

## 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: **Bradley Creek Station, LLC**  
PROJECT: **Bradley Creek Station**  
ADDRESS: **5815 Oleander Drive**  
PERMIT #: **2019014**  
DATE: **March 12, 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 March 12, 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 March 11, 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.



**Public Services**

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

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.





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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.



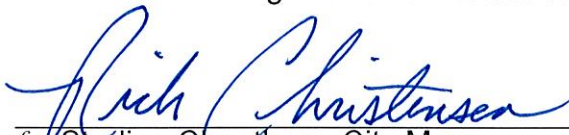


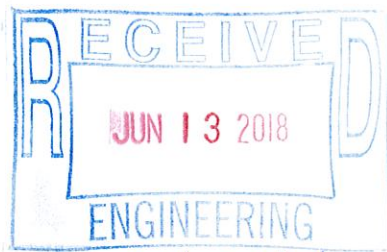
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17. The City of Wilmington may notify the permittee when the permitted site does not meet one or more of the minimum requirements of the permit. Within the time frame specified in the notice, the permittee shall submit a written time schedule to the 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.
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 12th day of March, 2019.

  
\_\_\_\_\_  
for Sterling Cheatham, City Manager  
City of Wilmington



**Public Services**  
 Engineering  
 212 Operations Center Dr  
 Wilmington, NC 28412  
 910 341-7807  
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*\* unless noted otherwise*

**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.):

Bradley Creek Station

2. Location of Project (street address):

5815 Oleander Drive

City: Wilmington County: New Hanover Zip: 28403

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

From the intersection of US 76 (Oleander Drive) and SR 1411 (Wrightsville Ave.), travel approx. 1.18 miles southwest on Oleander Drive. Site is on the right.

**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  X 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: Bradley Creek Station, LLC

Signing Official & Title: John S. Anderson, Member Manager

- a. Contact information for Applicant / Signing Official:

Street Address: 10 S. Cardinal Drive

City: Wilmington State: NC Zip: 28403

Phone: 616-0483 Fax: \_\_\_\_\_ Email: sa@ec.rr.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: \_\_\_\_\_

Signing Official & Title: \_\_\_\_\_

- a. Contact information for Property Owner:

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

Mailing Address (if different than physical address): \_\_\_\_\_

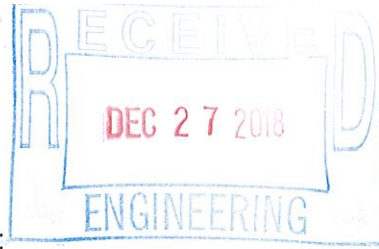
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

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**

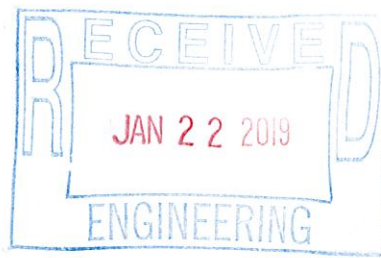
1. In the space provided below, briefly summarize how the stormwater runoff will be treated.

Underground infiltration  
\_\_\_\_\_  
\_\_\_\_\_

- 2. Total Property Area: 256,710 square feet
- 3. Total Coastal Wetlands Area: 0 square feet
- 4. Total Surface Water Area: 0 square feet
- 5. Total Property Area (2) – Total Coastal Wetlands Area (3) – Total Surface Water Area (4) = Total Project Area: 256,710 square feet.
- 6. Existing Impervious Surface within Property Area: 30,315 square feet
- 7. Existing Impervious Surface to be Removed/Demolished: 30,315 square feet
- 8. Existing Impervious Surface to Remain: 0 square feet
- 9. Total Onsite (within property boundary) Newly Constructed Impervious Surface (*in square feet*):

Buildings/Lots	26,235	
Impervious Pavement	134,608	
Pervious Pavement (adj. total, with 100 % credit applied)	0	(15,552 sf)
Impervious Sidewalks	6,000	
Pervious Sidewalks (adj. total, with % credit applied)	-	
Other (describe)	-	
Future Development	-	
<b>Total Onsite Newly Constructed Impervious Surface</b>	<b>166,843</b>	

- 10. Total Onsite Impervious Surface  
(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 166,843 square feet
- 11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 65 %



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

Impervious Pavement	10,720
Pervious Pavement (adj. total, with % credit applied)	-
Impervious Sidewalks	4,650
Pervious Sidewalks (adj. total, with % credit applied)	-
Other (describe)	-
<b>Total Offsite Newly Constructed Impervious Surface</b>	<b>15,370</b>

13. Total Newly Constructed Impervious Surface

(Total Onsite + Offsite Newly Constructed Impervious Surface) = 182,213 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 # 2	BMP # 3
Receiving Stream Name	UT Bradley Creek	UT Bradley Creek	UT 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)	87,388	128,345	24,284
On-Site Drainage Area (sf)	87,388	128,345	24,284
Off-Site Drainage Area (sf)	-	-	-
<b>Total Impervious Area (sf)</b>	<b>60,953</b>	<b>105,890</b>	<b>4,640</b>
Buildings/Lots (sf)	-	26,235	-
Impervious Pavement (sf)	60,953	73,655	4,640
Pervious Pavement (sf) 100% Credit	0	-	-
Impervious Sidewalks (sf)	-	6,000	126
Pervious Sidewalks (sf)	-	-	-
Other (sf)	-	-	-
Future Development (sf)	-	-	-
Existing Impervious to remain (sf)	-	-	-
Offsite (sf)	-	-	-
Percent Impervious Area (%)	70	83	19

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

N/A



## 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: Phillip G. Tripp, P.E.

Consulting Firm: Tripp Engineering, P.C.

a. Contact information for consultant listed above:

Mailing Address: 419 Chestnut Street

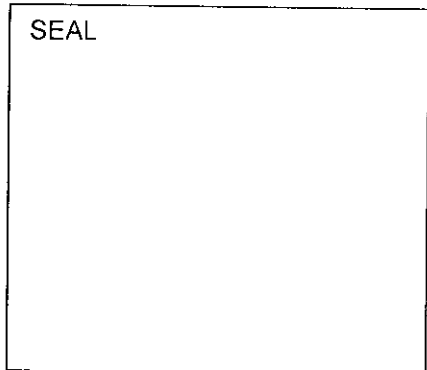
City: Wilmington State: NC Zip: 28401

Phone: 763-5100 Fax: 763-5631 Email: office@trippengineering.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) \_\_\_\_\_, 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: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_

I, \_\_\_\_\_, a Notary Public for the State of \_\_\_\_\_, County of \_\_\_\_\_, do hereby certify that \_\_\_\_\_ personally appeared before me this day of \_\_\_\_\_,

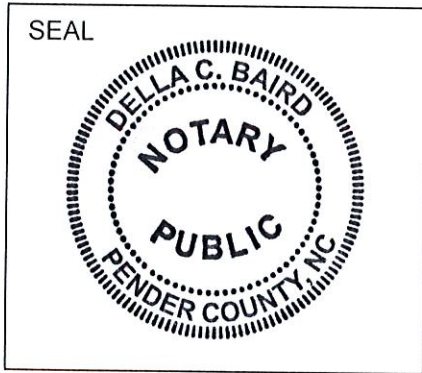


and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

My commission expires: \_\_\_\_\_

**VIII. APPLICANT'S CERTIFICATION**

I, (print or type name of person listed in Contact Information, item 1) , John S. Anderson 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: *John S. Anderson*  
Date: 6/11/18

I, Della C. Baird, a Notary Public for the State of North Carolina, County of Pender, do hereby certify that John S. Anderson personally appeared before me this 7 day of June, 2018, and acknowledge the due execution of the application for a stormwater

permit. Witness my hand and official seal,

*Della C. Baird*  
My commission expires: 10-15-21

# SUPPLEMENT-EZ FORM COVER PAGE



Please indicate the types, quantities and locations of SCMs that will be used on this project:

	Quantity	Location(s)
Infiltration System	2	under parking lot
Bioretention Cell Wet Pond		
Stormwater Wetland	1	northern area of parking lot
Permeable Pavement		
Sand Filter		
Rainwater Harvesting		
Green Roof		
Level Spreader-Filter Strip		
Disconnected Impervious Surface		
Treatment Swale		
Dry Pond		

**Project Name:**

**Bradley Creek Station**

**Address**

5815 Oleander Drive

**City / Town**

Wilmington

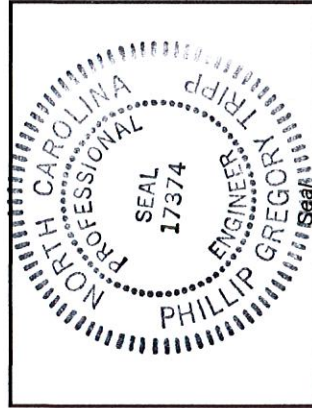
**Designer information for this project:**

Name and Title:	Phillip G. Tripp, P.E.
Organization:	Tripp Engineering, P.C.
Street address:	419 Chestnut Street
City, State, Zip:	Wilmington, NC 28401
Phone number(s):	910-763-5100
Email:	office@trippengineering.com

**Applicant:**

Company:	Bradley Creek Station, LLC
Contact:	Steve Anderson
Mailing Address:	10 S. Cardinal Drive
City, State, Zip:	Wilmington, NC 28403
Phone number(s):	910-616-0483
Email:	sa@ec.rr.com

**Designer**



*Phillip G. Tripp*

Signature of Designer

10-25-18

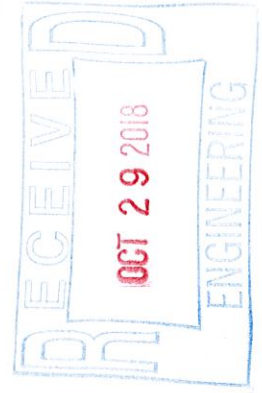
Date

**Certification Statement:**

I certify, under penalty of law: that this Supplement-EZ form and all supporting information were prepared under my direction or supervision;  
 - that the information provided in the form is, to the best of my knowledge and belief, true, accurate, and complete; and

- that the engineering plans, specifications, operation and maintenance agreements and other supporting information are consistent with the information provided here.

I am aware that there are significant penalties for submitting false information including the possibility of fines and imprisonment for knowing violations as well as a report being made to my professional board.





# INFILTRATION SYSTEMS

## THE DRAINAGE AREA

Drainage area number	1	Break down of BUA in the drainage area (both new and existing):	60593 sf
Total coastal wetlands area (sq ft)	sf	- Parking / driveway (sq ft)	sf
Total surface water area (sq ft)	sf	- Sidewalk (sq ft)	sf
Total drainage area (sq ft)	87388 sf	- Roof (sq ft)	sf
BUA associated with existing development (sq ft)	sf	- Roadway (sq ft)	sf
Proposed new BUA (sq ft)	60593 sf	- Other, please specify in the comment box below (sq ft)	sf
Percent BUA of drainage area	70%	Total BUA (sq ft)	60593 sf

## COMPLIANCE WITH THE APPLICABLE STORMWATER PROGRAM

Stormwater program(s) that apply (please specify):		Design rainfall depth (in)	1.5 in
City of Wilmington		Minimum volume required (cu ft)	9085 cf
		Design volume of SCM (cu ft)	40913 cf

## GENERAL MDC FROM 02H .1050

#1 Is the SCM sized to treat the SW from all surfaces at build-out?	Yes	#7 If applicable, with the SCM be cleaned out after construction?	No	varies-see plan
#2 Is the SCM located on or near contaminated soils?	No	#8 Does the maintenance access comply with General MDC (8)?	Yes	varies-see plan
#3 What are the side slopes of the SCM (H:V)?	na	#9 Does the drainage easement comply with General MDC (9)?	Yes	1.44
#3 Does the SCM have retaining walls, gabion walls or other engineered side slopes?	No	#10 If the SCM is on a single family lot, does the plat comply with General MDC (10)?	No	28412 sf
#4 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	#11 Is there an O&M Agreement that complies with General MDC (11)?	Yes	3.71
#5 Is there a bypass for flows in excess of the design flow?	Yes	#12 Is there an O&M Plan that complies with General MDC (12)?	Yes	23.35
#6 What is the method for dewatering the SCM for maintenance?	Pump (preferred)	#13 Was the SCM designed by an NC licensed professional?	Yes	

## INFILTRATION SYSTEM MDC FROM 02H .1051

#1 SHWT elevation (fmsl)	17.4	#5 Length (ft)	
#1 Was the soil investigated in the footprint and at the elevation of the infiltration system?	Yes	#5 Width (ft)	
#1 Soil infiltration rate (in/hr)	0.74	#5 Depth/Height (ft)	
#1 Briefly describe the hydraulic properties and characteristics of the soil profile: sandy soils with moderate permeability		#5 Surface area of the bottom of the infiltration system (sq feet)	
#2 SHWT elevation (fmsl)	17.4	#5 Ponding depth of the design volume (in)	
#2 Bottom of the Infiltration system (fmsl)	19.4	#5 Estimated dewatering time (hours)	
#2 Is a detailed hydrogeologic study attached if the separation is between 1 and 2 feet?	na	#5 For trenches only: Perforated pipe diameter, if applicable (inches)	
#3 Proposed slope of the subgrade surface (%)	0%	#5 For trenches only: Number of laterals	
#3 Are terraces or baffles provided?	No	#5 For trenches only: Stone type, if applicable	
#4 Describe the pretreatment that will be provided: permanent inlet protection		#5 For trenches only: Stone void ratio (%)	
		#5 For trenches only: Is stone free of fines?	Yes
		#5 For trenches only: Is the stone wrapped in geotextile fabric?	Yes
		#6 Is the infiltration system located underground?	Yes
		#6 If so, has at least one infiltration port been provided?	Yes

## ADDITIONAL INFORMATION

Please use this space to provide any information about this infiltration system that you think is relevant to the review.

<b>THE DRAINAGE AREA</b>		2	
Drainage area number		sf	Break down of BUA in the drainage area (both new and existing):
Total coastal wetlands area (sq ft)		128345 sf	- Parking / driveway (sq ft)
Total surface water area (sq ft)		105890 sf	- Sidewalk (sq ft)
Total drainage area (sq ft)		83%	- Roof (sq ft)
BUA associated with existing development (sq ft)			- Roadway (sq ft)
Proposed new BUA (sq ft)			- Other, please specify in the comment box below (sq ft)
Percent BUA of drainage area			<b>Total BUA (sq ft)</b>
<b>COMPLIANCE WITH THE APPLICABLE STORMWATER PROGRAM</b>			
Stormwater program(s) that apply (please specify):			
City of Wilmington			
<b>GENERAL MDC FROM 02H.1050</b>			
#1 Is the SCM sized to treat the SW from all surfaces at build-out?	Yes		#7 If applicable, with the SCM be cleaned out after construction?
#2 Is the SCM located on or near contaminated soils?	Yes		#8 Does the maintenance access comply with General MDC (8)?
#3 What are the side slopes of the SCM (H:V)?	na		#9 Does the drainage easement comply with General MDC (9)?
#3 Does the SCM have retaining walls, gabion walls or other engineered side slopes?	No		#10 If the SCM is on a single family lot, does the plat comply with General MDC (10)?
#4 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes		#11 Is there an O&M Agreement that complies with General MDC (11)?
#5 Is there a bypass for flows in excess of the design flow?	Yes		#12 Is there an O&M Plan that complies with General MDC (12)?
#6 What is the method for dewatering the SCM for maintenance?	Pump (preferred)		#13 Was the SCM designed by an NC licensed professional?
<b>INFILTRATION SYSTEM MDC FROM 02H.1051</b>			
#1 SHWT elevation (fmsl)	15.38		#5 Length (ft)
#1 Was the soil investigated in the footprint and at the elevation of the infiltration system?	Yes		#5 Width (ft)
#1 Soil infiltration rate (in/hr)	1.5 in/hr		#5 Depth/Height (ft)
#1 Briefly describe the hydraulic properties and characteristics of the soil profile: sandy soils with moderate permeability			#5 Surface area of the bottom of the infiltration system (sq feet)
			#5 Ponding depth of the design volume (in)
			#5 Estimated dewatering time (hours)
#2 SHWT elevation (fmsl)	15.38		#5 For trenches only: Perforated pipe diameter, if applicable (inches)
#2 Bottom of the infiltration system (fmsl)	17.38		#5 For trenches only: Number of laterals
#2 Is a detailed hydrogeologic study attached if the separation is between 1 and 2 feet?	na		#5 For trenches only: Stone type, if applicable
#3 Proposed slope of the subgrade surface (%)	0%		#5 For trenches only: Stone void ratio (%)
#3 Are terraces or baffles provided?	No		#5 For trenches only: Is stone free of fines?
#4 Describe the pretreatment that will be provided: permanent inlet protection			#5 For trenches only: Is the stone wrapped in geotextile fabric?
			#6 Is the infiltration system located underground?
			#6 If so, has at least one infiltration port been provided?
<b>ADDITIONAL INFORMATION</b>			
Please use this space to provide any information about this infiltration system that you think is relevant to the review.			



# PERMEABLE PAVEMENT

Bradley Creek Station

THE DRAINAGE AREA		1
Drainage area number		
Total coastal wetlands area (sq ft)		4514 sf
Total surface water area (sq ft)		126 sf
Total drainage area (sq ft)	24284 sf	
BUA associated with existing development (sq ft)		
Proposed new BUA (sq ft)	4640 sf	
Percent BUA of drainage area	19.0	
<b>COMPLIANCE WITH THE APPLICABLE STORMWATER PROGRAM</b>		
Stormwater program(s) that apply (please specify):		
City of Wilmington		
<b>GENERAL MDC FROM 02H .1050</b>		
#1 Is the SCM sized to treat the SW from all surfaces at build-out?	No	#7 If applicable, with the SCM be cleaned out after construction?
#2 Is the SCM located on or near contaminated soils?	No	#8 Does the maintenance access comply with General MDC (8)?
#3 What are the side slopes of the SCM (H:V)?	N/A	#9 Does the drainage easement comply with General MDC (9)?
#3 Does the SCM have retaining walls, gabion walls or other engineered side slopes?	No	#10 If the SCM is on a single family lot, does the plat comply with General MDC (10)?
#4 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	#11 Is there an O&M Agreement that complies with General MDC (11)?
#5 Is there a bypass for flows in excess of the design flow?	Yes	#12 Is there an O&M Plan that complies with General MDC (12)?
#6 What is the method for dewatering the SCM for maintenance?	Pump (preferred)	#13 Was the SCM designed by an NC licensed professional?
<b>PERMEABLE PAVEMENT MDC FROM 02H .1055</b>		
#1 Was the soil investigated in the footprint and at the elevation of the infiltration system?	No	#6 How will the pavement surface be tested?
Briefly describe the hydraulic properties and characteristics of the soil profile: sandy soils with moderate permeability		
#2 SHWT elevation (fmsl)	18.08	#7 Area of permeable pavement to be installed (square feet)
#2 Top of the subgrade (fmsl)	23.00	#7 Area of screened roof runoff that is directed to pavement (square feet)
#2 Storage elevation of the design rainfall depth (fmsl)	22.10	#7 Area of additional built-upon area runoff that is directed to pavement (square feet)
#2 Is a detailed hydrogeologic study attached if the separation is between 1 and 2 feet?	No	#7 Will runoff from pervious surfaces be directed away from the pavement?
#3 Will toxic pollutants be stored or handled on or near the permeable pavement?	No	#8 Dewatering time (hours)
#4 Proposed slope of the subgrade surface (%)	1.67	#8 Is additional media being added to the soil profile?
#4 Are terraces or baffles provided?	No	#9 Is at least one observation well per terrace been provided at the low point(s)?
#5 Size of aggregate to be used in the subbase	#57	#10 Is this a detention permeable pavement system?
#5 Aggregate depth (in)	6 in	#10 If so, what is the drawdown time for the design storm?
#5 Aggregate porosity (n)	40	#11 Have edge restraints been provided?
#5 Will the aggregate be washed?	Yes	#12 Will the subgrade be graded when dry?
<b>ADDITIONAL INFORMATION</b>		
Please use this space to provide any additional information about this permeable pavement design that you think is relevant to the review.		





# Operation & Maintenance Agreement

**Project Name:** Bradley Creek Station

**Project Location:** 5815 Oleander Drive

## Cover Page

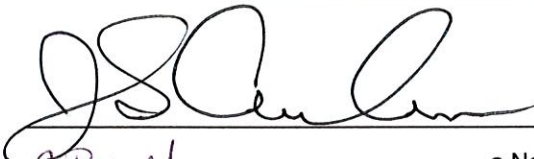
Maintenance records shall be kept on the following BMP(s). This maintenance record shall be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired, or replaced **immediately**. These deficiencies can affect the integrity of structures, safety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

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

Bioretention Cell	Quantity:		Location(s):	
Dry Detention Basin	Quantity:		Location(s):	
Grassed Swale	Quantity:		Location(s):	
Green Roof	Quantity:		Location(s):	
Infiltration Basin	Quantity:		Location(s):	
Infiltration Trench	Quantity:	2	Location(s):	Under parking lot
Level Spreader/VFS	Quantity:		Location(s):	
Permeable Pavement	Quantity:	1	Location(s):	Rear of site
Proprietary System	Quantity:		Location(s):	
Rainwater Harvesting	Quantity:		Location(s):	
Sand Filter	Quantity:		Location(s):	
Stormwater Wetland	Quantity:		Location(s):	
Wet Detention Basin	Quantity:	0	Location(s):	
Disconnected Impervious Area	Present:	No	Location(s):	
User Defined BMP	Present:	No	Location(s):	

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

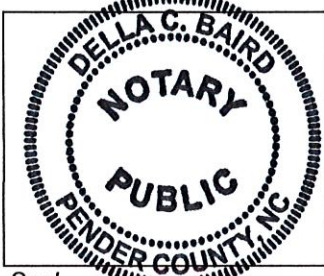
* Responsible Party:	<u>John S. Anderson</u>
Title & Organization:	<u>Member Manager, Bradley Creek Station, LLC</u>
Street address:	<u>10 S. Cardinal Drive</u>
City, state, zip:	<u>Wilmington, NC 28403</u>
Phone number(s):	<u>910-616-0483</u>
Email:	<u>sa@ec.rr.com</u>

Signature: 

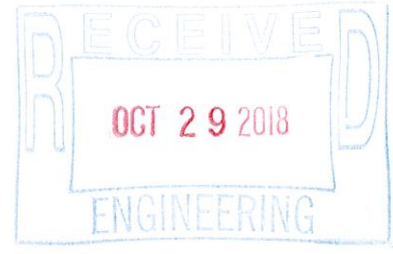
Date: 9/6/18

I, Della C. Baird, a Notary Public for the State of North Carolina  
 County of Pender, do hereby certify that John S. Anderson  
 personally appeared before me this 6 day of September, 2018 and  
 acknowledge the due execution of the Operations and Maintenance Agreement.

Witness my hand and official seal, Della C Baird



Seal My commission expires 10-15-21





## Infiltration System Maintenance Requirements

Important maintenance procedures:

- The drainage area will be carefully managed to reduce The sediment load to The infiltration basin.
- Immediately after the infiltration basin is established, the vegetation will be watered twice weekly if needed until the plants become established (commonly six weeks).
- No portion of the infiltration basin will be fertilized after the initial fertilization that is required to establish the vegetation.
- The vegetation in and around the basin will be maintained at a height of approximately six inches.

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

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

BMP element:	Potential problem:	How to remediate the problem:
<b>The entire BMP</b>	Trash/debris is present.	Remove the trash/debris.
<b>The perimeter of the infiltration basin</b>	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.
<b>The inlet device: pipe or swale</b>	The pipe is clogged (if applicable).	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged (if applicable).	Replace the pipe.
	Erosion is occurring in the swale (if applicable).	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.
<b>The forebay</b>	Sediment has accumulated and reduced the depth to 75% of the original design 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.
	Erosion has occurred or riprap is displaced.	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 pesticides are used, wipe them on the plants rather than spraying.
<b>The main treatment area</b>	A visible layer of sediment has accumulated.	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. Replace any media that was removed in the process. Revegetate disturbed areas immediately.
	Water is standing more than 5 days after a storm event.	Replace the top few inches of filter media and see if this corrects the standing water problem. If so, revegetate immediately. If not, consult an appropriate professional for a more extensive repair.
	Weeds and noxious plants are growing in the main treatment area.	Remove the plants by hand or by wiping them with pesticide (do not spray).
<b>The embankment</b>	Shrubs or trees have started to grow on the embankment.	Remove shrubs or trees immediately.
	An annual inspection by an appropriate professional shows that the embankment needs repair.	Make all needed repairs.
<b>The outlet device</b>	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.
<b>The receiving water</b>	Erosion or other signs of damage have occurred at the outlet.	Contact the local NC Department of Environment and Natural Resources Regional Office.



## Permeable Pavement Maintenance Requirements

At all times, the 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 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.

<b>BMP element:</b>	<b>Potential problem:</b>	<b>How to remediate the problem:</b>
<b>The entire BMP</b>	Trash/debris is present.	Remove the trash/debris.
<b>The perimeter of the permeable pavement</b>	Areas of bare soil and/or erosive gullies	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.
<b>The inlet device</b>	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.
<b>The surface of the permeable pavement</b>	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.
<b>Observation well</b>	Water present more than five days after a storm event	Clean out clogged underdrain pipes. Consult an appropriate professional for clogged soil subgrade.
<b>Educational sign</b>	Missing or is damaged.	Replace the sign.
<b>The outlet device</b>	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.
<b>The receiving water</b>	Erosion or other signs of damage have occurred at the outlet.	Contact the local NC Department of Environment and Natural Resources Regional Office.