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WAKE COUNTY, NC
TAMMY L. BRUNNER
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01-20-2022 AT 15:01:07

BOOK: 018889 PAGE: 00242 - 00275

Stormwater Operation and Maintenance Manuals

for

Twelve Oaks Subdivision Phase 6 and Phase 8

Holly Springs, North Carolina

Prepared for and Return to:
Twelve Oaks Master Association, Inc.
11010 Raven Ridge Road
Raleigh, NC 27614

Prepared by:
Withers Ravenal
115 MacKenan Drive
Cary, NC 27511

Submitted electronically by "Nexsen Pruet, LLC"
in compliance with North Carolina statutes governing recordable documents
and the terms of the submitter agreement with the Wake County Register of Deeds.

TOWN OF HOLLY SPRINGS OPERATIONS AND MAINTENANCE MANUAL

Twelve Oaks, Phase 6 and Phase 8

Holly Springs, North Carolina

Owner/Financially Responsible Party:
Twelve Oaks Master Association Inc.
11010 Raven Ridge Road
Raleigh, NC 27614

Contact Name:
Robert Van Graafeiland
C/O PPM
11010 Raven Ridge Road
Raleigh, NC 27614
Contact Phone: 919-848-4911
Contact Fax: 919-870-7241
Email: robert@ppmral.com

Prepared By:
Withers Ravenel
115 MacKenan Drive
Cary, NC 27511

Design Engineer:
Brandon Miller
c/o Withers Ravenel
115 MacKenan Drive
Cary, NC 27511
Design Engineer Phone: 919-469-3340
Design Engineer Email:
bmiller@withersravenel.com

Date Submitted by Design Engineer: 12/10/2021
Date of DRAFT Approval by Town of Holly Springs: 12/13/2021
Date of Approval by Town of Holly Springs: _____

Twelve Oaks Subdivision
Phases 6 and 8

Stormwater Operation and Maintenance Manuals

Table of Contents

Phase 6 – Operations and Maintenance Manual
- Exhibit A - Operations and Maintenance Log
- Exhibit B – Stormwater BMP Summary and Location Map
- Exhibit C – Copy of Recorded Plat
- Exhibit D – Engineer's Certification

Phase 8 – Operations and Maintenance Manual
- Exhibit E - Operations and Maintenance Log
- Exhibit F – Stormwater BMP Summary and As-Built Plans
- Exhibit G – Copy of Recorded Plat
- Exhibit H – Engineer's Certification

PHASE 6

Structural Stormwater Best Management Practice (BMP) Maintenance Acknowledgment

Twelve Oaks, Phase 6 Constructed Wetland

I. **Monthly** or after every runoff producing rainfall, whichever come first:
   a. *Inspect the outlet structure to ensure proper function. Check the drawdown orifice, riser structure, and outlet pipe for clogging.*
   b. *Keep the BMP free from trash or other debris that may hinder the performance of the outlet structure during a storm event.*
   c. *Inspect outlets for erosion.*

II. **Quarterly**
   a. *Inspect the collection system (catch basins, pipes, grates) for proper functioning.*
   b. *Clear accumulated trash and debris from collection system.*
   c. *Repair any broken pipes, grates, or structures and repair any defective joints.*
   d. *Replace riprap if it is clogged with sediment.*

III. **Semi-Annually**
   a. *Reseed any bare areas on embankment or areas draining into the wetland.*

IV. **General**
   a. *Dam and Bank Slope vegetation should be mowed regularly.*
   b. *All components of the system are to be kept in working order.*
   c. *Sediment and debris removal shall be performed by a licensed professional contractor using suitable equipment.*
   d. *Permits and/or professional certifications may be required prior to working in, on, or around the wetland.*
   e. *The responsible party shall submit an annual inspection report to the Town of Holly springs per the Town's SCM inspection requirements.*
   f. *In the event that the property ownership changes, the currently responsible party shall contact the Town within thirty (30) days of transfer of ownership, and submit a new Operation and Maintenance Plan identifying the new responsible party.*

I, Tim Frye 40 12 OAKS HOA, hereby acknowledge that I represent the financially responsible party for maintenance of the Structural Stormwater Best Management Practices for this site. I will perform the maintenance as outlined above for this project. Operation and maintenance responsibilities are hereby transferred to the HOA/OWNER, contingent upon the Town of Holly Springs approving that all installation, performance measures and documentation are in compliance with the approved stormwater ~~management~~ plan.

Signature: _____ Date: 1/12/22

BY: Tim Frye, President, Twelve Oaks Master Association, Inc.

I, Claudia C. Cooper, a Notary Public of the State of North Carolina County of Wake, do hereby certify that Tim Frye personally appeared before me this 12 day of, January and acknowledge due execution of the foregoing instrument. Witness my hand and official seal,

Seal Claudia C. Cooper My Commission Expires: 3/9/2024

CLAUDIA C. COOPER
NOTARY PUBLIC
Wake County
North Carolina
My Commission Expires March 9, 2024

OPERATIONS & MAINTENANCE MANUAL

Project Name & Phase: **Twelve Oaks, Phase 6 Stormwater Wetland**

Information: The 12 Oaks Bioretention Area Phase 8 and Stormwater Wetland Phase 6 have been constructed by the Developer and will be maintained by the Twelve Oaks Master Association Inc., 11010 Raven Ridge Road, Raleigh, NC 27614. Attn: Robert Van Graafeiland. Phone 919-848-4911 Fax 919-870-7241 email: robert@ppmral.com. The BMP(s) is/are located on property owned by the Twelve Oaks Master Association Inc. Deed Book 016551, Page 02019. A stormwater maintenance surety in the form of a cash payment to the Stormwater Facility Replacement Fund has been provided in the amount equal to 35% of actual construction cost of the BMP(s).

This operations and maintenance agreement may be assigned only upon the following conditions:

1. *(list any applicable conditions)*

Date Constructed: 8/2/2021
Location: 236 Sour Mash Ct, near the Ancient Oaks Dr. & Big Shadow Tr. intersection
Receiving Watercourse(s): White Oak Creek, Cape Fear River Basin

Contractor: (List Construction Information below)
(Jolley Construction) *Earthwork, plantings, outlet structure.*

Material Supplies: (List below)
(Riser Structure) *PVC drawdown orifice/pipe, 8" gate valve, anti-floatation base, trash rack*
(Outlet Pipe & Protection) *28-LF 15" RCP, riprap pad*

Project Name & Phase: **Twelve Oaks, Phase 6**
Type of BMP: Stormwater Wetland

This manual established procedures for maintenance and operation of the *(insert type of BMP this form shall be created specifically for each BMP).*

I. Maintenance

Immediately after the stormwater wetland is established, the wetland plants will be watered twice weekly f needed until the plants become established (commonly six weeks), Maintenance to establish vegetation should be more aggressive in the first two years of the life of the BMP.No portion of the stormwater wetland will be fertilized after the initial fertilization that is required to establish wetland plants.

Specific guidelines for inspections and maintenance of constructed wetland are provided in the table below. This table is to be consulted when completing BMP inspections, and is consistent with the tables provided in the example Inspection and Maintenance Log in the Appendix to this document.

BMP element:	Potential problem:	How I will remediate the problem:
Entire BMP	Trash/debris is present.	Remove the trash/debris.
The perimeter of the BMP	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
	Vegetation is too short or too long.	Maintain vegetation at a height of approximately six inches.
Forebay	Sediment has accumulated in the forebay to a depth that inhibits the forebay from functioning well.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.
	Erosion has occurred.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	Weeds are present.	Remove the weeds, preferably by hand. If a pesticide is used, wipe it on the plants rather than spraying.
The inlet device	The pipe is clogged.	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged.	Replace the pipe.
	Erosion is occurring in the swale.	Regrade the swale if necessary to smooth it over and provide erosion control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
	Stone verge is clogged or covered in sediment (if applicable).	Remove sediment and replace with clean stone.

Deep pool, shallow water and shallow land areas	Algal growth covers over 50% of the deep pool and shallow water areas.	Consult a professional to remove and control the algal growth.
	Cattails, phragmites or other invasive plants cover 50% of the deep pool and shallow water areas.	Remove invasives by physical removal or by wiping them with pesticide (do not spray) – consult a professional.
	Shallow land remains flooded more than 5 days after a storm event.	Unclog the outlet device immediately.
	Plants are dead, diseased or dying.	Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application to establish the ground cover if necessary.
	Best professional practices show that pruning is needed to maintain optimal plant health.	Prune according to best professional practices.
	Sediment has accumulated and reduced the depth to 75% of the original design depth of the deep pools.	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.
Embankment	A tree has started to grow on the embankment.	Consult a dam safety specialist to remove the tree.
	An annual inspection by appropriate professional shows that the embankment needs repair.	Make all needed repairs.
	Evidence of muskrat or beaver activity is present.	Consult a professional to remove muskrats or beavers.
Micropool	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.
The outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment off-site.
	The outlet device is damaged	Repair or replace the outlet device.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the local NC Department of Environment and Natural Resources Regional Office.

II. OPERATION

A. Record Keeping

The Town of Holly Springs shall be provided with written inspection reports as specified in this manual. These reports shall be provided annually within 30 days of the anniversary of receipt of the "Stormwater BMP/O&M Responsibility Transfer" letter (form #16037). A professional engineer shall certify the reports. The Town of Holly Springs Engineering Department shall be notified as soon as any deficiencies in the detention structure are recorded. The Town shall be notified of the proposed methods to bring the structure into conformance and furthermore, the Town shall approve of any proposed work to be completed on any part of the structure prior to any work being started. After work has been completed the Town shall inspect and approve of the work before it shall be considered complete. After the Town approves the work an as-built drawing shall be completed and provided to the Town.

Note: Operation of a BMP should include the following:

- Annual & Quarterly Inspection Reports – a collection of a written inspection report should be kept on record, Inspection should be conducted at minimum quarterly and certified by a professional engineer annually.
- Observations – all observations should be recorded. Where periodic inspections are performed following significant rainfall events, these inspections should be logged on the log forms found in Appendix D of the Town's Design Manual or created specifically for the project.
- Maintenance – written records of maintenance and/or repairs should be recorded on the Operation & Maintenance Log Form found in Appendix D of the Town's Design Manual or created specifically for the project.
- Other Operation Procedures – the owner should maintain a complete and up-to-date set of plans (as-built drawings) and all changes made to the dam over time should be recorded on the as-builts. Mylar and digital as-builts shall be provided to the Town each time they are updated.

B. Sedimentation & Dredging

Sedimentation from establishing areas tributary to the BMP may eventually result in the reduction of the storage volume and eventually will have to be removed. The frequency of this sediment removal can be reduced by ensuring that the site areas around the building be stabilized with a vegetative ground cover such that it restrains erosion. This would include a periodic application of fertilizer and other treatments necessary to promote a stable groundcover and minimize sedimentation to the BMP. The maintenance on this BMP requires that (*provide design specific clean out information here).* For aesthetic purposes it may be desirable to maintain it prior to this point. The removed material should be hauled offsite to a suitable landfill site or mounded somewhere on site and stabilized with a groundcover sufficient to restrain erosion.

III. INSPECTION, OPERATION & MAINTENANCE LOGS

(attach a blank copy of the applicable O&M log for each BMP)
(attach 8 ½ x 11 Location Map)
(attach 8 ½ x 11 copy of Recorded Plat(s))
(attach the Stormwater Management Plan, including form #16012 and As-builts)
(attach Engineer Certifications for construction of each BMP)

Exhibit A

Stormwater Control Measures (SCM)
Operation & Maintenance Log
Stormwater Wetland

Project Information & SCM Identification	
Project Name:	Twelve Oaks Phase 6 Section 1
PIN Number:	0639549608
Property Owner:	TWELVE OAKS MASTER ASSOCIATION INC
SCM Location:	Ancient Oaks Dr and Big Shadow Trl

	Operation Inspection	Maintenance Inspection
Date:		
By:		
Type of Inspection: *Quarterly or Annual*		
Last Rainfall Date:		
Last Rainfall Amount:		
Today's Weather:		
Photo Attached & Name:	☐	☐

SCM Element	Status	Maintenance Completed
Entire SCM	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Perimeter of the Wetland	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Inlet Device: *pipe or swale*	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Pretreatment Area / Forebay	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Planted Forebay & Wetland Zone	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Deep Pool, Shallow Water, &	Maintenance Required? ☐ *Yes*	Maintenance Completed? ☐ *Yes*

Stormwater Control Measures (SCM)
Operation & Maintenance Log
Stormwater Wetland

Shallow Land Areas	☐ *No* Description:	☐ *No* Description:
Embankment	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Micropool	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Outlet Device	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Receiving Water	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
General Comments, Sketches & Field Measurements (attach if necessary): *Include Date & Initials*		

Stormwater Control Measures (SCM)
Operation & Maintenance Log
Stormwater Wetland

Annual Certification of SCM Operation & Maintenance

Note: this section is not required to be filled out for quarterly inspections

I, _____ , a SCM Inspection and Maintenance certified professional in the
Print Name

State of North Carolina, certify that the _____ constructed as a part of
Type

_____ , project located at
Name of Project

_____
Size/lot/general description

has been maintained in substantial accordance with the approved plans and specifications, dated:

_____
Date of Operation Inspection

This is certification is based on my field observation during the periodic & annual operation and maintenance inspections and other methods as follows (*if applicable*):

_____

_____

_____

_____

_____

_____

Signature:_____ Certification Number:_____
(NCSU BAE SCM Inspection Certification #)

Exhibit B

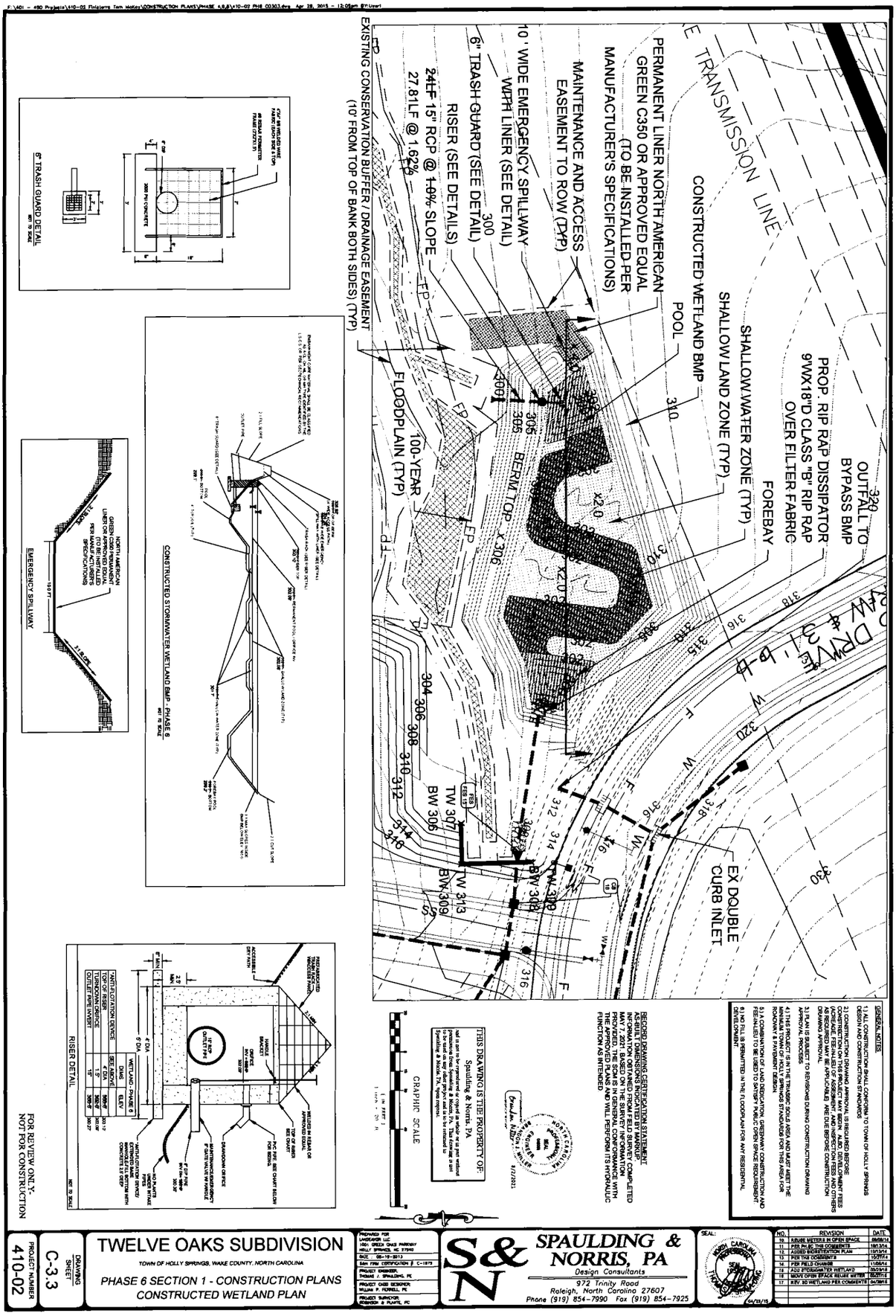
Stormwater BMP Summary
TOWN OF HOLLY SPRINGS ENGINEERING DEPARTMENT

Project Information	
Project Name:	12 Oaks Phase 6
TOHS Project Number:	13-MAS-01
Project Location:	SW corner of Ancient Oaks Dr and Big Shadow Trail intersection
PIN Number:	0639-65-4266

Identify the types of Best Management Practices in the project, location and give a brief description of their design, if you need additional space please attach separate sheet to this document. Please attach an 8 ½" x 11" site plan showing the general location of each BMP you identify in the table. This summary & map shall be included with the O&M Agreement, Bonding Application and Annual O&M Certifications.

BMP Type	Quantity in Project	Location & Brief Description of Each BMP	125% Total (Performance Surety	35% Total (Maintenance Surety)
Dry Extended Detention Basins				
Dry Extended Detention Basin with Infiltration				
Level Spreaders				
Wet Detention Basin				
Infiltration Level Spreaders				
Infiltration Trench				
Dry Wells				
Bioretention Areas				
Permeable Pavement				
Manufactured Products				
Grassed Swales				
Stormwater Wetlands	1	North of Lot 1014 on Big Shadow Trail, single inlet with ID 3'x3' riser and 15" RCP outlet	$114,875	$32,165
Vegetated Filter Strip / Restored Riparian Buffer				
		TOTALS	$114,875	$32,165

16012
4/24/12



GENERAL NOTES

1.) ALL CONSTRUCTION SHALL CONFORM TO TOWN OF HOLLY SPRINGS DESIGN AND CONSTRUCTION STANDARDS

2.) CONSTRUCTION DRAWING APPROVAL IS REQUIRED BEFORE CONSTRUCTION ON THIS PROJECT MAY BEGIN. ALSO, DEVELOPMENT FEES AS REQUIRED MAY BE DUE AT THIS TIME. PRE-CONSTRUCTION MEETINGS AND OTHER REQUIREMENTS MAY BE APPLICABLE. ARE DUE BEFORE CONSTRUCTION DRAWING APPROVAL PROCESS

3.) PLAN IS SUBJECT TO REVISIONS DURING CONSTRUCTION DRAWING APPROVAL PROCESS

4.) THIS PROJECT IS IN THE TRIASSIC SOILS AREA AND MUST MEET THE ROADWAY & PAVEMENT DESIGN STANDARDS FOR THIS AREA FOR CONSTRUCTION

5.) A CONNECTION OF LAND DEDICATION AGREEMENT, CONSTRUCTION AID FEE SHALL TO BE USED TO SATISFY PUBLIC OPEN SPACE REQUIREMENT

6.) NO FILL IS PERMITTED IN THE FLOODPLAIN FOR ANY RESIDENTIAL DEVELOPMENT

RECORD DRAWING CERTIFICATION STATEMENT
AS-BUILT SURVEY INFORMATION OBTAINED FROM FIELD SURVEY COMPLETED MAY 7, 2021. BASED ON THE SURVEY INFORMATION PROVIDED, THIS SCM IS IN GENERAL CONFORMANCE WITH THE APPROVED PLANS AND WILL PERFORM ITS HYDRAULIC FUNCTION AS INTENDED

THIS DRAWING IS THE PROPERTY OF:
Spaulding & Norris, PA
Use of this plan is for the purchaser or owner of the property shown hereon and is not to be used on any other project and is not to be loaned, copied or given to any other person or entity without the written permission of Spaulding & Norris, PA. All rights reserved. Unauthorized use or copying of the document, or any part thereof, is strictly prohibited and will expose violators to legal action for copyright infringement, including payment of any and all damages resulting from such unauthorized use.

NO.	REVISION	DATE
10	ADJUST METERS IN OPEN SPACE	08/06/13
11	PER PHEC TRB COMMENTS	10/13/14
12	ADDED BIORETENTION PLAN	10/13/14
13	PER TRB COMMENTS	10/27/14
14	PER FIELD CHANGE	11/06/14
15	ADD 2ND QUANTITY WETLAND	05/23/15
16	MOVE OPEN SPACE RELIEF METER	06/07/16
17	REV. SCM WETLAND PER COMMENTS	04/28/16

PREPARED FOR:
LANDMARK LLC
1001 GREEN OAKS PARKWAY
HOLLY SPRINGS, NC 27540
DATE: 05-10-2013
S&N FIRM CERTIFICATION #: C-1879
PROJECT ENGINEER:
THOMAS J. SPAULDING, PE
PROJECT CADD DESIGNER:
WILLIAM R. FERRELL, PE
PROJECT SURVEYOR:
ROBINSON & PLANTE, PC

SEAL:

SPAULDING & NORRIS, PA
Design Consultants
972 Trinity Road
Raleigh, North Carolina 27607
Phone (919) 854-7990 Fax (919) 854-7925

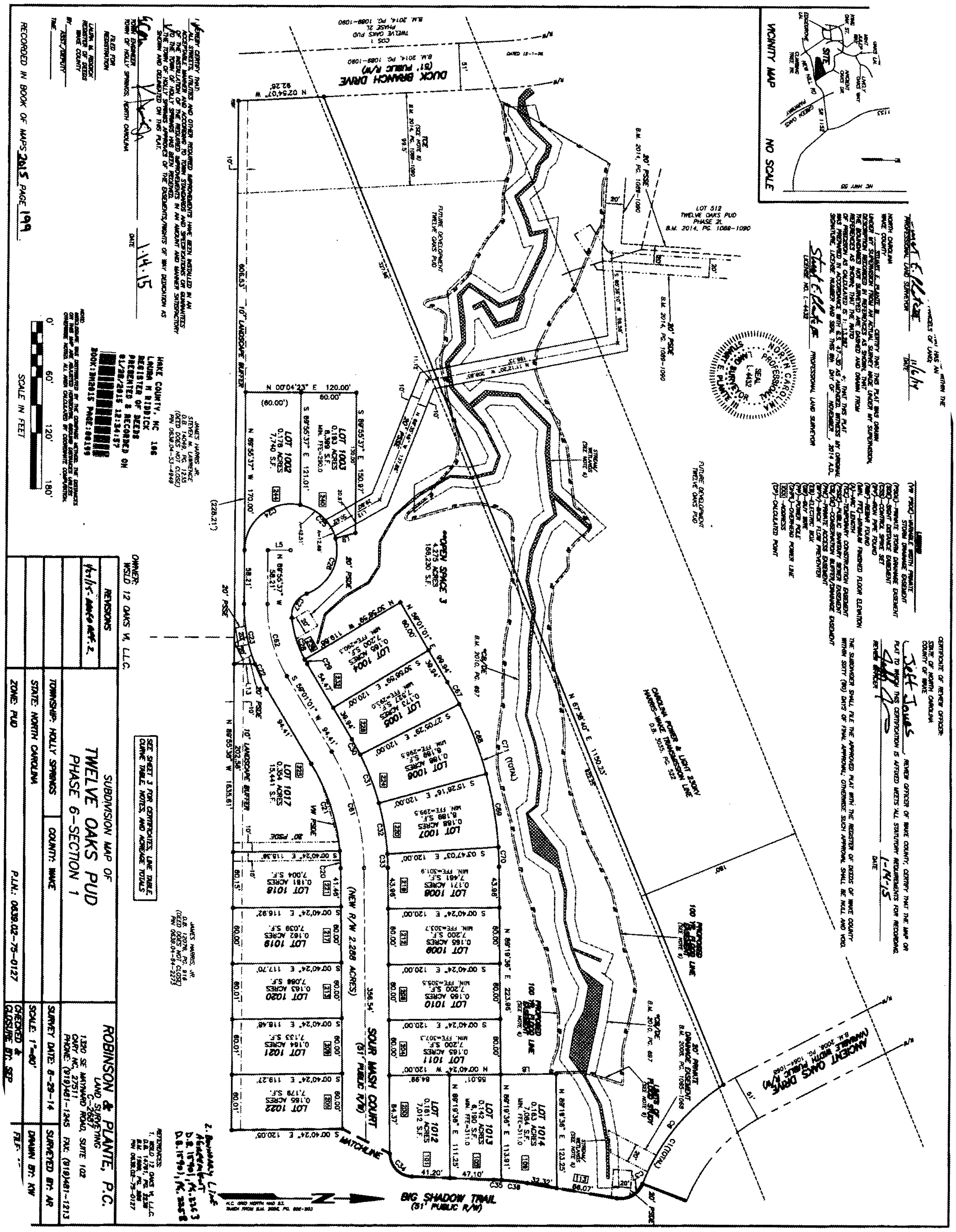
TWELVE OAKS SUBDIVISION
TOWN OF HOLLY SPRINGS, WAKE COUNTY, NORTH CAROLINA
PHASE 6 SECTION 1 - CONSTRUCTION PLANS
CONSTRUCTED WETLAND PLAN

DRAWING SHEET: C-3.3
PROJECT NUMBER: 410-02

FOR REVIEW ONLY-
NOT FOR CONSTRUCTION

This map may not be a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations and has not been reviewed for compliance with recording requirements for plats.

Exhibit C



This map is a copy of a that plat recorded in Book of Maps 2015, Page 199, Wake County Registry.

Exhibit D

DocuSign Envelope ID: 28FD2E2E-65A9-41CE-9975-E3B9DDB155CC

HOLLY SPRINGS
Discover the Source.

Town of Holly Springs
Engineering Department
Stormwater Engineer's Certification

Project Information	
Project Name:	12 Oaks
Phase, if applicable:	Phase 6 Section 1
Previous Project Name (*if applicable):*	
PIN:	0639549608
Project Contact Person:	Brandon Miller
Phone Number:	919.238.0355
Email:	bmiller@withersravenel.com

Note: BMP soils certifications must be attached with this PE certification

Engineer's Certification of Stormwater BMP

Note: this section is not required to be filled out for each BMP

I, Brandon Miller , a Licensed Professional Engineer in the State of North Carolina,
Print Name
do hereby certify that the Stormwater BMP(s) Wetland Constructed as a part of
Type
12 Oaks – Phase 6 , project located at
Name of Project
In the Twelve Oaks subdivision, north of Holly Springs New Hill Rd, south of 540, east of White Oak Creek, west of Holly Springs Towne Center
Size/lot/general description
has been constructed in substantial accordance with the approved plans and specifications and meets Town of Holly Springs performance standards, dated:

August 2, 2021
Date

This certification is based on my periodic field observations during construction and other methods as follows, including but not limited to (*if applicable*):

- ☐ Location of device and constructed as per approved plan confirmed
- ☒ Volume
- ☒ Elevations
- ☐ Structural Integrity of embankment confirmed
- ☐ Soil certification attached
- ☐ Plantings per plan and free of invasive species
- ☒ As-built drawings completed and approved by Town
- ☐ Stormwater Design As-built Table completed
- ☐ Applicable fees paid
- ☐ Other

NORTH CAROLINA PROFESSIONAL SEAL 049066 ENGINEER BRANDON J. MILLER

DocuSigned by:
Brandon Miller
9E86DC9C5FAC49C...

Date: 8/2/2021 PE #: 049066

PHASE 8

Structural Stormwater Best Management Practice (BMP) Maintenance Acknowledgment

Twelve Oaks, Phase 8 Constructed Wetland

I. **Monthly** or after every runoff producing rainfall, whichever come first:
   a. *Remove debris from the bioretention area.*
   b. *Check for ponding, ensure that device is draining as intended, washed out areas, and soils conditions.*
   c. *Check vegetation conditions within the bioretention area and replace if necessary and damaged plant materials.*
   d. *Clear detention device outlets of any debris or obstructions.*
   e. *Inspect outlets for erosion.*

II. **Quarterly**
   a. *Inspect the collection system (catch basins, pipes, grates) for proper functioning.*
   b. *Clear accumulated trash and debris from collection system.*
   c. *Repair any broken pipes, grates, or structures and repair defective joints.*
   d. *Re-mulch any bare areas.*
   e. *Replace riprap if it is clogged with sediment.*

III. **Semi-Annually**
   a. *Reseed grass in any swales emptying into bioretention area.*
   b. *Check mulch depth and add additional mulch if mulch thickness is less than 50% of design thickness.*

IV. **General**
   a. *All components of the system are to be kept in working order.*
   b. *Sediment and debris removal shall be performed by a licensed professional contractor using suitable equipment.*
   c. *Permits and/or professional certifications may be required prior to working in, on, or around the bioretention cell.*
   d. *The responsible party shall submit an annual inspection report to the Town of Holly springs per the Town's SCM inspection requirements.*
   e. *In the event that the property ownership changes, the currently responsible party shall contact the Town within thirty (30) days of transfer of ownership, and submit a new Operation and Maintenance Plan identifying the new responsible party.*

I, Tim Frye c/o 12 Oaks HOA, hereby acknowledge that I represent the financially responsible party for maintenance of the Structural Stormwater Best Management Practices for this site. I will perform the maintenance as outlined above for this project. Operation and maintenance responsibilities are hereby transferred to the HOA/OWNER, contingent upon the Town of Holly Springs approving that all installation, performance measures and documentation are in compliance with the approved stormwater management plan.

Signature: _____ Date: 1/12/22

BY: Tim Frye, President, Twelve Oaks Master Association, Inc.

I, Claudia C. Cooper, a Notary Public of the State of North Carolina County of Wake, do hereby certify that Tim Frye personally appeared before me this 12 day of January and acknowledge due execution of the foregoing instrument. Witness my hand and official seal,

Seal _____ My Commission Expires: 3/9/2024

CLAUDIA C. COOPER
NOTARY PUBLIC
Wake County
North Carolina
My Commission Expires March 9, 2024

OPERATIONS & MAINTENANCE MANUAL

Project Name & Phase: **Twelve Oaks, Phase 8 Bioretention**

Information: The 12 Oaks Bioretention Area Phase 8 and Stormwater Wetland Phase 6 have been constructed by the Developer and will be maintained by the Twelve Oaks Master Association Inc., 11010 Raven Ridge Road, Raleigh, NC 27614. Attn: Robert Van Graafeiland. Phone 919-848-4911 Fax 919-870-7241 email: robert@ppmral.com. The BMP(s) is/are located on property owned by the Twelve Oaks Master Association Inc. Deed Book 016551, Page 02019. A stormwater maintenance surety in the form of a cash payment to the Stormwater Facility Replacement Fund has been provided in the amount equal to 35% of actual construction cost of the BMP(s).

This operations and maintenance agreement may be assigned only upon the following conditions:

1. *(list any applicable conditions)*

Date Constructed: 2019
Location: 236 Sour Mash Ct, near the Ancient Oaks Dr. & Big Shadow Tr. intersection
Receiving Watercourse(s): White Oak Creek, Cape Fear River Basin

Contractor: (List Construction Information below)
(White Oak Land Services) *Earthwork, plantings, outlet structure, soil/media installation*

Material Supplies: (List below)
(Outlet Structure) *Riser box, 12" RCP, trash rack, 6" underdrains and cleanouts*
(Bioretention Soil/Media) *24" Bioretention media, 2" sand, 3" pea gravel, topsoil and mulch*
(Inlet Protection) *Riprap pads*

Project Name & Phase: **Twelve Oaks, Phase 8**
Type of BMP: Bioretention Area **Type of BMP:** _____

This manual established procedures for maintenance and operation of the *bioretention area.*

I. Maintenance

Important operation and maintenance procedures:

- Immediately after the bioretention cell is established, the plants will be watered twice weekly if needed until the plants become established (commonly six weeks).
- Snow, mulch or any other material will NEVER be piled on the surface of the bioretention cell.
- Heavy equipment will NEVER be driven over the bioretention cell.
- Special care will be taken to prevent sediment from entering the bioretention cell.
- Once a year, a soil test of the soil media will be conducted.
- Remove top layer of fill media when the pool does not drain quickly. Based on the media specification, the pool should drain within 24 hours.

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

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

SCM element:	Potential problem:	How to remediate the problem:
The entire bioretention cell	Trash/debris is present.	Remove the trash/debris.
The perimeter of the bioretention cell	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, plant ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The flow diversion structure (if applicable)	The structure is clogged.	Unclog the structure and dispose of any sediment off-site.
	The structure is damaged.	Make any necessary repairs or replace if the damage is too much for repair.
The inlet device	The inlet pipe is clogged (if applicable).	Unclog the pipe and dispose of any sediment in a location where it will not cause impacts to streams or the SCM.
	The inlet pipe is cracked or otherwise damaged (if applicable).	Repair or replace the pipe.

	Erosion is occurring in the swale (if applicable).	Regrade the swale if necessary and provide erosion control devices such as reinforced turf matting or riprap to avoid future erosion problems.
	Stone verge is clogged or covered in sediment (if applicable).	Remove sediment and clogged stone and replace with clean stone.
The pretreatment area	Flow is bypassing pretreatment area and/or gullies have formed.	Regrade if necessary to route all flow to the pretreatment area. Restabilize the area after grading.
	Sediment has accumulated to a depth greater than three 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 SCM.
	Erosion has occurred.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	Weeds are present.	Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.

Bioretention Maintenance Requirements (continued)

SCM element:	Potential problem:	How to remediate the problem:
Bioretention cell vegetation	Best professional practices show that pruning is needed to maintain optimal plant health.	Prune according to best professional practices. Maintain lines of sight between 2'-6'.
	Plants are dead, diseased or dying.	Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application to establish the ground cover if a soil test indicates it is necessary. If sod was used, check to see that it was not grown on clay or impermeable soils. Replace sod if necessary.
	Weeds are present.	Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
	Tree stakes/wires are present six months after planting.	Remove tree stake/wires (which can kill the tree if not removed).

Bioretention cell mulch and media	Mulch is breaking down or has floated away.	Spot mulch if there are only random void areas. Replace whole mulch layer if necessary. Remove the remaining mulch and replace with triple shredded hard wood mulch at a maximum depth of four inches.
	Soils and/or mulch are clogged with sediment.	Determine the extent of the clogging - remove and replace either just the top layers or the entire media as needed. Dispose of the spoil in an appropriate off-site location. Use triple shredded hard wood mulch at a maximum depth of four inches. Search for the source of the sediment and remedy the problem if possible.
	An annual soil test shows that pH has dropped or heavy metals have accumulated in the soil media.	Dolomitic lime shall be applied as recommended per the soil test and toxic soils shall be removed, disposed of properly and replaced with new planting media.
The underdrain, filter fabric element, and outlet system	Clogging has occurred.	Wash out the underdrain system.
	Clogging has occurred.	Clean out the drop inlet. Dispose of the sediment in a location where it will not cause impacts to streams or the SCM..
	The drop inlet is damaged	Repair or replace the drop inlet.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Repair the damage and improve the flow dissipation structure.
	Discharges from the bioretention cell are causing erosion or sedimentation in the receiving water.	Contact the local NCDEQ Regional Office.

II. OPERATION

A.. Record Keeping

The Town of Holly Springs shall be provided with written inspection reports as specified in this manual. These reports shall be provided annually within 30 days of the anniversary of receipt of the "Stormwater BMP/O&M Responsibility Transfer" letter (form #16037). A professional engineer shall certify the reports. The Town of Holly Springs Engineering Department shall be notified as soon as any deficiencies in the detention structure are recorded. The Town shall be notified of the proposed methods to bring the structure into conformance and furthermore, the Town shall approve of any proposed work to be completed on any part of the structure prior to any work being started. After work has been completed the Town shall inspect and approve of the work before it shall be considered complete. After the Town approves the work an as-built drawing shall be completed and provided to the Town.

Note: Operation of a BMP should include the following:

- Annual & Quarterly Inspection Reports – a collection of a written inspection report should be kept on record,

Inspection should be conducted at minimum quarterly and certified by a professional engineer annually.

- Observations – all observations should be recorded. Where periodic inspections are performed following significant rainfall events, these inspections should be logged on the log forms found in Appendix D of the Town's Design Manual or created specifically for the project.
- Maintenance – written records of maintenance and/or repairs should be recorded on the Operation & Maintenance Log Form found in Appendix D of the Town's Design Manual or created specifically for the project.
- Other Operation Procedures – the owner should maintain a complete and up-to-date set of plans (as-built drawings) and all changes made to the dam over time should be recorded on the as-builts. Mylar and digital as-builts shall be provided to the Town each time they are updated.

B. Sedimentation & Dredging

Sedimentation from establishing areas tributary to the BMP may eventually result in the reduction of the storage volume and eventually will have to be removed. The frequency of this sediment removal can be reduced by ensuring that the site areas around the building be stabilized with a vegetative ground cover such that it restrains erosion. This would include a periodic application of fertilizer and other treatments necessary to promote a stable groundcover and minimize sedimentation to the BMP. The maintenance on this BMP requires that *(provide design specific clean out information here)*. For aesthetic purposes it may be desirable to maintain it prior to this point. The removed material should be hauled offsite to a suitable landfill site or mounded somewhere on site and stabilized with a groundcover sufficient to restrain erosion.

III. INSPECTION, OPERATION & MAINTENANCE LOGS

(attach a blank copy of the applicable O&M log for each BMP)
(attach 8 ½ x 11 Location Map)
(attach 8 ½ x 11 copy of Recorded Plat(s))
(attach the Stormwater Management Plan, including form #16012 and As-builts)
(attach Engineer Certifications for construction of each BMP)

Exhibit E

Stormwater Control Measures (SCM)
Operation & Maintenance Log
Bioretention Areas

Project Information & SCM Identification	
Project Name:	Twelve Oaks, Phase 8A
PIN Number:	0639851661
Property Owner:	TWELVE OAKS MASTER ASSOCIATION INC
SCM Location:	Between 100 and 105 Lucky Ribbon Ln

	Operation Inspection	Maintenance Inspection
Date:		
By:		
Type of Inspection: *Quarterly or Annual*		
Last Rainfall Date:		
Last Rainfall Amount:		
Today's Weather:		
Photo Attached & Name:	☐	☐

SCM Element	Status	Maintenance Completed
Entire SCM	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Perimeter of the SCM (Embankment)	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Inlet Device: *(pipe, stone, verge or swale)*	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Pretreatment Area/ Forebay	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Vegetation	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:

Stormwater Control Measures (SCM)
Operation & Maintenance Log
Bioretention Areas

Soils & Mulch	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Underdrain System	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
Receiving Water	Maintenance Required? ☐ *Yes* ☐ *No* Description:	Maintenance Completed? ☐ *Yes* ☐ *No* Description:
General Comments, Sketches & Field Measurements (attach if necessary): *Include Date & Initials*		

Stormwater Control Measures (SCM)
Operation & Maintenance Log
Bioretention Areas

Annual Certification of SCM Operation & Maintenance

Note: this section is not required to be filled out for quarterly inspections

I, _____ , a SCM Inspection and Maintenance certified professional in the
Print Name

State of North Carolina, certify that the _____ constructed as a part of
Type

_____ , project located at
Name of Project

_____
Size/lot/general description

has been maintained in substantial accordance with the approved plans and specifications, dated:

_____
Date of Operation Inspection

This is certification is based on my field observation during the periodic & annual operation and maintenance inspections and other methods as follows (*if applicable*):

_____

_____

_____

_____

_____

_____

Signature:_____ Certification Number:_____
(NCSU BAE SCM Inspection Certification #)

Exhibit F

HOLLY SPRINGS
Discover the Source.

Stormwater BMP Summary

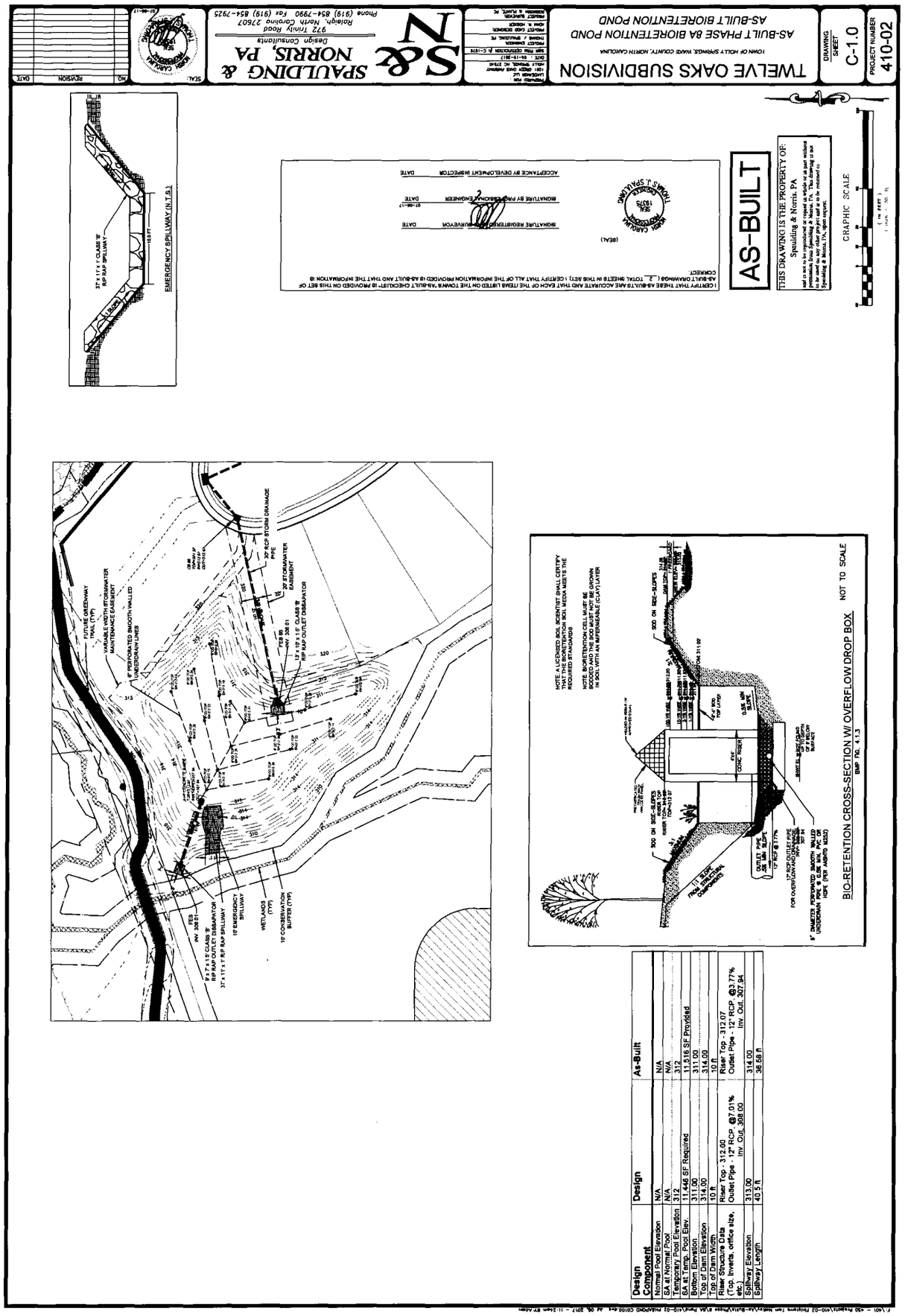
TOWN OF HOLLY SPRINGS ENGINEERING DEPARTMENT

Project Information	
Project Name:	12 Oaks
TOHS Project Number:	14-MAS-01
Project Location:	101 Eagle Springs Court, Holly Springs, NC
PIN Number:	0639851661

Identify the types of Best Management Practices in the project, location and give a brief description of their design, if you need additional space please attach separate sheet to this document. Please attach an 8 ½" x 11" site plan showing the general location of each BMP you identify in the table. This summary & map shall be included with the O&M Agreement, Bonding Application and Annual O&M Certifications.

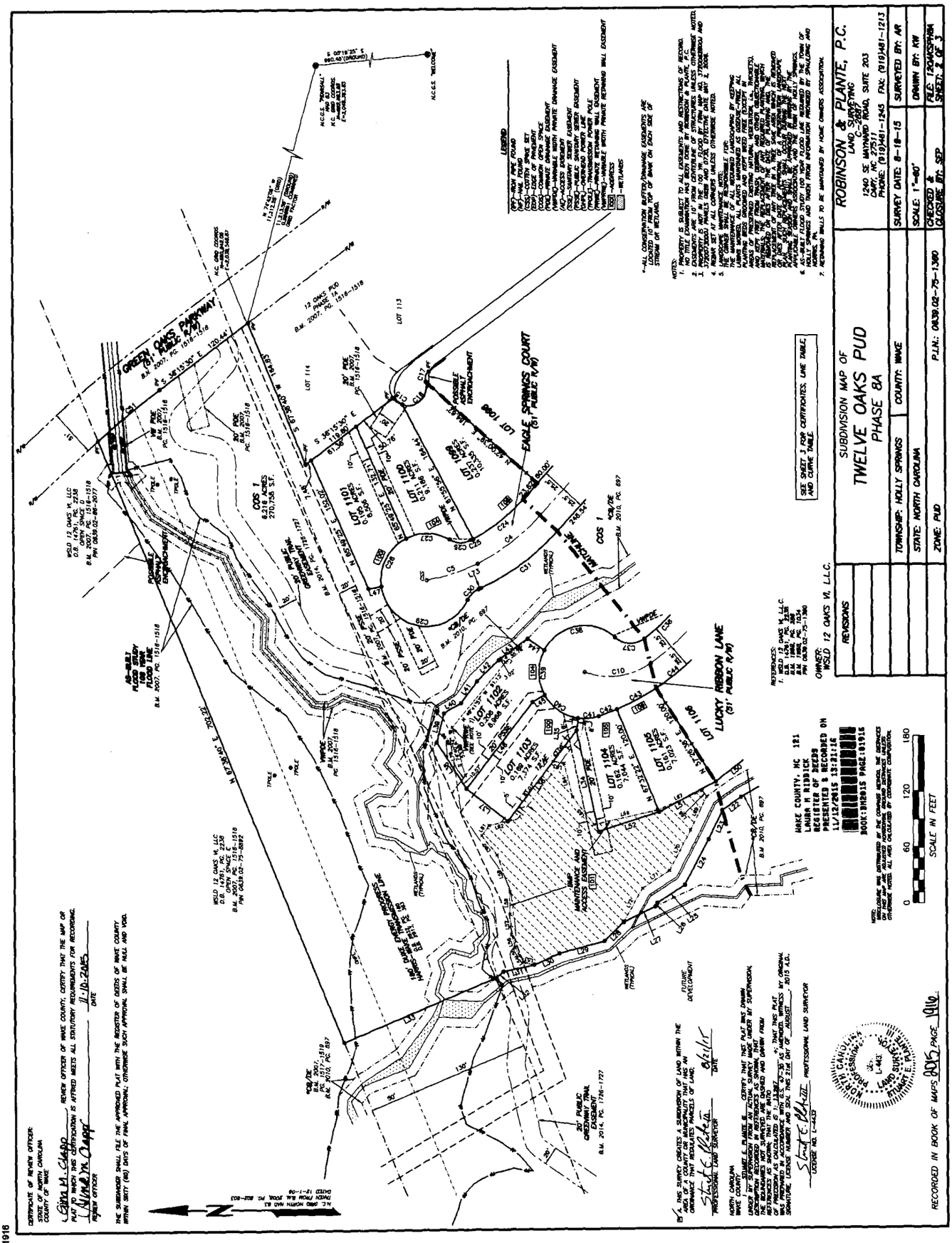
BMP Type	Quantity in Project	Location & Brief Description of Each BMP	125% Total (Performance Surety	35% Total (Maintenance Surety)
Dry Extended Detention Basins				
Dry Extended Detention Basin with Infiltration				
Level Spreaders				
Wet Detention Basin				
Infiltration Level Spreaders				
Infiltration Trench				
Dry Wells				
Bioretention Areas	1	Between 1103 & 1004 Lucky Ribbon Lane; Single inlet with 4' by 4' concrete riser and 12" RCP outlet pipe.	N/A	$33,272.75
Permeable Pavement				
Manufactured Products				
Grassed Swales				
Stormwater Wetlands				
Vegetated Filter Strip / Restored Riparian Buffer				
		TOTALS	N/A	$33,272.75

This map may not be a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations and has not been reviewed for compliance with recording requirements for plats.



This map may not be a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations and has not been reviewed for compliance with recording requirements for plats.

Exhibit G



BKBM2015PG01916

This map is a copy of that plat recorded in Book of Maps 2015, Page 1916, Wake County Registry.

Exhibit H

HOLLY SPRINGS
Discover the Source.

Town of Holly Springs
Engineering Department
Stormwater Engineer's Certification

Project Information	
Project Name:	12 Oaks Subdivision
Phase, if applicable:	Phase 8A
Previous Project Name (*if applicable*):	
PIN:	0639851661
Project Contact Person:	David Mason
Phone Number:	919-557-2011
Email:	mason@landeavor.com

Note: BMP soils certifications must be attached with this PE certification

Engineer's Certification of Stormwater BMP

Note: this section is not required to be filled out for each BMP

I, Thomas J. Spaulding (*Print Name*), a Licensed Professional Engineer in the State of North Carolina, do hereby certify that the Stormwater BMP(s) Bio-Retention (*Type*) Constructed as a part of 12 Oaks Phase 8A (*Name of Project*), project located at Accessible along the cul-de-sac west of 100 Lucky Ribbon Lane (*Size/lot/general description*) has been constructed in substantial accordance with the approved plans and specifications and meets Town of Holly Springs performance standards, dated:

6/19/2017 (*Date*)

This certification is based on my periodic field observations during construction and other methods as follows, including but not limited to (*if applicable*):

- [X] Location of device and constructed as per approved plan confirmed
- [X] Volume
- [X] Elevations
- [X] Structural Integrity of embankment confirmed
- [X] Soil certification attached
- [X] Plantings per plan and free of invasive species
- [X] As-built drawings completed and approved by Town
- [X] Stormwater Design As-built Table completed
- [X] Applicable fees paid
- [ ] Other

Date: 6/19/2017 PE #: 19375