



Public Services

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

May 27, 2016

Mr. William Mumford, VP Development
NNP IV - Cape fear River, LLC
4410 River Road
Wilmington, NC 28412

**Subject: Stormwater Management Permit No. 2016012R1
Riverlights - Conventional Neighborhood Ph 1, 1A & 2
High Density - Revision**

Dear Mr. Mumford:

The City of Wilmington Engineering Division has received a request for a revision to the Stormwater Management Permit for Riverlights Conventional Neighborhood. Having reviewed the application and all supporting materials, the City of Wilmington has determined that the proposed revision meets the requirements of the City of Wilmington's Comprehensive Stormwater Ordinance.

The revisions include:

- The addition of both Phase 1A and Phase II to the previously approved Phase I. Each Phase received a separate construction release but is covered by this one permit (SWP2016012)

Please be aware all terms and conditions of the permit 3/7/2016 remain in full force and effect. Any additional changes to the approved plans must be approved by this office prior to construction. The issuance of the plan revision does not preclude the permittee from complying with all other applicable statutes, rules, regulations or ordinances which may have jurisdiction over the proposed activity, and obtaining a permit or approval prior to construction.

The revised stamped, approved stormwater management drawings will be released for construction by the Wilmington Planning Division under separate cover. Please replace any old plan sheets from the approved set with the new, revised sheet. An electronic copy of the approved drawing set, permit, application and supplementary documents will be maintained by the Wilmington Engineering Division. If you have any questions, or need additional information, please contact Robert Gordon at (910) 341-5856 or rob.gordon@wilmingtonnc.gov

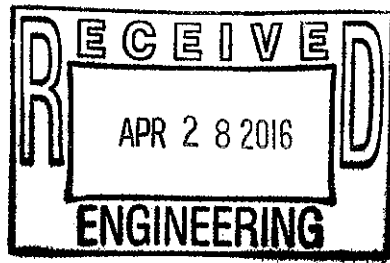
Sincerely,

A handwritten signature in black ink, appearing to read "Sterling Cheatham".

for Sterling Cheatham, City Manager
City of Wilmington

cc: Kathryn Espinoza, McKim & Creed
Brian Chambers, Wilmington Development Services/Planning

2016012R1



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 2.2)

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.):

Riverlights- Conventional Neighborhood Phase(s) 1,2 and 1A

2. Location of Project (street address):

4410 River Road

City: Wilmington County: New Hanover Zip: 28412

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

From Carolina Beach Road (US-421), turn right at Independence Boulevard (SR1209) and a left at River Road (SR1100). This site is located between Barnard's Creek and Mott's Creek.

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: 2015001 State – NCDENR/DWQ: SW8-070672, SW8-070526

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

CAMA Major Sedimentation/Erosion Control

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

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

NHC grading permit #22-15

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: NNP IV- Cape Fear River, LLC

Signing Official & Title: William Mumford, Vice President - Development

- a. Contact information for Applicant / Signing Official:

Street Address: 3410 River Road, Suite 103

City: Wilmington State: NC Zip: 28412

Phone: (704)877-5946 Fax: (704)877-5955 Email: bmumford@newlandco.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: Doug Brown

Signing Official & Title: Construction Manager

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

Street Address: 3410 River Road, Suite 103

City: Wilmington State: NC Zip: 28412

Phone: (910)442-2840 Fax: _____ Email: dbrown@newlandco.com

Mailing Address (if different than physical address): _____

City: _____ State: _____ Zip: _____

IV. PROJECT INFORMATION

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

Stormwater will be treated using two wet detention ponds and six infiltration basins.

2. Total Property Area: 5,073,009 square feet

3. Total Coastal Wetlands Area: 792,108 square feet

4. Total Surface Water Area: 392,015 square feet

5. Total Property Area (2) – Total Coastal Wetlands Area (3) – Total Surface Water Area (4) = Total Project Area: 3,888,886 square feet.

6. Existing Impervious Surface within Property Area: 99,152 square feet

7. Existing Impervious Surface to be Removed/Demolished: 99,152 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	815,262
Impervious Pavement	412,704
Pervious Pavement (adj. total, with 75 % credit applied)	0
Impervious Sidewalks	108,741
Pervious Sidewalks (adj. total, with % credit applied)	0
Other (describe)- Pump Station	1,276
Future Development	153,600
Total Onsite Newly Constructed Impervious Surface	1,491,583

10. Total Onsite Impervious Surface

(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 1,491,583 square feet

11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 38.4 %

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

Impervious Pavement	
Pervious Pavement (adj. total, with % credit applied)	
Impervious Sidewalks	
Pervious Sidewalks (adj. total, with % credit applied)	
Other (describe)	
Total Offsite Newly Constructed Impervious Surface	0

13. Total Newly Constructed Impervious Surface

(Total Onsite + Offsite Newly Constructed Impervious Surface) = 1,491,583 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	Modified		
	BMP #1	BMP #4	BMP #5
Receiving Stream Name	Cape Fear	Cape Fear	Cape Fear
Receiving Stream Index Number	18-(71)	18-(71)	18-(71)
Stream Classification	SC	SC	SC
Total Drainage Area (sf)	968,552	197,298	131,295
On-Site Drainage Area (sf)	968,552	197,298	131,295
Off-Site Drainage Area (sf)	0	0	0
Total Impervious Area (sf)	468,052	82,900	41,860
Buildings/Lots (sf) (Ph-1/Ph-2/Ph-1A)	123,760/178,360/25,480	43,680	40,040
Impervious Pavement (sf)(Ph-1/Ph-2/Ph-1A)	69,429/32,462/16,949	30,734	1,820
Pervious Pavement (sf) (Ph-1/Ph-2/Ph-1A)	0/0/0	0	0
Impervious Sidewalks (sf)(Ph-1/Ph-2/Ph-1A)	16,565/4,395/652	8,486	0
Pervious Sidewalks (sf) (Ph-1/Ph-2/Ph-1A)	0/0/0	0	0
Other (sf) (Ph-1/Ph-2/Ph-1A)	0/0/0	0	0
Future Development (sf)	0	0	0
Existing Impervious to remain (sf)	0	0	0
Offsite (sf)	0	0	0
Percent Impervious Area (%)	48.3	42.1	31.9

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

BMP Drainage area information (continued)

Basin Information	Infiltration BMP # 6	Infiltration BMP # 7	Infiltration BMP # 9
Receiving Stream Name	Cape Fear	Cape Fear	Cape Fear
Receiving Stream Index Number	18-(71)	18-(71)	18-(71)
Stream Classification	SC	SC	SC
Total Drainage Area (sf)	312422	972166	402047
On-Site Drainage Area (sf)	312422	972166	402047
Off-Site Drainage Area (sf)	0	0	0
Total Impervious Area (sf)	115783	435393	142735
Buildings/Lots (sf)	66430	126392	80080
Impervious Pavement (sf)	37151	115405	52673
Pervious Pavement, % credit (sf)	0	0	0
Impervious Sidewalks (sf)	10926	39996	9982
Pervious Sidewalks, % credit (sf)	0	0	0
Other (sf) - Pump Station	1276	0	0
Future Development (sf)	0	153600	0
Existing Impervious to remain (sf)	0	0	0
Offsite (sf)	0	0	0
Percent Impervious Area (%)	39.5	44.8	35.5
Basin Information	Infiltration BMP # 10	Infiltration BMP # 11	Non-BMP BMP # N/A
Receiving Stream Name	Cape Fear	Cape Fear	Cape Fear
Receiving Stream Index Number	18-(71)	18-(71)	18-(71)
Stream Classification	SC	SC	SC
Total Drainage Area (sf)	492440	48046	364620
On-Site Drainage Area (sf)	492440	48046	364620
Off-Site Drainage Area (sf)	0	0	0
Total Impervious Area (sf)	155548	25513	23799
Buildings/Lots (sf) (Ph-1A)	94640	18200	18200
Impervious Pavement (sf) (Ph-1A)	49883	6198	0
Pervious Pavement, % credit (sf)	0	0	0
Impervious Sidewalks (sf) (Ph-1A)	11025	1115	5599
Pervious Sidewalks, % credit (sf)	0	0	0
Other (sf)	0	0	0
Future Development (sf)	0	0	0
Existing Impervious to remain (sf)	0	0	0
Offsite (sf)	0	0	0
Percent Impervious Area (%)	31.6	53.1	6.5

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: Kathryn Espinoza, PE

Consulting Firm: McKim & Creed, Inc.

a. Contact information for consultant listed above:

Mailing Address: 243 N. Front Street

City: Wilmington State: NC Zip: 28401

Phone: 910-343-1048 Fax: 910-251-8282 Email: KEspinoza@mckimcreed.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.

SEAL

Signature: _____

Date: _____

I, _____, a Notary Public for the State of _____, County of _____, do

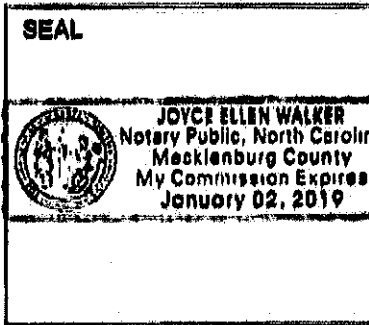
hereby certify that _____ personally appeared before me this day of _____,

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

Joyce Ellen Walker
My commission expires: January 2, 2019.

VIII. APPLICANT'S CERTIFICATION

I, (print or type name of person listed in Contact Information, Item 1) William Mumford, PE 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: William Mumford
Date: 9-14-15

I, Joyce Ellen Walker, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that William Mumford personally appeared before me this 14 day of September, 2015, and acknowledge the due execution of the application for a stormwater

permit. Witness my hand and official seal,

Joyce Ellen Walker
My commission expires: January 2, 2015

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

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

I. PROJECT INFORMATION

Project name	RiverLights-Conventional Phase 1A
Contact person	Kathryn Espinoza
Phone number	910-343-1048
Date	4/26/2016
Drainage area number	1

II. DESIGN INFORMATION

Site Characteristics

Drainage area	968,552 ft ²
Impervious area, post-development	468,052 ft ²
% impervious	48.32 %
Design rainfall depth	1.0 in

Storage Volume: Non-SA Waters

Minimum volume required	39,140 ft ³	OK
Volume provided	138,792 ft ³	OK, volume provided is equal to or in excess of volume required.

Storage Volume: SA Waters

1.5" runoff volume	ft ³
Pre-development 1-yr, 24-hr runoff	ft ³
Post-development 1-yr, 24-hr runoff	ft ³
Minimum volume required	ft ³
Volume provided	ft ³

Peak Flow Calculations

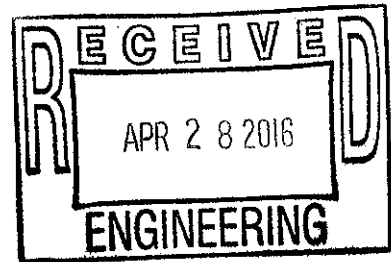
Is the pre/post control of the 1yr 24hr storm peak flow required?	Y (Y or N)	
1-yr, 24-hr rainfall depth	3.7 in	
Rational C, pre-development	0.10 (unitless)	
Rational C, post-development	0.30 (unitless)	
Rainfall intensity: 1-yr, 24-hr storm	0.16 in/hr	OK
Pre-development 1-yr, 24-hr peak flow	0.01 ft ³ /sec	
Post-development 1-yr, 24-hr peak flow	26.03 ft ³ /sec	
Pre/Post 1-yr, 24-hr peak flow control	26.02 ft ³ /sec	

Elevations

Temporary pool elevation	11.90 fmsl	
Permanent pool elevation	9.00 fmsl	
SHWT elevation (approx. at the perm. pool elevation)	9.35 fmsl	
Top of 10ft vegetated shelf elevation	9.50 fmsl	
Bottom of 10ft vegetated shelf elevation	8.50 fmsl	Data not needed for calculation option #1, but OK if provided.
Sediment cleanout, top elevation (bottom of pond)	2.00 fmsl	
Sediment cleanout, bottom elevation	1.00 fmsl	Data not needed for calculation option #1, but OK if provided.
Sediment storage provided	1.00 ft	

Is there additional volume stored above the state-required temp. pool? Y (Y or N)

Elevation of the top of the additional volume	11.9 fmsl	OK
---	-----------	----



II. DESIGN INFORMATION

Surface Areas

Area, temporary pool	52,779 ft ²	
Area REQUIRED, permanent pool	37,774 ft ²	
SA/DA ratio	3.90 (unitless)	
Area PROVIDED, permanent pool, A_{perm_pool}	40,787 ft ²	OK
Area, bottom of 10ft vegetated shelf, A_{bot_shelf}	35,811 ft ²	
Area, sediment cleanout, top elevation (bottom of pond), A_{bot_pond}	16,231 ft ²	

Volumes

Volume, temporary pool	138,792 ft ³	OK
Volume, permanent pool, V_{perm_pool}	187,368 ft ³	
Volume, forebay (sum of forebays if more than one forebay)	36,668 ft ³	
Forebay % of permanent pool volume	19.6% %	OK

SA/DA Table Data

Design TSS removal	90 %	
Coastal SA/DA Table Used?	Y (Y or N)	
Mountain/Piedmont SA/DA Table Used?	N (Y or N)	
SA/DA ratio	3.90 (unitless)	

Average depth (used in SA/DA table):

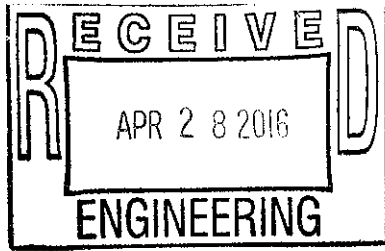
Calculation option 1 used? (See Figure 10-2b)	Y (Y or N)	
Volume, permanent pool, V_{perm_pool}	187,368 ft ³	
Area provided, permanent pool, A_{perm_pool}	40,787 ft ²	
Average depth calculated	4.60 ft	OK
Average depth used in SA/DA, d_{av} , (Round to nearest 0.5ft)	4.5 ft	OK
Calculation option 2 used? (See Figure 10-2b)	N (Y or N)	
Area provided, permanent pool, A_{perm_pool}	ft ²	
Area, bottom of 10ft vegetated shelf, A_{bot_shelf}	ft ²	
Area, sediment cleanout, top elevation (bottom of pond), A_{bot_pond}	ft ²	
"Depth" (distance b/w bottom of 10ft shelf and top of sediment)	ft	
Average depth calculated	ft	
Average depth used in SA/DA, d_{av} , (Round to nearest 0.5ft)	ft	

Drawdown Calculations

Drawdown through orifice?	Y (Y or N)	
Diameter of orifice (if circular)	3.00 in	
Area of orifice (if-non-circular)	in ²	
Coefficient of discharge (C_D)	0.60 (unitless)	
Driving head (H_o)	2.78 ft	
Drawdown through weir?	N (Y or N)	
Weir type	(unitless)	
Coefficient of discharge (C_w)	(unitless)	
Length of weir (L)	ft	
Driving head (H)	ft	
Pre-development 1-yr, 24-hr peak flow	0.01 ft ³ /sec	
Post-development 1-yr, 24-hr peak flow	26.03 ft ³ /sec	
Storage volume discharge rate (through discharge orifice or weir)	0.23 ft ³ /sec	Storage volume discharge rate greater than pre-dev. 1yr24hr.
Storage volume drawdown time	2.00 days	OK, draws down in 2-5 days.

Additional Information

Vegetated side slopes	3 :1	OK
Vegetated shelf slope	10 :1	OK
Vegetated shelf width	10.0 ft	OK
Length of flowpath to width ratio	10 :1	OK
Length to width ratio	4.7 :1	OK
Trash rack for overflow & orifice?	Y (Y or N)	OK
Freeboard provided	2.6 ft	OK
Vegetated filter provided?	N (Y or N)	OK
Recorded drainage easement provided?	Y (Y or N)	OK
Capures all runoff at ultimate build-out?	Y (Y or N)	OK
Drain mechanism for maintenance or emergencies is:	Pump	



Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

Wet Detention Basin Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the removal efficiency of the BMP.

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

This system (check one):

does does not incorporate a vegetated filter at the outlet.

This system (check one):

does does not incorporate pretreatment other than a forebay.

Important maintenance procedures:

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

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

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

Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

BMP element:	Potential problem:	How I will remediate the problem:
The inlet device: pipe or swale	The pipe is clogged.	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged.	Replace the pipe.
	Erosion is occurring in the swale.	Regrade the swale if necessary to smooth it over and provide erosion control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
The forebay	Sediment has accumulated to a depth greater than the original design depth for sediment storage.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.
	Erosion has occurred.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	Weeds are present.	Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
The vegetated shelf	Best professional practices show that pruning is needed to maintain optimal plant health.	Prune according to best professional practices
	The plant community and coverage is significantly (>25%) different from approved landscape plan.	Restore plant vegetation to approved condition. If landscape plan needs to be adjusted to specify vegetation more appropriate for site conditions, contact City Stormwater or Engineering Staff.
	Cattails or other invasive plants cover >25% of the veg't shelf. A monoculture of plants must be avoided)	Remove all invasives by physical removal or by wiping them with pesticide (do not spray) - consult a professional.
	Plants are dead, diseased or dying.	Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application to establish the ground cover if a soil test indicates it is necessary.
The main treatment area	Sediment has accumulated to a depth greater than the original design sediment storage depth.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.

Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

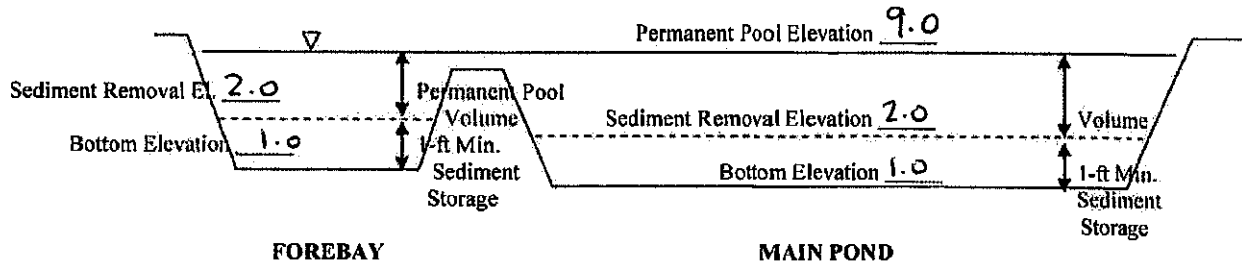
BMP element:	Potential problem:	How I will remediate the problem:
The main treatment area (continued)	Algal growth covers over 25% of the area.	Consult a professional to remove and control the algal growth.
	Cattails or other invasive plants cover >25% of the veg't shelf. A monoculture of plants must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

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

When the permanent pool depth reads 7.0 feet in the main pond, the sediment shall be removed.

When the permanent pool depth reads 7.0 feet in the forebay, the sediment shall be removed.

BASIN DIAGRAM
 (fill in the blanks)



Permit Number: _____
(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: RiverLights- Conventional Phase 1

BMP drainage basin number: 1

Print name: William Mumford, NNP IV-Cape Fear River, LLC

Title: Asst. Vice President

Address: 13777 Ballantyne Corporate Place, Suite 250, Charlotte, NC 28277

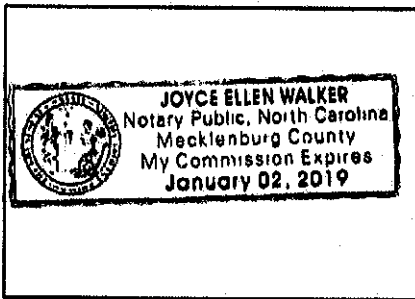
Phone: 704-887-5946

Signature: *William Mumford*

Date: 8-5-2015

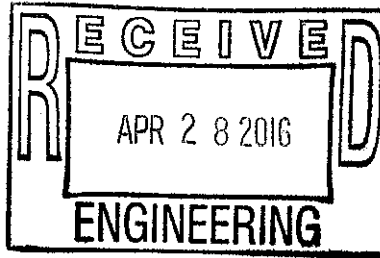
Note: The legally responsible party should not be a homeowners association unless more than 50% of the lots have been sold and a resident of the subdivision has been named the president.

I, Joyce Ellen Walker, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that William Mumford personally appeared before me this 5th day of August, 2015, and acknowledge the due execution of the forgoing wet detention basin maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires January 2, 2019



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

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

I. PROJECT INFORMATION

Project name	RiverLights-Conventional Phase 2
Contact person	Kathryn Espinoza
Phone number	910-343-1048
Date	3/22/2016
Drainage area number	9

II. DESIGN INFORMATION

Site Characteristics		
Drainage area	492,440	ft ²
Impervious area, post-development	155,548	ft ²
% impervious	31.59	%
Design rainfall depth	1.0	in
Storage Volume: Non-SA Waters		
Minimum volume required	13,718.0	ft ³ OK
Volume provided	48,549	ft ³ OK, volume provided is equal to or in excess of volume required.
Storage Volume: SA Waters		
1.5" runoff volume		ft ³
Pre-development 1-yr, 24-hr runoff		ft ³
Post-development 1-yr, 24-hr runoff		ft ³
Minimum volume required		ft ³
Volume provided		ft ³
Peak Flow Calculations		
Is the pre/post control of the 1yr 24hr storm peak flow required?	Y	(Y or N)
1-yr, 24-hr rainfall depth	3.7	in
Rational C, pre-development	0.10	(unitless)
Rational C, post-development	0.30	(unitless)
Rainfall intensity: 1-yr, 24-hr storm	0.16	in/hr OK
Pre-development 1-yr, 24-hr peak flow	0.00	ft ³ /sec
Post-development 1-yr, 24-hr peak flow	5.30	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	5.30	ft ³ /sec
Elevations		
Temporary pool elevation	9.70	fmsl
Permanent pool elevation	7.50	fmsl
SHWT elevation (approx. at the perm. pool elevation)	7.60	fmsl
Top of 10ft vegetated shelf elevation	8.00	fmsl
Bottom of 10ft vegetated shelf elevation	7.00	fmsl
Sediment cleanout, top elevation (bottom of pond)	2.00	fmsl
Sediment cleanout, bottom elevation	1.00	fmsl
Sediment storage provided	1.00	ft
Is there additional volume stored above the state-required temp. pool?	Y	(Y or N)
Elevation of the top of the additional volume	9.7	fmsl OK

II. DESIGN INFORMATION

Surface Areas

Area, temporary pool	24,300 ft ²	
Area REQUIRED, permanent pool	15,758 ft ²	
SA/DA ratio	3.20 (unitless)	
Area PROVIDED, permanent pool, A_{perm_pool}	18,315 ft ²	OK
Area, bottom of 10ft vegetated shelf, A_{bot_shelf}	15,692 ft ²	
Area, sediment cleanout, top elevation (bottom of pond), A_{bot_pond}	5,579 ft ²	

Volumes

Volume, temporary pool	48,549 ft ³	OK
Volume, permanent pool, V_{perm_pool}	63,946 ft ³	
Volume, forebay (sum of forebays if more than one forebay)	13,383 ft ³	
Forebay % of permanent pool volume	20.9%	OK

SA/DA Table Data

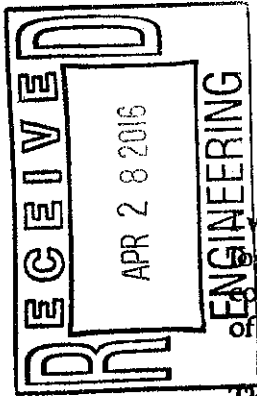
Design TSS removal	90 %	
Coastal SA/DA Table Used?	Y (Y or N)	
Mountain/Piedmont SA/DA Table Used?	N (Y or N)	
SA/DA ratio	3.20 (unitless)	
Average depth (used in SA/DA table):		
Calculation option 1 used? (See Figure 10-2b)	Y (Y or N)	
Volume, permanent pool, V_{perm_pool}	63,946 ft ³	
Area provided, permanent pool, A_{perm_pool}	18,315 ft ²	
Average depth calculated	3.49 ft	OK
Average depth used in SA/DA, d_{av} (Round to nearest 0.5ft)	3.5 ft	OK
Calculation option 2 used? (See Figure 10-2b)	N (Y or N)	
Area provided, permanent pool, A_{perm_pool}	ft ²	
Area, bottom of 10ft vegetated shelf, A_{bot_shelf}	ft ²	
Area, sediment cleanout, top elevation (bottom of pond), A_{bot_pond}	ft ²	
"Depth" (distance b/w bottom of 10ft shelf and top of sediment)	ft	
Average depth calculated	ft	
Average depth used in SA/DA, d_{av} (Round to nearest 0.5ft)	ft	

Drawdown Calculations

Drawdown through orifice?	Y (Y or N)	
Diameter of orifice (if circular)	1.75 in	
Area of orifice (if-non-circular)	in ²	
Coefficient of discharge (C_d)	0.60 (unitless)	
Driving head (H_o)	2.13 ft	
Drawdown through weir?	N (Y or N)	
Weir type	(unitless)	
Coefficient of discharge (C_w)	(unitless)	
Length of weir (L)	ft	
Driving head (H)	ft	
Pre-development 1-yr, 24-hr peak flow	0.00 ft ³ /sec	
Post-development 1-yr, 24-hr peak flow	5.30 ft ³ /sec	
Storage volume discharge rate (through discharge orifice or weir)	0.07 ft ³ /sec	Storage volume discharge rate greater than pre-dev. 1yr24hr.
Storage volume drawdown time	2.34 days	OK, draws down in 2-5 days.

Additional Information

Vegetated side slopes	3 :1	OK
Vegetated shelf slope	10 :1	OK
Vegetated shelf width	10.0 ft	OK
Length of flowpath to width ratio	3 :1	OK
Length to width ratio	2.0 :1	OK
Trash rack for overflow & orifice?	Y (Y or N)	OK
Freeboard provided	3.3 ft	OK
Vegetated filter provided?	N (Y or N)	OK
Recorded drainage easement provided?	Y (Y or N)	OK
Capures all runoff at ultimate build-out?	Y (Y or N)	OK
Drain mechanism for maintenance or emergencies is:	Pump	



Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

Wet Detention Basin Operation and Maintenance Agreement

will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the removal efficiency of the BMP.

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

This system (check one):

does does not incorporate a vegetated filter at the outlet.

This system (check one):

does does not incorporate pretreatment other than a forebay.

Important maintenance procedures:

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

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

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

Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

BMP element:	Potential problem:	How I will remediate the problem:
The inlet device: pipe or swale	The pipe is clogged.	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged.	Replace the pipe.
	Erosion is occurring in the swale.	Regrade the swale if necessary to smooth it over and provide erosion control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
The forebay	Sediment has accumulated to a depth greater than the original design depth for sediment storage.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.
	Erosion has occurred.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	Weeds are present.	Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
The vegetated shelf	Best professional practices show that pruning is needed to maintain optimal plant health.	Prune according to best professional practices
	The plant community and coverage is significantly (>25%) different from approved landscape plan.	Restore plant vegetation to approved condition. If landscape plan needs to be adjusted to specify vegetation more appropriate for site conditions, contact City Stormwater or Engineering Staff.
	Cattails or other invasive plants cover >25% of the veg't shelf. A monoculture of plants must be avoided)	Remove all invasives by physical removal or by wiping them with pesticide (do not spray) – consult a professional.
	Plants are dead, diseased or dying.	Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application to establish the ground cover if a soil test indicates it is necessary.
The main treatment area	Sediment has accumulated to a depth greater than the original design sediment storage depth.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.

Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

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

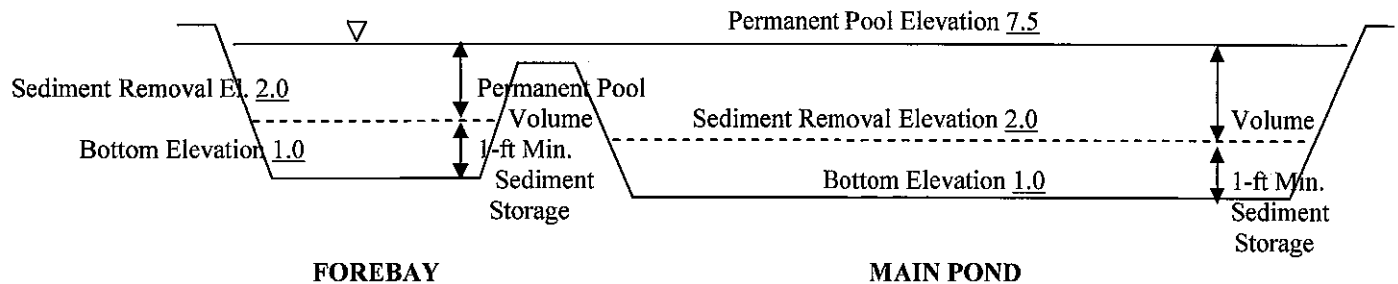
The measuring device used to determine the sediment elevation shall be such that it will give an accurate depth reading and not readily penetrate into accumulated sediments.

When the permanent pool depth reads 5.5 feet in the main pond, the sediment shall be removed.

When the permanent pool depth reads 5.5 feet in the forebay, the sediment shall be removed.

BASIN DIAGRAM

(fill in the blanks)



Permit Number:
(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.

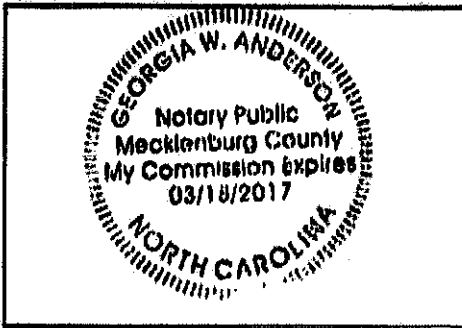
Project name: Riverlights- Conventional Phase 2
BMP drainage basin number: 109

Print name: William Mumford, PE NNP IV-Cape Fear River, LLC
Title: Vice President, Development
Address: 13777 Ballantyne Corporate Place, Suite 250, Charlotte, NC 28277
Phone: 704-887-5946

Signature: [Handwritten Signature]
Date: 9-15-15

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, Georgia W. Anderson, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that William Mumford personally appeared before me this 15th day of September, 2015, and acknowledge the due execution of the forgoing wet detention basin maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires 3/18/17

STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

INFILTRATION BASIN SUPPLEMENT

This form must be filled out, printed and submitted.

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

I. PROJECT INFORMATION

Project Name	Riverlights- Conventional Phase 1
Contact Person	Nick Lauretta, PE
Phone Number	910-343-1048
Date	2/17/2016
Drainage Area Number	4

II. DESIGN INFORMATION

Site Characteristics

Drainage area	197,298.00	ft ²
Impervious area	82,900.00	ft ²
Percent impervious	42.02	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.83	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.02	ft ³ /sec
Post-development 1-yr, 24-hr discharge	3.51	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	3.49	ft ³ /sec

Storage Volume: Non-SA Waters

Minimum design volume required	7,040.00	ft ³
Design volume provided	21,989.00	ft ³

OK for non-SA waters

Storage Volume: SA Waters

1.5" runoff volume		ft ³
Pre-development 1-yr, 24-hr runoff volume		ft ³
Post-development 1-yr, 24-hr runoff volume		ft ³
Minimum required volume		ft ³
Volume provided		ft ³

Soils Report Summary

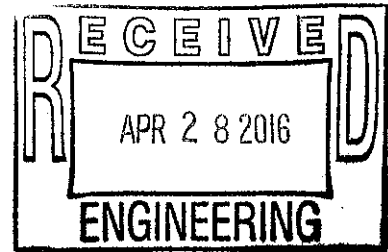
Soil type	Kureb Sands (Kr)	
Infiltration rate	28.10	in/hr
SHWT elevation	6.00	fmsl

Basin Design Parameters

Drawdown time	0.25	days	OK
Basin side slopes	3.00	:1	OK
Basin bottom elevation	8.75	fmsl	OK
Storage elevation	14.40	fmsl	
Storage Surface Area	7,318.00	ft ²	
Top elevation	16.00	fmsl	

Basin Bottom Dimensions

Basin length	200.00	ft
Basin width	48.00	ft
Bottom Surface Area	737.00	ft ²



Additional Information

Maximum runoff to each inlet to the basin?	<u>2.97</u> ac-in	Maximum of 2 acre-inches allowed
Length of vegetative filter for overflow	<u>-</u> ft	OK
Distance to structure	<u>85.00</u> ft	OK
Distance from surface waters	<u>200.00</u> ft	OK
Distance from water supply well(s)	<u>-</u> ft	OK
Separation from impervious soil layer	<u>--</u> ft	OK
Naturally occurring soil above shwt	<u>2.75</u> ft	OK
Bottom covered with 4-in of clean sand?	<u>Y</u> (Y or N)	OK
Proposed drainage easement provided?	<u>Y</u> (Y or N)	OK
Captures all runoff at ultimate build-out?	<u>Y</u> (Y or N)	OK
Bypass provided for larger storms?	<u>N</u> (Y or N)	Must provide bypass for larger flows
Pretreatment device provided	<u>MEETS 16.3.9 OF BMP MANUAL</u>	

**STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM
 INFILTRATION BASIN SUPPLEMENT**

This form must be filled out, printed and submitted.

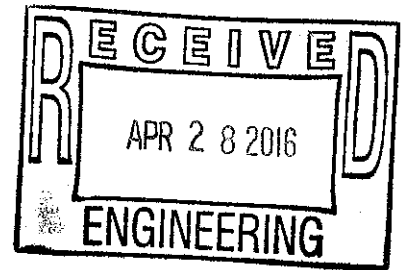
The Required Items Checklist (Part III) must be printed, filled out and submitted along with all of the required information.

I. PROJECT INFORMATION

Project Name	RiverLights-Conventional Phase 1
Contact Person	Nick Laurretta
Phone Number	910-343-1048
Date	4/26/2016
Drainage Area Number	5

II. DESIGN INFORMATION

Site Characteristics		
Drainage area	131,295.00	ft ²
Impervious area	41,860.00	ft ²
Percent impervious	31.88	%
Design rainfall depth	1.00	in
Peak Flow Calculations		
1-yr, 24-hr rainfall depth	3.83	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.00	ft ³ /sec
Post-development 1-yr, 24-hr discharge	2.53	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	2.53	ft ³ /sec
Storage Volume: Non-SA Waters		
Minimum design volume required	3,687.00	ft ³
Design volume provided	13,506.00	ft ³
Storage Volume: SA Waters		
1.5" runoff volume		ft ³
Pre-development 1-yr, 24-hr runoff volume		ft ³
Post-development 1-yr, 24-hr runoff volume		ft ³
Minimum required volume		ft ³
Volume provided		ft ³
Soils Report Summary		
Soil type	Kureb Sands (Kr)	
Infiltration rate	28.80	in/hr
SHWT elevation	6.00	fmsl
Basin Design Parameters		
Drawdown time	0.12	days
Basin side slopes	3.00	:1
Basin bottom elevation	12.50	fmsl
Storage elevation	15.30	fmsl
Storage Surface Area	5,907.00	ft ²
Top elevation	16.00	fmsl
Basin Bottom Dimensions		
Basin length	123.00	ft
Basin width	105.60	ft
Bottom Surface Area	3,806.00	ft ²



OK for non-SA waters

Additional Information

Maximum runoff to each inlet to the basin?	2.85 ac-in	Maximum of 2 acre-inches allowed
Length of vegetative filter for overflow	-- ft	OK
Distance to structure	60.00 ft	OK
Distance from surface waters	325.00 ft	OK
Distance from water supply well(s)	-- ft	OK
Separation from impervious soil layer	-- ft	OK
Naturally occurring soil above shwt	6.50 ft	OK
Bottom covered with 4-in of clean sand?	Y (Y or N)	OK
Proposed drainage easement provided?	Y (Y or N)	OK
Captures all runoff at ultimate build-out?	Y (Y or N)	OK
Bypass provided for larger storms?	Y (Y or N)	OK
Pretreatment device provided		

STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM

INFILTRATION BASIN SUPPLEMENT

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

I. PROJECT INFORMATION	
Project Name	RiverLights-Conventional Phase 1
Contact Person	Nick Laurretta
Phone Number	910-343-1048
Date	10/16/2015
Drainage Area Number	6

II. DESIGN INFORMATION

Site Characteristics	
Drainage area	312,422.00 ft ²
Impervious area	115,783.00 ft ²
Percent impervious	37.06 %
Design rainfall depth	1.00 in

Peak Flow Calculations	
1-yr, 24-hr rainfall depth	3.83 in
1-yr, 24-hr intensity	0.16 in/hr
Pre-development 1-yr, 24-hr discharge	0.00 ft ³ /sec
Post-development 1-yr, 24-hr discharge	7.63 ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	7.63 ft ³ /sec

Storage Volume: Non-SA Waters	
Minimum design volume required	9,985.00 ft ³
Design volume provided	36,801.00 ft ³

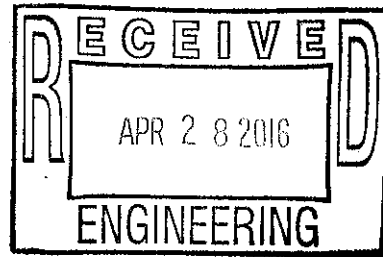
OK for non-SA waters

Storage Volume: SA Waters	
1.5" runoff volume	_____ ft ³
Pre-development 1-yr, 24-hr runoff volume	_____ ft ³
Post-development 1-yr, 24-hr runoff volume	_____ ft ³
Minimum required volume	_____ ft ³
Volume provided	_____ ft ³

Soils Report Summary	
Soil type	Kureb Sands (Kr)
Infiltration rate	27.70 in/hr
SHWT elevation	4.65 fmsl

Basin Design Parameters		
Drawdown time	0.43 days	OK
Basin side slopes	3.00 :1	OK
Basin bottom elevation	7.00 fmsl	OK
Storage elevation	13.60 fmsl	
Storage Surface Area	9,427.00 ft ²	
Top elevation	15.00 fmsl	

Basin Bottom Dimensions	
Basin length	190.00 ft
Basin width	67.00 ft
Bottom Surface Area	2,111.00 ft ²



Additional Information

Maximum runoff to each inlet to the basin?	<u>9.69</u>	ac-in	Maximum of 2 acre-inches allowed
Length of vegetative filter for overflow	<u>-</u>	ft	OK
Distance to structure	<u>125.00</u>	ft	OK
Distance from surface waters	<u>96.00</u>	ft	OK
Distance from water supply well(s)	<u>-</u>	ft	OK
Separation from impervious soil layer	<u>-</u>	ft	OK
Naturally occurring soil above shwt	<u>2.35</u>	ft	OK
Bottom covered with 4-in of clean sand?	<u>Y</u>	(Y or N)	OK
Proposed drainage easement provided?	<u>Y</u>	(Y or N)	OK
Capures all runoff at ultimate build-out?	<u>Y</u>	(Y or N)	OK
Bypass provided for larger storms?	<u>N</u>	(Y or N)	Must provide bypass for larger flows
Pretreatment device provided	<u>MEETS 16.3.9 OF BMP MANUAL</u>		

STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM

INFILTRATION BASIN SUPPLEMENT

This form must be filled out, printed and submitted.

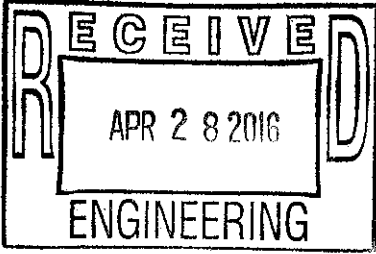
The Required Items Checklist (Part III) must be printed, filled out and submitted along with all of the required information.

I. PROJECT INFORMATION	
Project Name	Riverlights- Conventional Phase 1
Contact Person	Nick Laurretta, PE
Phone Number	910-343-1048
Date	2/17/2016
Drainage Area Number	7

II. DESIGN INFORMATION

Site Characteristics	
Drainage area	972,166.00 ft ²
Impervious area	435,393.00 ft ²
Percent impervious	44.79 %
Design rainfall depth	1.00 in

Peak Flow Calculations	
1-yr, 24-hr rainfall depth	3.83 in
1-yr, 24-hr intensity	0.16 in/hr
Pre-development 1-yr, 24-hr discharge	0.00 ft ³ /sec
Post-development 1-yr, 24-hr discharge	19.57 ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	19.57 ft ³ /sec



Storage Volume: Non-SA Waters	
Minimum design volume required	36,705.00 ft ³
Design volume provided	123,551.00 ft ³

OK for non-SA waters

Storage Volume: SA Waters	
1.5" runoff volume	ft ³
Pre-development 1-yr, 24-hr runoff volume	ft ³
Post-development 1-yr, 24-hr runoff volume	ft ³
Minimum required volume	ft ³
Volume provided	ft ³

Soils Report Summary	
Soil type	Kureb Sands (Kr)
Infiltration rate	27.70 in/hr
SHWT elevation	4.65 fmsl

Basin Design Parameters		
Drawdown time	0.38 days	OK
Basin side slopes	3.00 :1	OK
Basin bottom elevation	8.50 fmsl	OK
Storage elevation	14.60 fmsl	
Storage Surface Area	27,716.00 ft ²	
Top elevation	16.00 fmsl	

Basin Bottom Dimensions	
Basin length	200.00 ft
Basin width	86.00 ft
Bottom Surface Area	11,800.00 ft ²

Additional Information

Maximum runoff to each inlet to the basin?	39.24	ac-in	Maximum of 2 acre-inches allowed
Length of vegetative filter for overflow	--	ft	OK
Distance to structure	125.00	ft	OK
Distance from surface waters	60.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer	--	ft	OK
Naturally occurring soil above shwt	3.85	ft	OK
Bottom covered with 4-in of clean sand?	Y	(Y or N)	OK
Proposed drainage easement provided?	Y	(Y or N)	OK
Captures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	N	(Y or N)	Must provide bypass for larger flows
Pretreatment device provided	Catch Basins No discharge for 10-year storm, no bypass provided		

STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM

INFILTRATION BASIN SUPPLEMENT

This form must be filled out, printed and submitted.

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

I. PROJECT INFORMATION

Project Name	RiverLights-Conventional Phase 2 (SF2)
Contact Person	Kathryn Espinoza
Phone Number	910-343-1048
Date	24-Mar-16
Drainage Area Number	8 (IB-9)

II. DESIGN INFORMATION

Site Characteristics

Drainage area	402,047.00	ft ²
Impervious area	142,735.00	ft ²
Percent impervious	35.50	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.70	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.00	ft ³ /sec
Post-development 1-yr, 24-hr discharge	7.16	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	7.16	ft ³ /sec

Storage Volume: Non-SA Waters

Minimum design volume required	12,380.00	ft ³
Design volume provided	48,341.00	ft ³

OK for non-SA waters

Storage Volume: SA Waters

1.5" runoff volume		ft ³
Pre-development 1-yr, 24-hr runoff volume		ft ³
Post-development 1-yr, 24-hr runoff volume		ft ³
Minimum required volume		ft ³
Volume provided		ft ³

Soils Report Summary

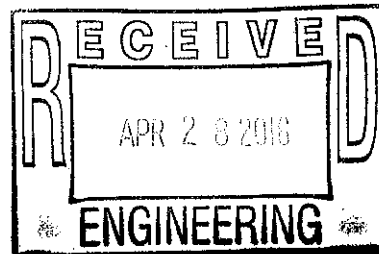
	Kureb (Kr)	Leon (Le)
Soil type		
Infiltration rate	22.10	in/hr
SHWT elevation	9.50	fmsl

Basin Design Parameters

Drawdown time	0.39	days	OK
Basin side slopes	3.00	:1	OK
Basin bottom elevation	12.50	fmsl	OK
Storage elevation	18.00	fmsl	
Storage Surface Area	12,317.00	ft ²	
Top elevation	19.50	fmsl	

Basin Bottom Dimensions

Basin length	205.00	ft
Basin width	74.00	ft
Bottom Surface Area	5,538.00	ft ²



Additional Information

Maximum runoff to each inlet to the basin?	1.18	ac-in	OK
Length of vegetative filter for overflow		ft	
Distance to structure	50.00	ft	OK
Distance from surface waters	50.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer	--	ft	OK
Naturally occurring soil above shwt	3.00	ft	OK
Bottom covered with 4-in of clean sand?	Y	(Y or N)	OK
Proposed drainage easement provided?	Y	(Y or N)	OK
Capures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	Y	(Y or N)	OK
Pretreatment device provided	catch basin		

**STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM
INFILTRATION BASIN SUPPLEMENT**

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

I. PROJECT INFORMATION

Project Name	RiverLights-Conventional Phase 2 (SF2)
Contact Person	Kathryn Espinoza
Phone Number	910-343-1048
Date	22-Mar-16
Drainage Area Number	10 (IB-11)

II. DESIGN INFORMATION

Site Characteristics

Drainage area	48,046.00	ft ²
Impervious area	25,513.00	ft ²
Percent impervious	53.10	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.70	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.00	ft ³ /sec
Post-development 1-yr, 24-hr discharge	1.25	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	1.25	ft ³ /sec

Storage Volume: Non-SA Waters

Minimum design volume required	2,114.00	ft ³
Design volume provided	3,787.00	ft ³

OK for non-SA waters

Storage Volume: SA Waters

1.5" runoff volume		ft ³
Pre-development 1-yr, 24-hr runoff volume		ft ³
Post-development 1-yr, 24-hr runoff volume		ft ³
Minimum required volume		ft ³
Volume provided		ft ³

Soils Report Summary

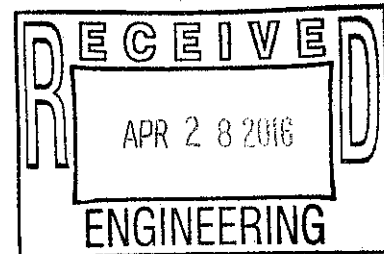
Soil type	Kureb (Kr)	
Infiltration rate	21.40	in/hr
SHWT elevation	4.50	fmsl

Basin Design Parameters

Drawdown time	0.09	days	OK
Basin side slopes	3.00	:1	OK
Basin bottom elevation	6.50	fmsl	OK
Storage elevation	8.00	fmsl	
Storage Surface Area	3,078.00	ft ²	
Top elevation	9.50	fmsl	

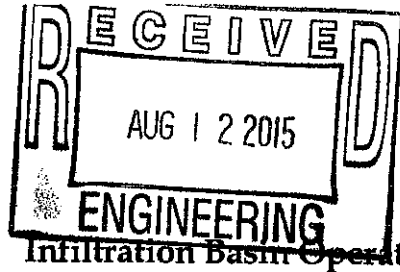
Basin Bottom Dimensions

Basin length	115.00	ft
Basin width	40.00	ft
Bottom Surface Area	1,985.00	ft ²



Additional Information

Maximum runoff to each inlet to the basin?	0.66	ac-in	OK
Length of vegetative filter for overflow		ft	
Distance to structure	40.00	ft	OK
Distance from surface waters	100.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer	--	ft	OK
Naturally occurring soil above shwt	2.00	ft	OK
Bottom covered with 4-in of clean sand?	Y	(Y or N)	OK
Proposed drainage easement provided?	Y	(Y or N)	OK
Capures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	Y	(Y or N)	OK
Pretreatment device provided	catch basin		



Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

Infiltration Basin Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the removal efficiency of the BMP.

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

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

BMP element:	Potential problem:	How I will remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The perimeter of the infiltration basin	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The inlet device: pipe or swale	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.

BMP element:	Potential problem:	How I will remediate the problem:
The forebay	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.
The main treatment area	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).
The embankment	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.
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 Division of Water Quality 401 Oversight Unit at 919-733-1786.

Permit Number: _____
(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: RiverLights- Conventional Phase 1

BMP drainage basin number: 4, 5, 6, & 7

Print name: William Mumford, NNP IV-Cape Fear River, LLC

Title: Asst. Vice President

Address: 13777 Ballantyne Corporate Place, Suite 250 Charlotte, NC 28277

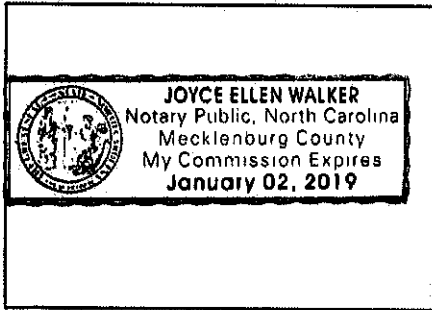
Phone: 704-887-5946

Signature: [Handwritten Signature]

Date: 8-5-2015

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, Joyce Ellen Walker, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that William Mumford personally appeared before me this 5th day of August, 2015, and acknowledge the due execution of the forgoing infiltration basin maintenance requirements. Witness my hand and official seal,



SEAL

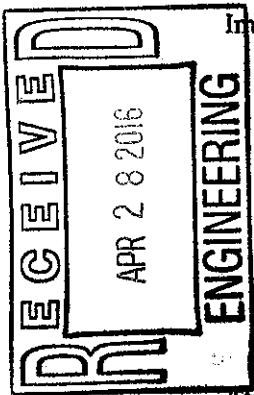
My commission expires January 2, 2019

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

Permit Number: _____
 (to be provided by City of Wilmington)
 BMP Drainage Basin #: _____

Infiltration Basin Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the removal efficiency of the BMP.



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

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

BMP element:	Potential problem:	How I will remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The perimeter of the infiltration basin	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The inlet device: pipe or swale	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.

BMP element:	Potential problem:	How I will remediate the problem:
The forebay	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.
The main treatment area	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).
The embankment	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.
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 Division of Water Quality 401 Oversight Unit at 919-733-1786.

Permit Number: _____
(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: RiverLights- Conventional Phase 2

BMP drainage basin number: ~~9 & 11~~ 8 & 10

Print name: William Mumford, PE NNP IV-Cape Fear River, LLC

Title: Vice President, Development

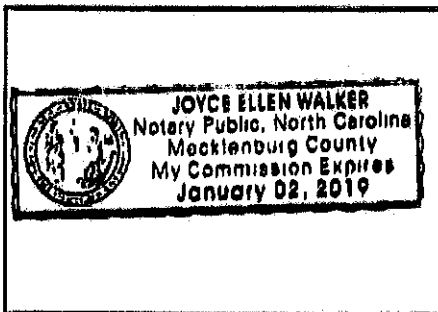
Address: 13777 Ballantyne Corporate Place, Suite 250 Charlotte, NC 28277

Phone: 704-887-5946

SIGNATURE: [Signature]
DATE: 9-14-15

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, Joyce Ellen Walker, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that William Mumford personally appeared before me this 14th day of September, 2015, and acknowledge the due execution of the forgoing infiltration basin maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires JANUARY 2, 2019

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