



Public Services

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

September 10, 2018

Mr. Jeff Kentner, President & CEO
State Street Companies SSG-1, LLC
P.O. Box 12477
Charlotte, NC 28220

**Subject: Stormwater Management Permit No. 2017038R2
Airlie at Wrightsville Sound
High Density Development**

Dear Mr. Kentner:

The City of Wilmington Engineering Division has received a request for a revision to the Stormwater Management Permit for Airlie at Wrightsville Sound. 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:

- Site Layout changes impacting impervious surface areas.
- Underground Infiltration Trench redesigns.
- See plans dated August 28, 2018.

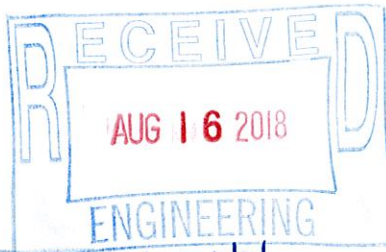
Please be aware all terms and conditions of the permit Issued on September 8, 2017 remain in full force and effect. Any additional changes to the approved plans must be approved by this office prior to construction. The issuance of the plan revision does not preclude the permittee from complying with 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 Richard Christensen at (910) 341-7813 or richard.christensen@wilmingtonnc.gov

Sincerely,

for Sterling Cheatham, City Manager
City of Wilmington

cc: Richard Collier, PE, McKim & Creed Inc.
Brian Chambers, Senior Planner, City of Wilmington



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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.):

Airlie at Wrightsville Sound - 49 Lot Subdivision

2. Location of Project (street address):

315 Airlie Road

City: Wilmington

County: New Hanover

Zip: 28403

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

From north bound Oleander Drive (US-76), turn right on to Airlie Road. The project is located on the left approximately 0.25 miles from the intersection.

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: 2017038R1

State – NCDENR/DWQ: _____

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

CAMA Major ☐

☒ Sedimentation/Erosion Control

NPDES Industrial Stormwater ☐

☒ 404/401 Permit: Proposed Impacts

0.336 acres

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 #28-17; and USACE SAW-2017-1448

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: Airlie at Wrightsville Sound, LLC

Signing Official & Title: Elizabeth K. Brinkman, Member

- a. Contact information for Applicant / Signing Official:

Street Address: P.O. Box 12477

City: Charlotte State: NC Zip: 28220

Phone: (704) 372-3703 Fax: (704) 973-9804 Email: bbrinkman@statestreetco.com

Mailing Address (if different than physical address): _____

City: _____ State: _____ Zip: _____

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



The property owner (Skip to item 3)

Lessee* (Attach a copy of the lease agreement and complete items 2 and 2a below)

Purchaser* (Attach a copy of the pending sales agreement and complete items 2 and 2a below)

Developer* (Complete items 2 and 2a below.)

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

Property Owner / Organization: _____

Signing Official & Title: _____

- a. Contact information for Property Owner:

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ Email: _____

Mailing Address (if different than physical address): _____

City: _____ State: _____ Zip: _____

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

Other Contact Person / Organization: _____

Signing Official & Title: _____

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

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ Email: _____

Mailing Address (if different than physical address): _____

City: _____ State: _____ Zip: _____

IV. PROJECT INFORMATION

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

Stormwater is treated by use of underground infiltration trenches, an infiltration basin, and a storm filter.

2. Total Property Area: 514,434 square feet

3. Total Coastal Wetlands Area: 0 square feet

4. Total Surface Water Area: 0 square feet

5. Total Property Area (2) – Total Coastal Wetlands Area (3) – Total Surface Water Area (4) = Total Project Area: 514,434 square feet.

6. Existing Impervious Surface within Property Area: 6,388 square feet

7. Existing Impervious Surface to be Removed/Demolished: 6,388 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	231,823
Impervious Pavement	44,112
Pervious Pavement (adj. total, with 0 % credit applied)	17,865 *
Impervious Sidewalks	19,353
Pervious Sidewalks (adj. total, with % credit applied)	0
Other (describe) Mail Kiosk and Fire Pit	500
Future Development	0
Total Onsite Newly Constructed Impervious Surface	313,653

* 8,634 sf of additional Pervious Concrete is receiving 100% Pervious Credit ~~under impervious table.~~

10. Total Onsite Impervious Surface

(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 313,653 square feet

11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 60.97 %

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

Impervious Pavement	1,898
Pervious Pavement (adj. total, with % credit applied)	
Impervious Sidewalks	3,610
Pervious Sidewalks (adj. total, with % credit applied)	
Other (describe)	
Total Offsite Newly Constructed Impervious Surface	5,508

13. Total Newly Constructed Impervious Surface

(Total Onsite + Offsite Newly Constructed Impervious Surface) = 319,161 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 # A	BMP # B	BMP # C
Receiving Stream Name	Bradley Creek	Bradley Creek	Bradley Creek
Receiving Stream Index Number	18-87-24-4-(2)	18-87-24-4-(2)	18-87-24-4-(2)
Stream Classification	S.C. : #	S.C. : #	S.C. : #
Total Drainage Area (sf)	99,374	83,635	234,152
On-Site Drainage Area (sf)	99,374	83,635	234,152
Off-Site Drainage Area (sf)	0	0	0
Total Impervious Area (sf)	53,094	51,213	167,680
Buildings/Lots (sf)	47,839	45,427	108,086
Impervious Pavement (sf)	614	0	34,837
Pervious Pavement (sf)	2,168 *	4,589	11,108
Impervious Sidewalks (sf)	2,173	997	13,649
Pervious Sidewalks (sf)	0	0	0
Other (sf)	300	200	0
Future Development (sf)	0	0	0
Existing Impervious to remain (sf)	0	0	0
Offsite (sf)	0	0	0
Percent Impervious Area (%)	53.43%	61.23%	71.67%

* 8,634 sf of additional Pervious Concrete is receiving 100% Pervious Credit BMP-A DA only.

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

BMP Drainage area information (continued)

Basin Information	StormFilter BMP # D	Infiltration Basin BMP # F	Pervious Concrete BMP # PC
Receiving Stream Name	Bradley Creek	Bradley Creek	Located within DA-A
Receiving Stream Index Number	18-87-24-4-(2)	18-87-24-4-(2)	(100% Credit for BUA)
Stream Classification	SC:#	SC:#	
Total Drainage Area (sf)	50937	24092	0
On-Site Drainage Area (sf)	50937	24092	
Off-Site Drainage Area (sf)	0	0	
Total Impervious Area (sf)	26549	15117	0 (8634)
Buildings/Lots (sf)	15354	15117	0
Impervious Pavement (sf)	8661	0	0
Pervious Pavement, 100% credit (sf)	0	0	0 (8634)
Impervious Sidewalks (sf)	2534	0	0
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 (%)	52.12%	62.75%	0
Basin Information	(Type of BMP) 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 (%)			

8-17-18
rac

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: Richard M. Collier, PE

Consulting Firm: McKim & Creed, Inc.

- a. Contact information for consultant listed above:

Mailing Address: 243 North Front Street

City: Wilmington State: NC Zip: 28401

Phone: (910) 343-1048 Fax: (910) 251-8282 Email: rcollier@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: _____

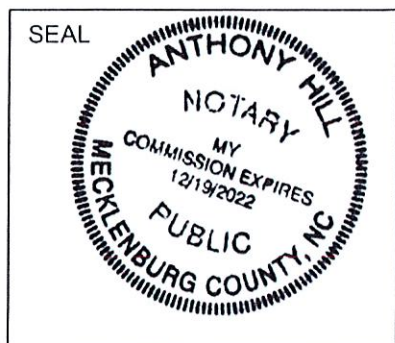
I, _____, a Notary Public for the State of _____, County of _____, do hereby certify that _____ personally appeared before me this day of _____, _____,

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

My commission expires: 12/19/2022

VIII. APPLICANT'S CERTIFICATION

I, (print or type name of person listed in Contact Information, item 1), Elizabeth K. Brinkman 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: Elizabeth K Brinkman
Date: 6/28/18

I, Anthony Hill, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that Elizabeth Kentner Brinkman personally appeared before me this day of June, 2018, and acknowledge the due execution of the application for a stormwater

permit. Witness my hand and official seal,

My commission expires: 12/19/2022

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	Airlie at Wrightsville Sound
Contact person	Richard M. Collier, PE
Phone number	910-343-1048
Date	8/10/2018
Drainage area number	A

II. DESIGN INFORMATION

Site Characteristics

Drainage area	99,374.00	ft ²
Impervious area	53,094.00	ft ²
Percent impervious	53.4%	%
Design rainfall depth	1.50	in

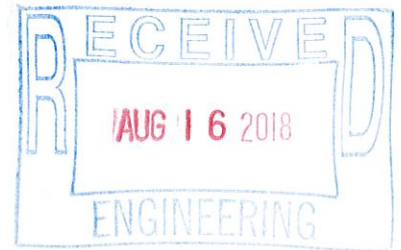
Peak Flow Calculations

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

Storage Volume: Non-SA Waters

Minimum volume required	6,594.00	ft ³
Volume provided	7,675.00	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	Baymeade	
Infiltration rate	2.97	in/hr
SHWT elevation	12.25	fmsl

Trench Design Parameters

Drawdown time	0.16	days	OK
Perforated pipe diameter	34.00	in	
Perforated pipe length	367.00	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	14.25	fmsl	OK
Storage/overflow elevation	16.40	fmsl	
Top elevation	17.58	fmsl	

Trench Dimensions

Length (long dimension)	115.00	ft	
Width (short dimension)	58.40	ft	
Height (depth)	3.33	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	2		OK
Distance to structure	15.00	ft	OK
Distance from surface waters	115.00	ft	OK
Distance from water supply well(s)		ft	
Separation from impervious soil layer	2.00	ft	OK
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	Sump		

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	Airlie at Wrightsville Sound
Contact person	Richard M. Collier, PE
Phone number	910-343-1048
Date	7/2/2018
Drainage area number	B

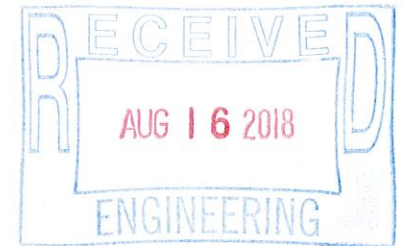
II. DESIGN INFORMATION

Site Characteristics

Drainage area	83,635.00	ft ²
Impervious area	51,213.00	ft ²
Percent impervious	61.2%	%
Design rainfall depth	1.50	in

Peak Flow Calculations

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



Storage Volume: Non-SA Waters

Minimum volume required	6,284.00	ft ³
Volume provided	6,665.00	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	Seagate	
Infiltration rate	4.48	in/hr
SHWT elevation	12.50	fmsl

Trench Design Parameters

Drawdown time	0.22	days	OK
Perforated pipe diameter	51.00	in	
Perforated pipe length	185.00	ft	
Number of laterals	3		
Stone type (if used)	#57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

Trench Elevations

Bottom elevation	14.50	fmsl	OK
Storage/overflow elevation	18.35	fmsl	
Top elevation	19.00	fmsl	

Trench Dimensions

Length (long dimension)	185.00	ft	
Width (short dimension)	14.25	ft	
Height (depth)	4.50	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	1		OK
Distance to structure	15.00	ft	OK
Distance from surface waters	585.00	ft	OK
Distance from water supply well(s)	N/A	ft	OK
Separation from impervious soil layer	2.00	ft	OK
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	Sump		

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	Airlie at Wrightsville Sound
Contact person	Richard M. Collier
Phone number	910-343-1048
Date	8/10/2018
Drainage area number	C

II. DESIGN INFORMATION

Site Characteristics

Drainage area	234,152.00	ft ²
Impervious area	167,680.00	ft ²
Percent impervious	71.6%	%
Design rainfall depth	1.50	in

Peak Flow Calculations

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

Storage Volume: Non-SA Waters

Minimum volume required	20,327.00	ft ³
Volume provided	23,367.00	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	Seagate	
Infiltration rate	12.72	in/hr
SHWT elevation	7.75	fmsl

Trench Design Parameters

Drawdown time	0.10	days	OK
Perforated pipe diameter	51.00	in	
Perforated pipe length	122.33	ft	
Number of laterals	15		
Stone type (if used)	#57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK



Trench Elevations

Bottom elevation	10.00	fmsl	OK
Storage/overflow elevation	13.74	fmsl	
Top elevation	14.25	fmsl	

Trench Dimensions

Length (long dimension)	122.33	ft	
Width (short dimension)	76.65	ft	
Height (depth)	4.50	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	5		OK
Distance to structure	15.00	ft	OK
Distance from surface waters	522.00	ft	OK
Distance from water supply well(s)	N/A	ft	OK
Separation from impervious soil layer	2.00	ft	OK
Depth of naturally occurring soil above SHWT	1.00	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	Sump		

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	Airlie at Wrightsville Sound
Contact Person	Richard M. Collier
Phone Number	(910) 343-1048
Date	8/10/2018
Drainage Area Number	F

II. DESIGN INFORMATION

Site Characteristics

Drainage area	24,092.00	ft ²
Impervious area	15,117.00	ft ²
Percent impervious	0.63	%
Design rainfall depth	1.50	in

Peak Flow Calculations

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

Storage Volume: Non-SA Waters

Minimum design volume required	1,851.00	ft ³
Design volume provided	2,873.00	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

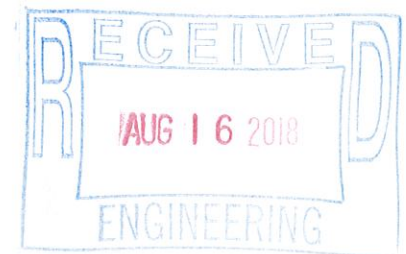
Soil type	Baymeade	
Infiltration rate	11.56	in/hr
SHWT elevation	8.00	fmsl

Basin Design Parameters

Drawdown time	0.06	days	OK
Basin side slopes	3.00	:1	OK
Basin bottom elevation	10.00	fmsl	OK
Storage elevation	11.00	fmsl	
Storage Surface Area	1,277.00	ft ²	
Top elevation	12.00	fmsl	

Basin Bottom Dimensions

Basin length	55.00	ft
Basin width	35.00	ft
Bottom Surface Area	1,277.00	ft ²



Additional Information

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

0.55	ac-in	OK
70.00	ft	OK
50.00	ft	OK
70.00	ft	OK
n/a	ft	OK
2.00	ft	OK
2.00	ft	OK
n/a	(Y or N)	OK
y	(Y or N)	OK
y	(Y or N)	OK
y	(Y or N)	OK
overland vegetative filter		


 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	Airline at Wrightsville Sound
Contact Person	Richard M. Collier
Phone Number	(910) 343-1048
Date	August 10, 2018
Drainage Area	PPS-A

II. DESIGN INFORMATION
Soils Report Summary

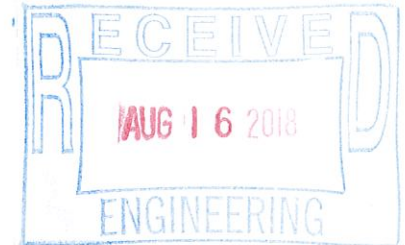
Hydrologic soil group (HSG) of subgrade	A
Infiltration rate	13.13 in/hr

Pavement Design Summary

Permeable Pavement (PP) design type	Infiltration - HSG A/B
SA of PP being proposed (A_p)	8,634 ft ²
Resulting BUA counted as impervious for main application form	2,159 0 ft ²
Adjacent BUA directed to PP (A_c)	8,600 ft ² OK
Ratio of A_c to A_p	1.00 (unitless)
Flow from pervious surfaces is directed away from PP?	Yes OK
Design rainfall depth	1.5" in
Permeable pavement surface course type	PC
Layer 1 - Washed aggregate size (ex. No. 57)	No. 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})	6.2 in
Drawdown/infiltration time for D_{wq}	0.0 days OK
How is 10-yr, 24-hr storm handled?	infiltrated
Aggregate depth to infiltrate 10-yr, 24-hr storm (D_{10})	in
Drawdown/infiltration time of 10-yr, 24-hr storm	days
Actual provided total aggregate depth	8.0 in OK
Top of aggregate base layer elevation	19.18 fmsl
Storage elevation of design rainfall depth	19.18 fmsl
Overflow elevation	19.68 fmsl
Bottom elevation at subgrade	18.51 fmsl
SHWT elevation	16.51 fmsl
Underdrain diameter	0 in

BUA Credit for Permeable Pavement Footprint:

100% BUA Credit



#REF!

Detention Systems (skip for infiltration systems)

Diameter of orifice	N/A	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	0.85	%	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?	Yes		OK
Number of observation wells provided	1		OK
Distance to structure	8.00	ft	
Distance to surface waters	96.00	ft	OK
Distance to water supply well(s)	N/A	ft	OK

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.

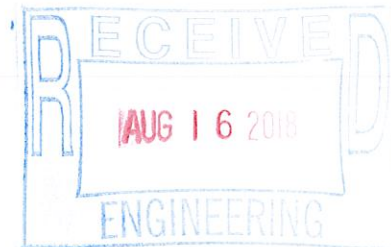
Important maintenance procedures:

- 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: Airlie at Wrightsville Sound

BMP drainage basin number: A, B, C

Print name: State Street Companies - SSG-1, LLC (Elizabeth Brinkman/Vice President)

Title: Developer

Address: P.O. Box 12477 Charlotte, NC 28220

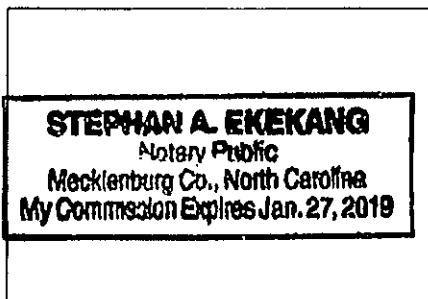
Phone: (704) 372-3703

Signature: Beth K Brinkman

Date: JULY 21, 2017

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, Stephan A. EkeKang, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that Elizabeth Brinkman personally appeared before me this 21st day of July, 2017, and acknowledge the due execution of the forgoing infiltration trench maintenance requirements. Witness my hand and official seal,



SEAL

Stephan A. EkeKang

My commission expires Jan 27, 2019

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.

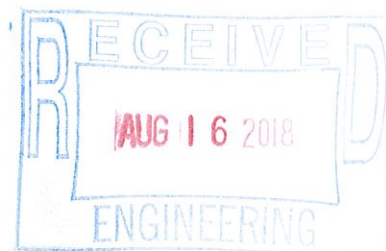
Important maintenance procedures:

- 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: Airlie at Wrightsville Sound

BMP drainage basin number: Basin - F

Print name: Elizabeth K. Brinkman

Title: Member

Address: P.O. Box 12477, Charlotte, NC 28220

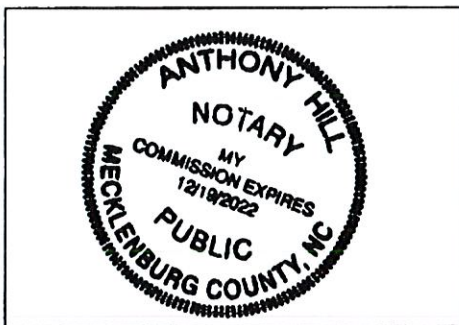
Phone: (704) 372-3703

Signature: Elizabeth K. Brinkman

Date: 6/29/18

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, Anthony Hill, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that Elizabeth Kentner Brinkman personally appeared before me this 28 day of June, 2018, and acknowledge the due execution of the forgoing infiltration basin maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires 12/19/2022

Signature: [Handwritten Signature]

StormFilter 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.

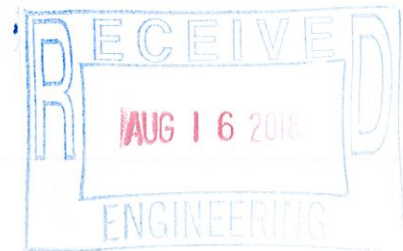
Important maintenance procedures:

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

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

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

BMP element:	Potential problem:	How I will remediate the problem:
Entire BMP	Trash/debris is present.	Remove the trash/debris.
Adjacent pavement (if applicable)	Sediment is present on the pavement surface.	Sweep or vacuum the sediment as soon as possible.
Flow diversion structure	The structure is clogged.	Unclog the conveyance and dispose of any sediment offsite.
	The structure is damaged.	Make any necessary repairs or replace if damage is too large for repair.
StormFilter Cartridges	Cartridges not performing as designed – see Contech I&M document to determine if cartridge maintenance is required.	Replace cartridges per manufacturer's recommendations.
Outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment offsite.
	The outlet device is damaged	Repair or replace the outlet device.
Receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the NC Division of Water Quality 401 Oversight Unit at 919-733-1786.



Permit Number: _____
(to be provided by DWQ)

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

Project name: Airlie at Wrightsville Sound

BMP drainage area number: D

Print name: State Street Companies - SSG-1, LLC (Elizabeth Brinkman / Vice President)

Title: Developer

Address: P.O. Box 12477 Charlotte, NC 28220

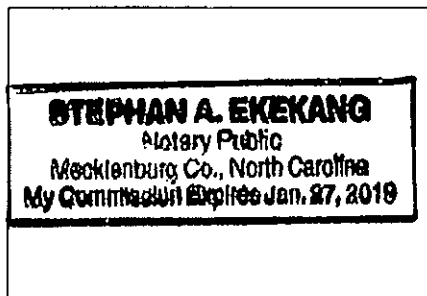
Phone: (704) 372-3703

Signature: Beth K Brinkman

Date: JULY 21, 2017

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, Stephan A. EkeKang, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that Elizabeth Brinkman personally appeared before me this 21st day of July, 2017, and acknowledge the due execution of the forgoing sand filter maintenance requirements. Witness my hand and official seal,



Stephan A. EkeKang

SEAL

My commission expires Jan. 27, 2019

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.

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

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

The permeable pavement will be inspected **once a quarter**. Records of operation and maintenance will be kept in a known set location and will be available upon request.

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

BMP element:	Potential problem:	How to remediate the problem:
The perimeter of the permeable pavement	Areas of bare soil and/or erosive gullies	Regrade the soil if necessary to remove the gully, then plant ground cover and water until established.
	A vegetated area drains toward the pavement.	Regrade the area so that it drains away from the pavement, then plant ground cover and water until established.
The surface of the permeable pavement	Trash/debris present	Remove the trash/debris.
	Weeds	Do not pull the weeds (may pull out media as well). Spray them with a systemic herbicide such as glyphosate and then return within the week to remove them by hand. (Another option is to pour boiling water on them or steam them.)
	Sediment	Vacuum sweep the pavement.
	Rutting, cracking or slumping or damaged structure	Consult an appropriate professional.
Observation well	Water present more than five days after a storm event	Clean out clogged underdrain pipes. Consult an appropriate professional for clogged soil subgrade.
Educational sign	Missing or is damaged.	Replace the sign.



Permit Number: _____
(to be provided by DWQ)

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

Project name: Airlic at Wrightsville Sound

BMP drainage area or lot number: ~~4.1~~ A.

Print name: State Street Companies - SSG-1, LLC (Elizabeth Brinkman/Vice President)

Title: Developer

Address: P.O. Box 12477 Charlotte, NC 28220

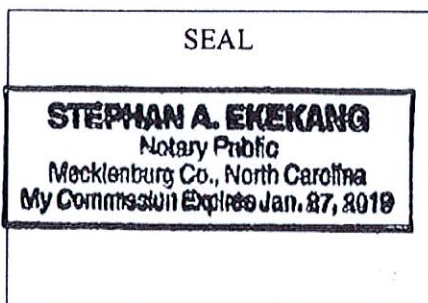
Phone: (704) 3721-3703

Signature: Elizabeth Brinkman

Date: JULY 21, 2017

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, Stephan A. EkeKang, a Notary Public for the State of North Carolina, County of Mecklenburg, do hereby certify that Elizabeth Brinkman personally appeared before me this day of July 21, 2017, and acknowledge the due execution of the forgoing permeable pavement maintenance requirements. Witness my hand and official seal,



Stephan A. EkeKang

My commission expires Jan. 27, 2019