	Remove the trash/debris.
	Weeds.	Do not pull the weeds (may pull out media as well). Spray them with a systemic herbicide such as glyphosate and then return within the week to remove them by hand. (Another option is to pour boiling water on them or steam them.)
	Sediment.	Vacuum sweep the pavement.
	Rutting, cracking or slumping or damaged structure.	Consult an appropriate professional.
Observation well	Water present more than five days after a storm event.	Clean out clogged underdrain pipes. Consult an appropriate professional for clogged soil subgrade.
Educational sign	Missing or is damaged.	Replace the sign.
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 NC Department of Environment and Natural Resources Regional Office.

Permit Number: 2022037
(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: CenterPoint


SCM drainage basin number: 1-2-3-5-6-7

Print name: Jason Swain

Title: Registered Agent

Address: 1131-B Military Cutoff Road, Wilmington NC 28405

Phone: 910-239-5590

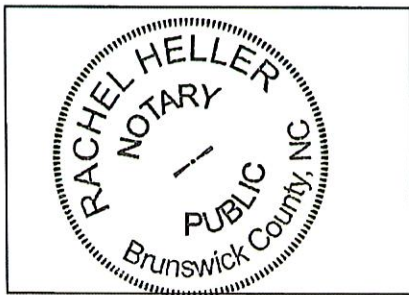
Signature: 

Date: 4-28-21

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, Rachel Heller, a Notary Public for the State of North Carolina, County of New Hanover, do hereby certify that Jason D Swain personally appeared before me this 28 day of April, 2021, and acknowledge the due execution of the forgoing filter strip, riparian buffer, and/or level spreader maintenance requirements.

Witness my hand and official seal,



SEAL

My commission expires 1-30-2024