



Public Services

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

March 22, 2016

Mr. Bill Mumford
NNP IV - Cape Fear River, LLC
3410 River Road, Suite 103
Wilmington, NC 28412

**Subject: Stormwater Management Permit No. 2015021R1
Riverlights - Marina Village
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 The Marina Village Phase of the Riverlights project. 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 Phase IB of Marina Village
- Minor changes to the previously approved stormwater management system from phase I

Please be aware all terms and conditions of the permit 9/4/2015 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.

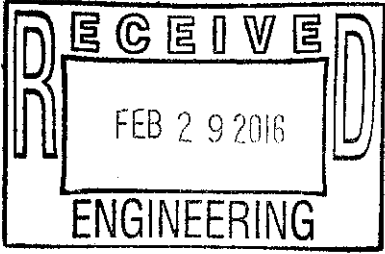
The revised stamped, approved stormwater management drawings will be released for construction by the Wilmington Planning Division under separate cover. An electronic copy of the approved drawing set, permit, application and supplementary documents will be maintained by the Wilmington Engineering Division. 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: Nick Lauretta PE, McKim & Creed
Ron Satterfield, Wilmington Development Services/Planning



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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- Marina Village

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: 2015024; 2015021 State - NCDENR/DWQ: _____

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

CAMA Major Sedimentation/Erosion Control
 NPDES Industrial Stormwater 404/401 Permit: Proposed Impacts: 0.25 acres of non-404

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:

CAMA- RiverLights #92-07, 01/10/2014; 401-RiverLights DWQ Project # 07-1335, 07/16/2013;
NHC SEC GP#24-15, 07/16/2015

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: Bill 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 permeable pavement and five infiltration trenches. Trenches are fed by stormwater conveyance systems.

- 2. Total Property Area: 1,684,343 square feet
- 3. Total Coastal Wetlands Area: 634,715 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: 1,049,628 square feet.
- 6. Existing Impervious Surface within Property Area: 32,773 square feet
- 7. Existing Impervious Surface to be Removed/Demolished: 32,773 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	85,931	+ 12 Lots (43,680sf)
Impervious Pavement	179,672	
Pervious Pavement (adj. total, with 75 % credit applied)	3,184	
Impervious Sidewalks	48,073	
Pervious Sidewalks (adj. total, with % credit applied)	0	
Other (describe) Village Green Site Improvements	1,649	
Future Development	0	
Total Onsite Newly Constructed Impervious Surface	362,189	

10. Total Onsite Impervious Surface
 (Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 362,189 square feet

11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 34.5 %

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) = 362,189 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	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)	88,013	102,460	327,091
On-Site Drainage Area (sf)	88,013	102,460	327,091
Off-Site Drainage Area (sf)			
Total Impervious Area (sf)	61,932	59,765	110,052
Buildings/Lots (sf)	11,500	28,484	21,423
Impervious Pavement (sf)	42,716	20,367	72,128
Pervious Pavement (sf)	0	910	2,274
Impervious Sidewalks (sf)	7,716	10,004	14,227
Pervious Sidewalks (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 (%)	70	58	34

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

BMP Drainage area information (continued)

Basin Information	BMP # VG	Phase 1B BMP # 4	Phase 1B 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)	49483	81827	83008
On-Site Drainage Area (sf)	49483	81827	83008
Off-Site Drainage Area (sf)	0	0	0
Total Impervious Area (sf)	1943	62948	65549
Buildings/Lots (sf)	294	23958	43952
Impervious Pavement (sf)		27981	16480
Pervious Pavement, % credit (sf)		0	0
Impervious Sidewalks (sf)		11009	5117
Pervious Sidewalks, % credit (sf)		0	0
Other (sf)	1649	0	0
Future Development (sf)		0	0
Existing Impervious to remain (sf)		0	0
Offsite (sf)		0	0
Percent Impervious Area (%)	4	77	79
Basin Information	BMP #	(Type of BMP) BMP #	(Type of BMP) BMP #
Receiving Stream Name			
Receiving Stream Index Number			
Stream Classification			
Total Drainage Area (sf)	0	0	0
On-Site Drainage Area (sf)			
Off-Site Drainage Area (sf)			
Total Impervious Area (sf)	0	0	0
Buildings/Lots (sf)			
Impervious Pavement (sf)			
Pervious Pavement, % credit (sf)			
Impervious Sidewalks (sf)			
Pervious Sidewalks, % credit (sf)			
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)			
Offsite (sf)			
Percent Impervious Area (%)			

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: Nick Lauretta, PE, LEED AP

Consulting Firm: McKim & Creed, Inc.

a. Contact information for consultant listed above:

Mailing Address: 243 N. Front Street

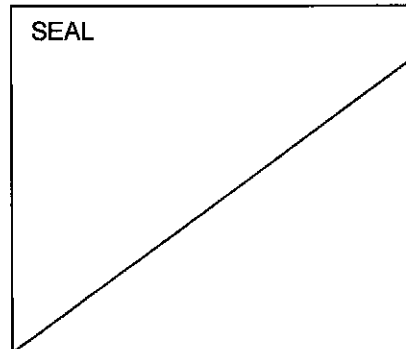
City: Wilmington State: NC Zip: 28401

Phone: 910-398-2882 Fax: 910-251-8282 Email: nlauretta@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.



Signature: _____

Date: _____

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

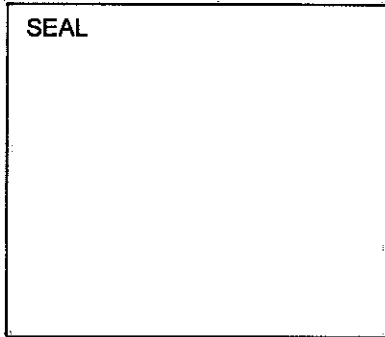
hereby certify that _____ personally appeared before me this day of _____, _____.

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) Bill Mumford 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: *Bill Mumford*

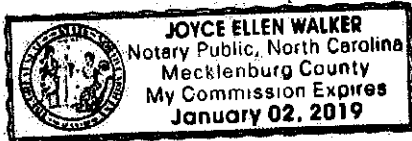
Date: 5-19-2015

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 day of 19th May, 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, 2019





STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM
INFILTRATION TRENCH 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 - Marina Village
Contact person	Nick Laurretta, PE
Phone number	910-343-1048
Date	2/16/2016
Drainage area number	1

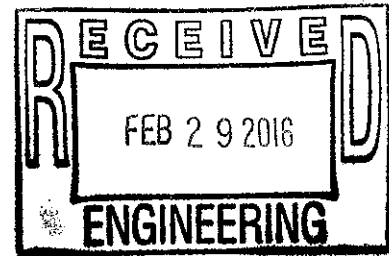
II. DESIGN INFORMATION

Site Characteristics

Drainage area	88,013.00	ft ²
Impervious area	61,932.00	ft ²
Percent impervious	70.4%	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.94	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	4.65	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	4.65	ft ³ /sec



Storage Volume: Non-SA Waters

Minimum volume required	5,012.00	ft ³
Volume provided	7,690.00	ft ³

OK for non-SR 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 volume required		ft ³
Volume provided		ft ³

Soils Report Summary

Soil type	SP	
Infiltration rate	25.50	in/hr
SHWT elevation	4.22	fmsl

Trench Design Parameters

Drawdown time	0.04	days	OK
Perforated pipe diameter	36.00	in	
Perforated pipe length	78.00	ft	
Number of laterals	8		
Stone type (if used)	57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

Trench Elevations

Bottom elevation	6.50	fmsl	OK
Storage/overflow elevation	9.35	fmsl	
Top elevation	10.50	fmsl	

Trench Dimensions

Length (long dimension)	82.00	ft	
Width (short dimension)	38.50	ft	
Height (depth)	4.00	ft	OK

Additional Information

Maximum volume to each inlet into the trench?		ac-in	
Length of vegetative filter for overflow		ft	
Number of observation wells	6		OK
Distance to structure	70.00	ft	OK
Distance from surface waters	510.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer		ft	
Depth of naturally occurring soil above SHWT	2.28	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
Trench wrapped with geotextile fabric?	Y	(Y or N)	OK
Pretreatment device provided			



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM
INFILTRATION TRENCH SUPPLEMENT



Permit No. _____
 (to be provided by DWQ)

This form must be filled out, printed and submitted.

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I. PROJECT INFORMATION

Project name	RiverLights - Marina Village
Contact person	Nick Lauretta, PE
Phone number	910-343-1048
Date	2/16/2016
Drainage area number	2

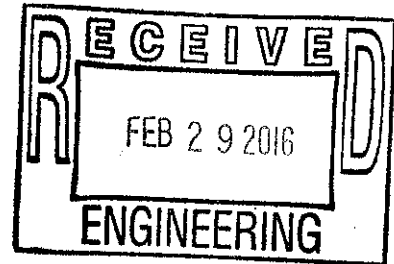
II. DESIGN INFORMATION

Site Characteristics

Drainage area	102,460.00	ft ²
Impervious area	59,765.00	ft ²
Percent impervious	58.3%	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.94	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	6.16	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	6.16	ft ³ /sec



Storage Volume: Non-SA Waters

Minimum volume required	4,909.00	ft ³
Volume provided	11,294.00	ft ³

OK for non-SR 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 volume required		ft ³
Volume provided		ft ³

Soils Report Summary

Soil type	SP	
Infiltration rate	25.50	in/hr
SHWT elevation	4.22	fmsl

Trench Design Parameters

Drawdown time	0.04	days	OK
Perforated pipe diameter	36.00	in	
Perforated pipe length	132.00	ft	
Number of laterals	7		
Stone type (if used)	57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

Trench Elevations

Bottom elevation	6.50	fmsl	OK
Storage/overflow elevation	9.80	fmsl	
Top elevation	10.50	fmsl	

Trench Dimensions

Length (long dimension)	136.00	ft	
Width (short dimension)	34.00	ft	
Height (depth)	4.00	ft	OK

Additional Information

Maximum volume to each inlet into the trench?		ac-in	
Length of vegetative filter for overflow		ft	
Number of observation wells	6		OK
Distance to structure	35.00	ft	OK
Distance from surface waters	275.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer		ft	
Depth of naturally occurring soil above SHWT	2.28	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
Trench wrapped with geotextile fabric?	Y	(Y or N)	OK
Pretreatment device provided			



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I. PROJECT INFORMATION

Project name	RiverLights - Marina Village
Contact person	Nick Lauretta, PE
Phone number	910-343-1048
Date	2/16/2016
Drainage area number	3

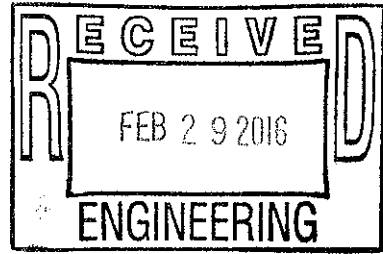
II. DESIGN INFORMATION

Site Characteristics

Drainage area	327,091.00	ft ²
Impervious area	110,052.00	ft ²
Percent impervious	33.6%	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.94	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	12.37	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	12.37	ft ³ /sec



Storage Volume: Non-SA Waters

Minimum volume required	9,617.00	ft ³
Volume provided	27,391.00	ft ³

OK for non-SR 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 volume required		ft ³
Volume provided		ft ³

Soils Report Summary

Soil type	SP
Infiltration rate	26.60 in/hr
SHWT elevation	4.50 fmsl

Trench Design Parameters

Drawdown time	0.04	days	OK
Perforated pipe diameter	36.00	in	
Perforated pipe length	85.00	ft	
Number of laterals	27		
Stone type (if used)	57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

Trench Elevations

Bottom elevation	6.50	fmsl	OK
Storage/overflow elevation	9.45	fmsl	
Top elevation	10.50	fmsl	

Trench Dimensions

Length (long dimension)	124.00	ft	
Width (short dimension)	89.00	ft	
Height (depth)	4.00	ft	OK

Additional Information

Maximum volume to each inlet into the trench?		ac-in	
Length of vegetative filter for overflow		ft	
Number of observation wells	6		OK
Distance to structure	90.00	ft	OK
Distance from surface waters	210.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer		ft	
Depth of naturally occurring soil above SHWT	1.98	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
Trench wrapped with geotextile fabric?	Y	(Y or N)	OK
Pretreatment device provided			



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Permit No. _____
(to be provided by DWQ)

This form must be filled out, printed and submitted.

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I. PROJECT INFORMATION

Project name	RiverLights - Marina Village
Contact person	Nick Lauletta, PE
Phone number	910-343-1048
Date	2/16/2016
Drainage area number	4

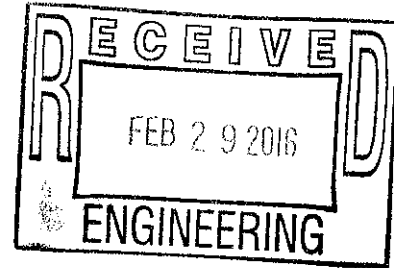
II. DESIGN INFORMATION

Site Characteristics

Drainage area	81,827.00	ft ²
Impervious area	62,948.00	ft ²
Percent impervious	76.9%	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.94	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	4.65	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	4.65	ft ³ /sec



Storage Volume: Non-SA Waters

Minimum volume required	5,062.00	ft ³
Volume provided	10,972.00	ft ³

OK for non-SR 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 volume required		ft ³
Volume provided		ft ³

Soils Report Summary

Soil type	Ly	
Infiltration rate	25.10	in/hr
SHWT elevation	4.50	fmsl

Trench Design Parameters

Drawdown time	0.04	days	OK
Perforated pipe diameter	36.00	in	
Perforated pipe length	100.00	ft	
Number of laterals	9		
Stone type (if used)	57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

Trench Elevations

Bottom elevation	6.50	fmsl	OK
Storage/overflow elevation	9.00	fmsl	
Top elevation	10.50	fmsl	

Trench Dimensions

Length (long dimension)	104.00	ft	
Width (short dimension)	43.00	ft	
Height (depth)	4.00	ft	OK

Additional Information

Maximum volume to each inlet into the trench?		ac-in	
Length of vegetative filter for overflow		ft	
Number of observation wells	6		OK
Distance to structure	20.00	ft	OK
Distance from surface waters	200.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer		ft	
Depth of 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
Captures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	Y	(Y or N)	OK
Trench wrapped with geotextile fabric?	Y	(Y or N)	OK
Pretreatment device provided			



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
 401 CERTIFICATION APPLICATION FORM
INFILTRATION TRENCH SUPPLEMENT



Permit No. _____
 (to be provided by DWQ)

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 - Marina Village
Contact person	Nick Lauretta, PE
Phone number	910-343-1048
Date	2/16/2016
Drainage area number	5

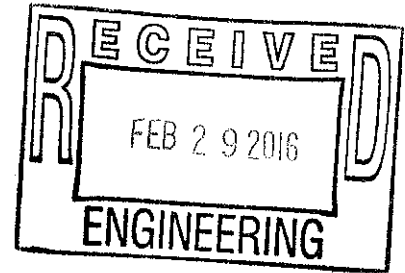
II. DESIGN INFORMATION

Site Characteristics

Drainage area	83,008.00	ft ²
Impervious area	65,549.00	ft ²
Percent impervious	79.0%	%
Design rainfall depth	1.00	in

Peak Flow Calculations

1-yr, 24-hr rainfall depth	3.94	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	4.65	ft ³ /sec
Pre/Post 1-yr, 24-hr peak flow control	4.65	ft ³ /sec



Storage Volume: Non-SA Waters

Minimum volume required	5,262.00	ft ³
Volume provided	10,381.00	ft ³

OK for non-SR 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 volume required		ft ³
Volume provided		ft ³

Soils Report Summary

Soil type	Kr	
Infiltration rate	25.10	in/hr
SHWT elevation	4.50	fmsl

Trench Design Parameters

Drawdown time	0.04	days	OK
Perforated pipe diameter	36.00	in	
Perforated pipe length	167.00	ft	
Number of laterals	5		
Stone type (if used)	57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

Trench Elevations

Bottom elevation	6.50	fmsl	OK
Storage/overflow elevation	9.25	fmsl	
Top elevation	10.50	fmsl	

Trench Dimensions

Length (long dimension)	171.00	ft	
Width (short dimension)	25.00	ft	
Height (depth)	4.00	ft	OK

Additional Information

Maximum volume to each inlet into the trench?		ac-in	
Length of vegetative filter for overflow		ft	
Number of observation wells	6		OK
Distance to structure	16.00	ft	OK
Distance from surface waters	75.00	ft	OK
Distance from water supply well(s)	--	ft	OK
Separation from impervious soil layer		ft	
Depth of 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
Trench wrapped with geotextile fabric?	Y	(Y or N)	OK
Pretreatment device provided			

Infiltration Trench 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.

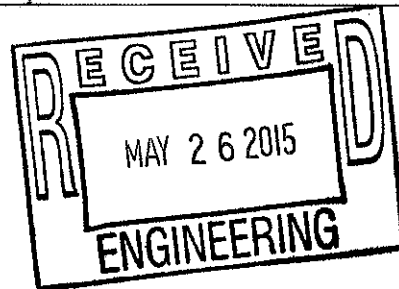
Important maintenance procedures:

- The drainage area of the infiltration trench will be carefully managed to reduce the sediment load to the sand filter.
- The water level in the monitoring wells will be recorded once a month and after every storm event greater than 1.5 inches if in a Coastal County.

The infiltration trench 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 grass filter strip or other pretreatment area	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
	Sediment has accumulated to a depth of greater than six inches.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.
The flow diversion structure (if applicable)	The structure is clogged.	Unclog the conveyance and dispose of any sediment off-site.
	The structure is damaged.	Make any necessary repairs or replace if damage is too large for repair.



BMP element:	Potential problem:	How I will remediate the problem:
The trench	Water is ponding on the surface for more than 24 hours after a storm.	Remove the accumulated sediment from the infiltration system and dispose in a location that will not impact a stream or the BMP.
	The depth in the trench is reduced to 75% of the original design depth.	Remove the accumulated sediment from the infiltration system and dispose in a location that will not impact a stream or the BMP.
	Grass or other plants are growing on the surface of the trench.	Remove the plants, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
The observation well(s)	The water table is within one foot of the bottom of the system for a period of three consecutive months.	Contact the DWQ Stormwater Unit immediately at 919-733-5083.
	The outflow pipe is clogged.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	The outflow pipe is damaged.	Repair or replace the pipe.
The emergency overflow berm	Erosion or other signs of damage have occurred at the outlet.	The emergency overflow berm will be repaired or replaced if beyond repair.
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)

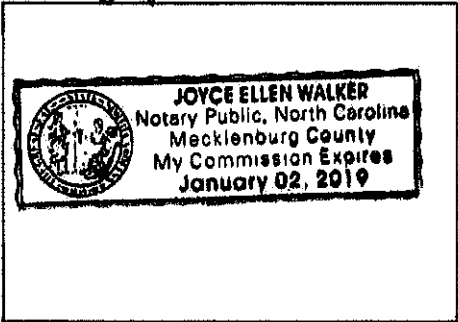
I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed above. I agree to notify City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: RiverLights- Marina Village Phase 1
BMP drainage basin number: 1,2,3

Print name: Bill Mimford
Title: Vice President, Development
Address: 3410 River Road, Suite 103 Wilmington, NC 28412
Phone: 704-877-5946
Signature: [Handwritten Signature]
Date: 5-19-2015

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 19th day of May, 2015, and acknowledge the due execution of the forgoing infiltration trench maintenance requirements. Witness my hand and official seal, Joyce Ellen Walker



SEAL

My commission expires January 2, 2019



STORMWATER MANAGEMENT PERMIT APPLICATION FORM
401 CERTIFICATION APPLICATION FORM
PERMEABLE PAVEMENT SUPPLEMENT



*This form must be completely 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 - Marina Village
Contact Person	Nick Laretta, PE
Phone Number	910-343-1048
Date	5/13/2015
Drainage Area	1-2/1-3

II. DESIGN INFORMATION

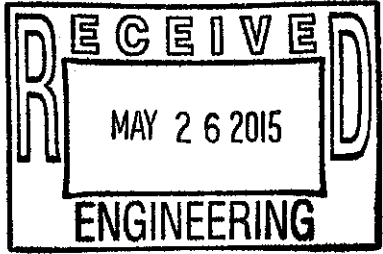
Soils Report Summary

Hydrologic soil group (HSG) of subgrade	A
Infiltration rate	25.80 in/hr

Pavement Design Summary

Permeable Pavement (PP) design type	Infiltration - HSG A/B	
SA of PP being proposed (A _p)	12,734	ft ²
Resulting BUA counted as impervious for main application form	3,183	ft ²
Adjacent BUA directed to PP (A _c)	12,700	ft ² OK
Ratio of A _c to A _p	1.00	(unitless) OK
Flow from pervious surfaces is directed away from PP?	Yes	OK
Design rainfall depth	1.0"	in
Permeable pavement surface course type	PC	
Layer 1 - Washed aggregate size (ex. No. 57)	57	
Layer 1 - Aggregate porosity (n)	0.40	(unitless) OK
Layer 2 - Washed aggregate size (ex. No. 57)		
Layer 2 - Aggregate porosity (n)		(unitless)
Minimum total aggregate depth for design rainfall (D _{wq})	5.0	in
Drawdown/infiltration time for D _{wq}	0.0	days OK
How is 10-yr, 24-hr storm handled?	bypassed	Underdrain Required
Aggregate depth to infiltrate 10-yr, 24-hr storm (D ₁₀)	20.6	in
Drawdown/infiltration time of 10-yr, 24-hr storm	0.22	days
Actual provided total aggregate depth	6.0	in OK
Top of aggregate base layer elevation	10.50	fmsl
Storage elevation of design rainfall depth	10.42	fmsl
Overflow elevation	11.00	fmsl
Bottom elevation at subgrade	10.00	fmsl
SHWT elevation	3.83	fmsl
Underdrain diameter		in

BUA Credit for Permeable Pavement Footprint:
75% BUA Credit



#REF!

SCANNED

Detention Systems (skip for infiltration systems)

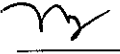


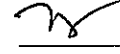
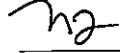


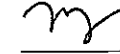
Diameter of orifice	_____	in
Coefficient of discharge (C_d)	_____	(unitless)
Driving head (H_o)	_____	ft
Storage volume discharge rate (through discharge orifice)	_____	ft ³ /sec
Storage volume drawdown time	_____	days
Pre-development 1-yr, 24-hr peak flow	_____	ft ³ /sec
Post-development 1-yr, 24-hr peak flow	_____	ft ³ /sec

Additional Information

Slope of soil subgrade at bottom of permeable pavement	_____	0.50	%	OK
Slope of the permeable pavement surface	_____	0.50	%	OK
Construction sequence minimizes compaction to soils?	_____	Yes		OK
Subsoil preparation specified (must select one)	_____	scarified		
Meets industry standards for structural requirements?	_____	Yes		OK
Washed stone is specified for the aggregate?	_____	Yes		OK
Required signage specified on plans?	_____	No		Signage must be specified on the plans
Number of observation wells provided	_____	1		OK
Distance to structure	_____	60.00	ft	
Distance to surface waters	_____	100.00	ft	OK
Distance to water supply well(s)	_____	--	ft	OK

Permeable Pavement

Please indicate the page or plan sheet numbers where the supporting documentation can be found. **An incomplete submittal package will result in a request for additional information. This will delay final review and approval of the project.** Initial in the space provided to indicate the following design requirements have been met. If the applicant has designated an agent, the agent may initial below. **If a requirement has not been met, attach justification.**

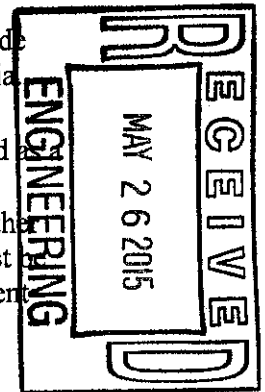
Initials	Page/ Plan Sheet No.	Version 1.0
	CG101	Plans (1" = 50' or larger) of the entire site showing: - Design at ultimate build-out, 1. - Location of permeable pavement, - Roof and other surface flow directed away from permeable pavement,
	CS501	Section view of the permeable pavement (1" = 20' or larger) showing: 2. - Layers, and - SHWT
	Narrative	A soils report that is based upon an actual field investigation, soil borings, and 3. infiltration tests. County soil maps are not an acceptable source of soils information.
	CG502	4. A construction sequence that shows how the permeable pavement will be protected from sediment until the entire drainage area is stabilized.
	Narrative	5. The supporting calculations.
	Attached	6. A copy of the signed and notarized operation and maintenance (O&M) agreement.
	To be provided	7. A copy of the deed restrictions (if required).
	Noted	8. Installation must be at a slope of 0.5% or less.

Permeable Pavement 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 operation and maintenance procedures:

- Stable groundcover will be maintained in the drainage area to reduce the sediment load to the permeable pavement.
- The area around the perimeter of the permeable pavement will be stabilized and mowed, with clippings removed.
- Any weeds that grow in the permeable pavement will be sprayed with pesticide immediately. Weeds will not be pulled, since this could damage the fill media.
- Once a year, the permeable pavement surface will be vacuum swept.
- At no time shall wet sweeping (moistening followed by sweeping) be allowed as a means of maintenance.
- There shall be no repair or treatment of Permeable Pavement surfaces with other types of pavement surfaces. All repairs to Permeable Pavement surfaces must be accomplished utilizing permeable pavement which meets the original pavement specifications.
- Concentrated runoff from roof drains, piping, swales or other point sources, directly onto the permeable pavement surface shall not be allowed. These areas must be diverted away from the permeable pavement.



Initial Inspection: Permeable Pavements shall be inspected monthly for the first three months for the following:

BMP element:	Potential problem:	How to remediate the problem:
The perimeter of the permeable pavement	Areas of bare soil and/or erosive gullies have formed.	In the event that rutting or failure of the groundcover occurs, the eroded area shall be repaired immediately and permanent groundcover re-established. Appropriate temporary Erosion Control measures (such as silt fence) shall be installed in the affected area during the establishment of permanent groundcover, and any impacted area of permeable pavement is to be cleaned via vacuum sweeping.
The surface of the permeable pavement	Rutting / uneven settlement	This indicates inadequate compaction of the pavement base / sub-base. If rutting or uneven settlement on the order of 1/2 inch or greater occurs, permeable pavement shall be removed and base / sub-base re-compacted, smoothed, and permeable pavement shall then be re-installed. Base and sub-base compaction shall be monitored by a licensed geotechnical engineer to ensure that infiltration capacity of base and sub-base are not compromised by compaction and smoothing processes.
	The pavement does not dewater between storms, or water is running off.	Vacuum sweep the pavement. If the pavement still does not dewater, consult a professional.

Permit Number: _____
 (to be provided by City of Wilmington)
 Drainage Area / Lot Number: _____

The permeable pavement 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 to remediate the problem:
The perimeter of the permeable pavement	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, 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 3 to 6 inches (remove clippings).
The surface of the permeable pavement	Trash/debris is present.	Remove the trash/debris.
	Weeds are growing on the surface of the permeable pavement.	Do not pull the weeds (may pull out media as well). Spray them with pesticide.
	Sediment is present on the surface.	Vacuum sweep the pavement.
	The structure is deteriorating or damaged.	Consult an appropriate professional. Damaged areas of the pavement shall be removed and repaired.
	The pavement does not dewater between storms.	Vacuum sweep the pavement. If the pavement still does not dewater, consult a professional. Permanently clogged pavement shall be removed and repaired.

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 City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: RiverLights- Marina Village Phase 1

BMP drainage area or lot number: 12,734 SF

Print name: Bill Mumford

Title: Vice President, Development

Address: 3410 River Road, Suite 103, Wilmington, NC 28412

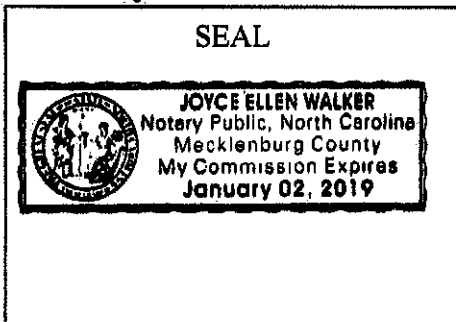
Phone: 704-877-5946

Signature: *William Mumford*

Date: 5-19-2015

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 19th day of May, 2015, and acknowledge the due execution of the forgoing permeable pavement maintenance requirements. Witness my hand and official seal, Joyce Ellen Walker



My commission expires January 2, 2019