BEAUFORT COUNTY
STORMWATER MANAGEMENT UTILITY BOARD AGENDA
Wednesday, January 27, 2016
2:00 p.m.
Executive Conference Room 170, 100 Ribaut Road, Beaufort, SC
843.255.2805

In accordance with South Carolina Code of Laws, 1976, as amended, Section 30-4-80(d), all local media was duly notified of the time, date, place and agenda of this meeting.

1. CALL TO ORDER – 2:00 p.m.
   A. Approval of Agenda
   B. Approval of Minutes – December 16, 2015 (backup)
2. INTRODUCTIONS
3. PUBLIC COMMENT
4. REPORTS
   A. Utility Update – Eric Larson, P.E. (backup)
   B. Monitoring Update – Eric Larson, P.E. (backup)
   C. Stormwater Implementation Committee Report – Eric Larson, P.E. (backup)
   D. Stormwater Related Projects – Eric Larson, P.E. (backup)
   E. Upcoming Professional Contracts Report – Eric Larson, P.E. (backup)
   F. Regional Coordination – Eric Larson, P.E. (backup)
   G. MS4 Update – Rebecca Baker (backup)
   H. Maintenance Projects Report – David Wilhelm (backup)
   I. Financial Report – Alicia Holland
      1. Fiscal Year 2015 Actuals
5. UNFINISHED BUSINESS
   A. Factory Creek Watershed Site Phase II
6. NEW BUSINESS (backup)
   A. Special Report – Kevin Pitts, Bill Weiss, Al Stokes, and Stephen Borgianini - Discussion of monitoring needs to measure impacts to local marine organisms.
7. PUBLIC COMMENT
8. EXECUTIVE SESSION
   A. Discussion of Negotiations Incident to Proposed Contractual Arrangements and Proposed Purchase of Factory Creek Watershed Site Phase II
9. ACTION TAKEN AS A RESULT OF EXECUTIVE SESSION
10. NEXT MEETING AGENDA
    A. February 24, 2016 (backup)
11. ADJOURNMENT

The County Channel

Beaufort County Stormwater Management Utility Board (SWMU Board)
Meeting Minutes

December 16, 2015 at 2:00 p.m. in Beaufort Industrial Village Building #3 Conference Room
Draft 01/09/2016

Board Members		Ex-Officio Members	
Present	**Absent**	**Present**	**Absent**
Don Smith		Andy Kinghorn	
Allyn Schneider		Scott Liggett	
Marc Feinberg		Jeremy Ritchie	
Larry Meisner		Van Willis	
Patrick Mitchell			
James Fargher			
William Bruggeman			

Beaufort County Staff
Eric Larson
Eddie Bellamy
Patricia Wilson
Kevin Pitts
Danny Polk
Rebecca Baker
Joshua Gruber
David Wilhelm
Carolyn Wallace

Visitors
Tony Maglione, Applied Technology & Mgt.
Lamar Taylor, City of Beaufort
Reed Armstrong, Coastal Conservation League
Neil Desai, City of Beaufort

1. Meeting called to order – Don Smith

- **A.** Agenda – The Agenda was approved after adding voting for Stormwater Chairman and Vice Chairman prior to Agenda Item Eight (Executive Session).
- **B.** November 18, 2015 Minutes - Approved.

2. Introductions – Completed.

3. Public Comment(s) – Mr. Eric Larson introduced Mr. David Wilhelm, the new Public Works Director and Mr. Lamar Taylor introduced Mr. Neil Desai, the new City of Beaufort Stormwater Manager and Assistant Public Works Director.

4. Reports – Mr. Eric Larson, Mr. Eddie Bellamy, and Mr. Alan Eisenman provided a written report which is included in the posted agenda and can be accessed at: http://www.bcgov.net/departments/Administrative/beaufort-county-council/boards-and-commissions/council-appointed/board-list/stormwater-management-utility-board/agendas/2015/121615.pdf

- **A. Utility Update –** Eric Larson

Annual Stormwater Fee Billing – Mr. Eric Larson mentioned that call volume appears to be less than anticipated, but there have been some reoccurring calls such as fees generated on open marsh, wetlands, and unusable properties submerged by water. The Utility is discussing options for providing financial relief such as updating the credit manual. Other issues involve inaccurate parcel lines which resulted in GIS measurements being off. Whenever possible, the utility staff has worked with the Tax Assessor and Management Information System (MIS) staff to make necessary adjustments.

B. Municipal Separate Storm Sewer System (MS4 Update) – Eric Larson

BMP Manual Update – Mr. Larson said that Mrs. Rebecca Baker (MS4 Coordinator) will be giving this report in the future. Mrs. Baker has been working with ATM (Applied Technology and Management) to discuss the revision of the BMP Manual to make sure ordinances are in place to meet MS4 Minimum Control Measures.

Inspection Data Management – Mrs. Baker has been working with MIS staff to develop a program for permitting and inspection.

Education and Outreach – Mrs. Baker has been working with BSWCD (Beaufort Soil and Water Conservation District) to discuss the education campaign for the next fiscal year.

C. Monitoring Update – Eric Larson

USCB and County MOU for the Lab Services – Mrs. Baker and Mr. Kevin Pitts have been working with USCB staff to update the MOU to be more flexible to meet MS4 needs.

D. Stormwater Implementation Committee (SWIC) Report – Eric Larson

SWIC Meeting December 9, 2015 - Mr. Larson stated that the meeting was canceled this month and the next meeting is January 20, 2016.

E. Stormwater Related Projects – Eric Larson

US 278 Retrofit Ponds – Crews are clearing pond 3 and have started excavating pond 2.

Turtle Lane Paving on Lady's Island – The engineering firm and contractor are working together on this project. The road is being paved and Stormwater improvements associated with the project are being addressed.

Okatie West / SC 170 Widening Retrofit Land Purchase – Mr. Larson said this project would be addressed under New Business.

SC 170 Widening Pond #8 project - Mr. Larson stated that the contract is still pending. Mr. Joshua Gruber (Deputy County Administrator) stated that at least 8 attorneys are involved with the land acquisition for this project and it is slowly moving forward.

Huspah Court South Ditch Easement/ Mike Zara **–** The county has made an offer and is waiting on a counter offer from Mr. Zara. Mr. Larson said that the County wants to provide services in lieu of fee.

F. Professional Contracts Report – Eric Larson

Utility Rate Study – Mr. Larson reported that the final report will not be available this month. A couple of the municipalities have indicated that the Stormwater Management Utility Board's approval will not be necessary for their jurisdictions to take action. The final report will be presented at a later meeting.

Stormwater Management Plan (Master Plan) Update – Mr. Larson reported that the recommendation was approved by the Natural Resources Committee and was passed by County Council on December 14, 2015. The contract is in the process of being signed. Mr. Larson thanked the board members for attending the Natural Resources Committee

meeting and showing their support. Mr. Lamar Taylor later added that the City of Beaufort is in the process of signing the MOU cost share, which Mr. Larson should receive later this week.

G. Regional Coordination - Eric Larson

Plantation Business Park Drainage Assessment – Mr. Larson stated that the County is having the stormsewer system evaluated in consideration of taking over the maintenance which was the original plan in the 1980's. At that time, the development was not part of The Town of Bluffton. The Town is included in this discussion and a final report should be available in January.

City of Beaufort and SCDOT Partnership Projects – Mr. Lamar Taylor reported that Paul Moore (Ward Edwards Engineering) is developing a cost share recommendation to present to SCDOT and the County to alleviate flooding issues off Greene Street and Hamar Street.

Battery Creek Pond Funded by an EPA 319 Grant – Mr. Taylor updated the board that all the permits have been obtained except for the wetland permit. The project will be submitted for bidding and Ward Edwards Engineering is establishing a timeline for completion by October 2016. Scheduling adjustments should allow Dr. John Gray (property owner) to timber the land. Project construction needs to begin no later than mid- February.

*Stoney Creek Projec*t – Mr. Jeremy Ritchie reported that level loggers have been placed to evaluate flow and ground water elevations for a 4 to 5 month duration.

*Pine Ridge Retrofit Projec*t – Mr. Ritchie stated that 3 bids have been received and the Town is getting ready begin the evaluation process of the proposals.

H. Financial Report – See posted agenda

I. Maintenance Projects Report – Mr. Eddie Bellamy

Mr. Eddie Bellamy made his final maintenance report as Beaufort County Public Works Director. There were no questions on the seven routine or minor projects included in the posted agenda. Mr. Don Smith thanked Mr. Bellamy for his service and the board supported this decision with a round of applause. Mr. David Wilhelm will be providing the reports in the future.

5. Unfinished Business – None

6. New Business – Mr. Eric Larson

A. *Okatie West Pond Funded by an EPA 319 Grant ($110,000)* – Mr. Larson reported that five firms submitted SOQs (Statements of Qualifications). The evaluation committee consisted of five members including a representative from finance. The committee interviewed three of the five firms. Ward Edwards Engineering was selected and submitted a scope of service of $119,303. To stay within the $110,000 design budget, Ward Edwards Engineering made adjustments which decreased the scope to $109,473. Mr. Andy Kinghorn pointed out that the ranking order on the memorandum to recommend Ward Edwards Engineering was out of order. Mr. Larson said the order would be corrected before presenting the recommendation memorandum to County Council's Natural Resources Committee. A motion was made and passed unanimously (7:0) to recommend awarding the contract to Ward Edwards Engineering.

B. *Voting for Stormwater Management Utility Board Chairman and Vice Chairman*
The board voted unanimously (7:0) to retain Mr. Don Smith as Chairman and Allyn Schneider as Vice Chairman.

7. Public Comment(s) – None.

8. Executive Session -
Discussion of Negotiations Incident to Proposed Contractual Arrangements and Proposed Purchase of Factory Creek Watershed Site Phase II and continuation of Phase I Process

A. Mr. Don Smith recused himself due to a conflict of interest. Mr. Allyn Schneider took over as board chairman for the remainder of the meeting.
B. Actions As A Result of Executive Session
    1. A motion was made and passed unanimously (6:0) to allow Mr. Eric Larson (on behalf of the Stormwater Utility) to spend $9,900.00 on the feasibility study for Factory Creek Watershed Site Phase II.
    2. A motion was made for Mr. Larson to continue negotiations on Factory Creek Watershed Site Phase I.

9. Next Meeting Agenda – Included in posted agenda
Passed with Mr. Eddie Bellamy being replaced with Mr. David Wilhelm on Item H.

10. Meeting Adjourned

BEAUFORT COUNTY STORMWATER UTILITY
120 Shanklin Road
Beaufort, South Carolina 29906
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January 27, 2016

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Utility Update

1. Rate Increase and Rate Structure Change – Staff continues to answer questions and make adjustments to bills as needed.
2. Utility Rate Study – The portion of the rate study for the municipalities is still pending and will likely be presented to the Board at the March 2016 meeting. See the attached email letter sent to the SWIC members in January outlining the timeline for project completion.
3. Credit Manual Update – Staff is negotiating a scope of services with ATM for an update to the manual to reflect needed changes as a result of the rate structure change. The proposal is pending.
4. The County Stormwater Department welcomes Robbie O'Quinn to the staff. Robbie will serve as a Stormwater Infrastructure Inspection Technician with primary responsibilities of mapping our system and assessing its condition. He will also assist with monitoring and site inspections.

Larson, Eric

From: Larson, Eric
Sent: Monday, January 11, 2016 9:06 AM
To: Bryan McIlwee (bryanm@hiltonheadislandsc.gov); Jeremy Ritchie (jritchie@townofbluffton.com); Kim Jones (kjones@townofbluffton.com); (LTaylor@cityofbeaufort.org); Neil Desai; Van Willis (vwillis@portroyal.org)
Cc: Anthony C. Maglione (TMaglione@appliedtm.com); Keith Readling (kreadling@raftelis.com); Wallace, Carolyn; Stanbery, Seth; Wilson, Patricia; Gruber, Joshua; Holland, Alicia; Jennifer Fitts (jfitts@raftelis.com)
Subject: URGENT: Beaufort Co. SWU Rate Study, IGAs, Budgets, and Tax Run - Status

All,

Happy New Year. Now that the new year is upon us, I've already been thinking about next year's budget and SWU fee billings. We have a lot of work to do. I need to make you aware of some deadlines and impress upon you the urgency to get some things moving.

First, The County Auditor will be contacting you soon. He has decided to evoke his authority by statue to move up the date of tax billing for 2016 to give citizens the maximum amount of time to pay their bills. Historically, the County has sent out tax bills mid-November. This year he plans to do this by September 30. What does that mean? Tax run starts early July instead of Labor Day. This is going to require us to communicate with each other on the setting of rates for TY 16 sooner. The IGA says you must transmit your rates to the County by Aug 15th. We are going to need to amend the IGA to move that date to June 30 or earlier. That doesn't concern me too much since we will all probably know if we intend to increase rates or not during the budget process, a decision made long before July 1.

Which brings me to the next point, Budget. I, as well as you, must budget our program starting in February or March. SWU management fees paid to the County, cost shares, revenue needs (aka rates), etc. all need to be figured out soon. In my opinion, none of that can even start until everyone takes action on the rate study results. Of course, that means we need to get the rate study finished. Why the urgency? I'll explain.

The rate study, in its draft form, is recommending to all a change in rate structure to Option E – the same structure the County adopted last fall. As I understand it, our consultants are still needing final numbers on expenditures, CIP, etc. so that they can confidently model revenue and rates and confirm Option E. Those final numbers are your FY 17 budget, or at least a good draft of a five year plan of expenses. Once the rate study is complete, your respective Councils have to take action to adopt a new rate structure and any rate increases. So please work hard to get the study done and get your government to make a decision.

If everyone does not adopt Option E, the SWU admin (mgt) cost to manage the data and do the tax billing goes up. Carolyn and I have already been looking at the additional time it will take to manage two (or more) separate rate structures. We basically have to manage two billing systems, two sets of data, etc., etc. When tax run comes, we have to do the billing process for the different rate structures separately. More time = More hours = overtime = more $$$. This past year, the County had Option E and everyone else had Option A (the existing rate structure). It took more time. Since the change was 100% the County's imitative, we absorbed all the additional cost in the county's program. If no one takes action on the rate study again this year and we bill out two rate structures again, the County will again take the annual cost of the management program and share it proportionally among the five as we've done in the past, but we will extract the tax run time out of the distribution, estimate the time to do Option E for the County and internalize that cost in the county, and then take the time and cost to bill Option A for the other 4 and divide it proportionally among the Towns and City. This fairly assigns costs to those receiving the service. However, dividing cost 4 ways instead of 5 ways will increase everyone's cost, including the County's.

However, what if all but one adopt the new rate structure (Option E)? As an example, what if everyone adopts Option E but one municipality decides to stay with Option A. Same scenario as before but the additional time to do the different rate structure is a cost incurred by one body, not all. Would it be fair to make everyone pay more in management costs because of this? I don't think so. Therefore, I would propose that the additional time and cost be attributed to the mgt. fees for that one municipality while the others share the cost of administering Option E with the County. Again, fairly assigning costs.

So back to the budget and the IGAs…
Management fees to be paid by the municipalities and received by the County are all part of the budget process. In addition, the IGAs define how mgt. fees are calculated and paid, how cost shares are handled, and deadlines for submittals, etc. Therefore, neither the budget or the IGA can be completed without a decision on the rate study being completed and acted upon. Everything has to be done in a timely manner so that we are ready to begin the billing process July 1.

I anticipated all of this late last year as the County finished the rate study and informed all of you in SWIC meetings and by letter. The IGAs must be amended regardless of your Town/City decision on the rate study. Since either party must give 180 days advanced notice of termination of an IGA agreement, I sent you notice back in November in the event any party is unable to come to terms with the changes I noted above and any of the four municipalities decides to withdraw and attempt to manage their utility billing without the assistance of the County. (If you did billing and collection on your own, you would have to have the necessary GIS software, skilled staff, time, billing software / mechanism, collection process, etc. – the things the County provides with the Management fee via the SWU, Assessor, Treasurer, and Auditor offices)

I've spent a little time determining some deadlines to work with. If you have 3 readings for ordinances like the County, this should be compatible with your process.

ASAP!!! - Submission of draft 5 year plans to ATM for the rate study
February 2016 – Budgets start; determine cost shares
March 16, 2016 - Final draft of Rate Study and completed rate models from ATM
March 23, 2016 – SWUB mtg. to accept, recommend Rate Study to Municipalities as needed
Early April 2016 – Begin drafting revised IGA agreements; Municipal staff introduce Rate Study to Councils
Late April 2016 - 1st reading of municipal ordinances on rate study
Early May 2016 - 2nd reading
Late May 2016 - 3rd and final reading
Late May 2016 - Final draft of Budget
Early June 2016 - Final draft of IGA
Mid – Late June 2016 - Approval of IGA
June(ish) 2016 – Budgets are approved
June 30, 2016 - Submission of SWU fee rates for TY 16
July 1, 2016 – Tax Run begins
September 15, 2016 – Tax Run Complete
September 30, 2016 – Bills mailed

The County Council ended up delaying third and final reading of the County's ordinance twice so my advice is get the readings started sooner if possible to give yourself a safety net. Same is true for the resolution for the IGAs (I'm assuming only one reading for those).

This email is intended to be detailed enough for you to share with your Managers, Finance Directors, etc. so that everyone understands the importance of taking action on the rate study EVEN IF you DO NOT plan to raise fees. We really need to get this wrapped up and behind us.

Thanks for your time and attention to this matter.

Eric W Larson
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January 27, 2016

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Monitoring Update

1. USCB and County MOU for the Lab Services – A final draft is scheduled to be presented to the Board at the February meeting.
2. Lab Update – Dr. Alan Warren provided County Administrator Gary Kubic a comprehensive update on the status of the development of the USCB lab earlier this month. See attached memo from Dr. Warren.

Date: January 7, 2016

To: Eric Larson

From: Alan Warren

Subject: Gary's inquiry about USCB's Water Quality Laboratory

USCB's Water Quality Laboratory (WQL) began in 2007 with financial support from the Town of Bluffton that allowed the University to purchase equipment for the microbial analysis of surface water. At about the same time, the University and Town of Bluffton entered into a memorandum of understanding (MOU) that has provided recurring grant funds in return for water quality sampling and analytical services to this day. More recently, the University has entered into a MOU with Beaufort County to provide sampling and analytical services for 25 different water quality parameters (listed below), greatly expanding the University's capabilities beyond microbial analysis. This expansion was made possible by a $250,000 grant from the County in 2013 for the purchase of additional equipment, including an automated BOD analyzer, nutrient analyzer, ICP mass spectrometer, total organic carbon analyzer, fluorometer for chlorophyll-a analysis, etc. It is noteworthy that the WQL has received State certification for a battery of parameters measured *in situ* as well as microbial parameters, and is actively pursuing certification for all others. At present, new MOUs more reflective of current needs and capabilities are being formulated with the Town of Bluffton and Beaufort County. In addition to these arrangements, the WQL conducts weekly monitoring for Beaufort County on a fee-for-services basis, for the Palmetto Bluff and Leamington communities, and serves as a subcontractor to GEL, Inc. to analyze *E. coli* in surface water samples it collects on Hilton Head Island. The WQL has also served engineering firms responsible for the environmental assessment of the RiverPort Business Park in Jasper County and most recently, the Cypress Wetlands in Port Royal, SC.

WQL staff include: Dr. Alan Warren, WQL Director, Danielle Mickel, WQL Manager hired November 2008, and Mike Monday, WQL Technologist hired January 2014. In addition to the above-mentioned sampling and analysis activities, the WQL supports undergraduate students pursuing degrees in Biology and Health Promotion by providing an opportunity for hands-on learning experiences that are applied rather than theoretical. In fact, such a lab experience involving an assessment of USCB's stormwater retention ponds for *E. coli*, turbidity, pH and dissolved oxygen is required of students taking Dr. Warren's Environmental Health course taught each spring semester. Additionally, in 2012 the WQL provided experimental design and analytical support for Rebecca Swearingin, a student at DePauw University in Indiana who was serving as a summer intern at the Waddell Mariculture Center. As for Gary's question about funding, the WQL has received nothing from the State, though like every other lab on campus, the WQL does not pay overhead to USCB as is customary at many institutions. As for Beaufort County, its contribution of $250k has been supplemented with 90K to support the WQL's expansion, training on new equipment, pursuit of certification, and assumption of contractual services previously provided by GEL, Inc. As for the amount of support from the Town of Bluffton, that information would most appropriately be obtained from Kim Jones who has championed the WQL from its inception. I hope the above information is adequately

informative for Gary. If not, please email or call me at 843-208-8338. The WQL continues to be grateful for the County's financial support, visionary leadership, and proactive approach to environmental quality.

Water Quality Parameters

Ammonia-Nitrogen (NH3)
Total Kheldahl Nitrogen (TKN)
Nitrate
Nitrite
Phosphorus (Total)
pH
Salinity
Temperature
Turbidity
Specific Conductivity
Dissolved Oxygen (DO)
Chlorophyll-a
Total Organic Carbon (TOC)
Biochemical Oxygen Demand (BOD5)
Total Suspended Solids (TSS)
Fecal Coliform, Total Coliform + *E. coli, and Enterococcus*
Cadmium (Total)
Chromium (Total)
Copper (Total)
Iron (Total)
Lead (Total)
Manganese (Total)
Nickel (Total)
Zinc (Total)
Mercury (Total)

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From: Jones, Kim [mailto:kjones@townofbluffton.com]
Sent: Friday, January 8, 2016 8:59 AM
To: Larson, Eric
Cc: Alan Warren (dwarren@gwm.sc.edu)
Subject: RE: Status USCB water quality lab

Thanks for trying to reach me Alan and I'm sorry I was tied up in meetings yesterday afternoon (and am about to be tied up again for the rest of today).

Please feel free to share financial info. Below is the info I included in our SCASM presentation:

Agreements -

- 2008: Established a Memorandum of Agreement with University of South Carolina Beaufort Gateway Campus
    - $325,000 total
        - $25,000 initial investment for equipment
        - $100,000 annually for 3-years
- 2011:
    - $330,000
        - $110,000 annually for 3-years
- 2014:
    - $360,000 committed
        - $120,000 annually for 3-years

Total investment committed to 2017= $1,015,000
Total investment to date = $895,000

Thank you,
Kim

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From: MICKEL, DANIELLE [mailto:MICKEL@uscb.edu]
Sent: Friday, January 8, 2016 11:42 AM
To: Larson, Eric
Subject: USCB Lab parameters

Hello Eric,

The following parameters are certified as of July 1, 2015: pH, Turbidity, Conductivity, Dissolved Oxygen, Temperature, *E. coli, Enterococci*

Additional lab certifications are to be determined throughout the remainder of this year.

Also, Alan wanted me to mention that the initial investment for equipment to the lab from the County and Town of Bluffton was $275,000, with the remainder of annual funding commitments were for fee for services.

Danielle Mickel

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January 27, 2016

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Stormwater Implementation Committee (SWIC) Report

1. The SWIC met on January 20, 2016. The focus of the meeting was on the public education program for the remainder of the fiscal year. The SWIC members also discussed the current status of the rate study and the needed timeline for completion of the study for each of the five municipalities that participated in the project. In particular, the outcome of the study will dictate needed changes to the IGAs and the SWU management budgets for each municipality. The remainder of the time was spent discussing topics that will be continued at the next meeting, scheduled for February 10, 2016. See attached minutes of the January meeting.

DRAFT MINUTES
January 20, 2016, 1:30 pm at BJWSA, 6 Snake Road, Okatie, SC

Invited Attendees:	Eric Larson, Bryan McIllwee, Lamar Taylor, Neal Desai, Danny Polk, Kevin Pitts, Robbie O'Quinn, Shelby Berry, Denise Parsick, Rebecca Baker, Jeremey Ritchie. (Tony Maglione via email report.)

1. Approval of Nov. 12, 2015 meeting minutes (Eric) - approved by common consent.
2. Public Education
    a. Report from BSWCD
        i. Report on recent activity (Shelby)
            1. BSWCD has updated the budget for the second half of the year.
            January 15- BC - Dataw Health Fair, 9-noon (Est. attend. – 300+)
            March 13 – HHI – Broad Creek Cleanup, HH Outdoors – 10am -2pm (100)
            April 2 – CoB – Kidfest Cross Creek parking lot – 10am - 2pm (5,000)
            April 16 – ToPR – Soft Shell Crab Fest – Paris Avenue - noon-5-(5,000)
            April 16, 23, or 30 – ToPR - Earth Day –Farmers market – 9 – noon (300+)
            April 16 or 30th – BC - Hunting Island Beach Sweep
            April 23 – ToB – River Sweep (AM)/Earth Day(into PM) – Oyster Factory . River Sweep likes for us to set up after start so participants visit booth after clean up, so set up around 10:30 or so. Experience Green has been hosting Earth Day from 11 to 3 or 4 afterwards. Not announced yet.
            June 4 – Date for World Oceans Day – We are hoping PRSF will host this event in their Okatie location – BC
            Shelby had asked that a staff member from the appropriate jurisdiction attend and help if possible to help with questions that may come up from citizens while exhibiting.
            2. Storm drain marking - trying to do 50 markers in each jurisdiction. Maps were distributed to each jurisdiction. Everyone was asked to confirm this week so that BCSWCD can go forward and SWU staff can update the SWUB. Looking to try to do one location per week in March. BCSWCD will work

with County Channel to get publicity and advertise for volunteers.

3. Survey - Do spinning wheel for festival table in addition to paper / on line survey. Eric noted needed a base line data set using a statistically valid method, not just a spinning wheel. Denise noted needed a way to track "hits" to the website. Beth Lewis is working on that. It is a report, not a clicker.
4. Adams Outdoor Advertising Partnership - BCWSCD looked into the cost of paying for billboard space and it was too expensive. They decided to go back to the concept of accepting the free ad space as needed. They will start with the general N4CW.org ad and pet waste. Rates for materials change if we start paying for ads in other sources such as radio. Digital board to get started ASAP.
5. Rain Garden Workshop - Kim Counts Morganello and Laura Lee Rose with Clemson Extension willing to do a workshop. They suggest partnering with Lowes or Home Depot so that participates can get materials for rain gardens after the training is complete. Currently on hold since Kim in on maternity leave. There was discussions on the target audience, either a hands-on for the general public for experience or a contractor certification course. It was agreed that we probably needed to develop both courses.
6. Five Star Grant (Shelby) - Eric suggested BCSWCD look into a rain garden program as an opportunity.
7. Essay / poster contest - Rebecca suggested doing a calendar contest instead of poster and essay. Denise noted Weston really wanted the essay and poster contest. Denise and Shelby are working with Monica Spells to get this advertised in the schools. BCSWCD to provide SWIC a schedule
8. Facebook Sponsored ads (Jeremy Ritchie) - Beth Lewis suggested doing a Facebook ad to promote N4CW. Prices seemed reasonable. Facebook will be able to provide "hit" data.
9. Website content updates - Eric asked to get the website updated with fresh content and current events so that the Facebook ads direct people to current information.
10. EPA Pollution Brochure - BCSWCD recently did a brochure, used a N4CW sticker on back.
11. School events - none scheduled yet. That 7th grade unit is in the spring. BCSWCD will be sending flyer to the schools soon.

They are also getting requests and doing presentations in the 5th grade.

3. Management Plan
    a. Kick off meeting.(Tony) - A time and date has not been set for this meeting as of this date. The SWIC members did attend the Project Scoping meeting earlier so the final scope is set. We envision having this meeting in the next few weeks and will be sending out a request for some times and dates to have this meeting.
    b. MOUs status (all) - CoB and ToB have submitted signed copies to the County. ToHHI and ToPR are pending. County will sign all once received.
4. Rate Study
    a. Discussion of timeline, impacts of recommendations, IGA revisions. (Eric)
    b. Status on Towns, City Rate Studies. (Tony)
        · County – all work completed awaiting final reports from others to complete report write up.
        · Town of Port Royal – all work completed, awaiting final rate determinations by Town Council to complete report. Option E officially accepted.
        · City of Beaufort – Awaiting capital plan and any updated budget information in order to complete report, official acceptance of Option E? Report can then be completed. Staff is meeting Friday to discuss CIP and budget.
        · Town of Bluffton – No increase for next year, need final budget to support no increase to complete the report, official acceptance of Option E? Report can then be completed.
        · HHI – Impact of takeover of additional private systems being evaluated, once completed a final budget will need to be prepared to reflect final rates and take over plan. Official acceptance of Option E? Report can then be completed.
    c. SWUB actions needed? (All) - Not discussed.
    d. County needs to get Admin cost for FY 17 to Municipalities soon so that they can draft budgets.
5. Stormwater Design Standards
    a. Discussion on commonalities & differences (Bryan) - Bryan stated a consultant doing a redevelopment is arguing that stormwater should be a non-conformity in redevelopment. BC noted that they do not have differing standards. ToB hasn't had to deal with redevelopment much and hasn't been an issue yet. Peak control is typically approved with

reduction in impervious area. Agrees water quality needs to be addressed. Rebecca and Eric noted "jurisdiction shopping" is occurring in the county and even in Jasper County.

6. MS4
    a. Discussion: Comparison of Ordinance language for MS4 compliance (Rebecca) - Due to time, this item was tabled until February.
7. Monitoring
    a. Discussion: Sampling parameters and locations - Who is doing what? (Rebecca) - Due to time, this item was tabled until February.
8. Reports by each jurisdiction - Due to time, this item was tabled until February.
    a. BC
    b. ToHHI
    c. ToB
    d. CoB
    e. ToPR
9. Other items - None
10. Public Education Contract for FY 17 (Executive Session of SWIC members only) - No action came out of session.
11. Next Meeting
    a. Next meeting - Feb. 10, 2016 @ 1:30pm at BJWSA Community Room
12. Adjourn at approx. 3:15 pm.

BEAUFORT COUNTY STORMWATER UTILITY
120 Shanklin Road
Beaufort, South Carolina 29906
Voice (843) 255-2801 Facsimile (843) 255-9478

January 27, 2016

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Stormwater Related Projects

1. US 278 Retrofit Ponds ($356,000 =Budget) – Nothing new to report. Clearing and excavation on ponds 2 and 3 continues.
2. Turtle Lane Paving on Lady's Island (Stormwater Add-On) ($8,940 Budget) – Staff has authorized an additional scope of services to survey the downstream receiving storm sewer system to verify that flooding problems of adjacent residents are not negatively affected by the road and storm sewer work. The cost for this work is unknown at this time and not reflected in the budget listed above.
3. Okatie West / SC 170 Widening Retrofit Land Purchase (Land Acquisition = $160,415 Budget, Design and Construction = $915,000 Budget) – Closing of the property is still pending. The contract with Ward Edwards Engineering is complete. Staff has had a kick off meeting with WEE. The first reporting period for the grant ended December 31, 2015. WEE and staff will be preparing a report showing 0% progress. Design work will begin immediately.
4. SC 170 Widening Pond #8 project (Land Acquisition = $155,694 Budget, Design and Construction = $630,840) – Closing of the property is still pending. Nothing new to report.
5. Huspah Court South Ditch Easement / Mike Zara – Mr. Zara's response is still pending. Staff will be meeting next week to discuss the project further and how the drainage improvements proposed relate to the paving project on Huspah Ct. S.

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January 27, 2016

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Professional Contracts Report

1. Stormwater Management Plan (Master Plan) Update – The contract with Applied Technology and Management (ATM) was approved in December. A kick off meeting with the SWIC is pending.

BEAUFORT COUNTY STORMWATER UTILITY
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January 27, 2016

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Regional Coordination

1. Battery Creek Pond Funded by an EPA 319 Grant ($132,609 Budget – County Portion) – Dr. Gray has decided not to timber the land separately from the project. Clearing has been added back into the project and the City is in the process of advertising for bids.
2. May River Watershed Action Plan – No update to report. (Town of Bluffton staff may also report)
3. Stoney Creek Project – No update to report. (Town of Bluffton staff may also report)
4. Pine Ridge Retrofit Project – The Town of Bluffton is in the process of finalizing a construction services contract for the installation of a reuse irrigation system within the Pine Ridge Subdivision located off Buckwalter Parkway. The project is funded in part by the US EPA under a Section 319 Grant through SC DHEC and will reduce stormwater volume and fecal loadings to the May River by bringing an established high density development into compliance with the current volume control requirements.
5. Buckingham Plantation Drive Innovation District Conceptual Design Study ($25,000 Budget – SWU Portion) – One of the business owners in the project area has contacted the County Administrator's office asking for a status on the County's plans for the area. His concerns were not related to stormwater. However, the Stormwater Department still intends to support the project once additional funding for the project is found.
6. SC 170 Widening – The roadway project is complete. There are remaining issues from an adjacent property owner concerning the project. However, the staff is of the opinion that the project was constructed as designed and functioning adequately.
7. City of Beaufort Stormwater Assistance MOU – Nothing new to report. With the recent hire of a Stormwater Engineer by the City, this item has become unneeded.
8. Factory Creek Watershed Regional Detention Basin & Academy Park Subdivision Proposal – Contract negotiations with the developer are ongoing. The Natural Resources Committee delayed action on the agreement until the February meeting. Several residents spoke against the project at the Lady Island Community Preservation Committee meeting and County Council meeting on January 11, 2016.
9. Factory Creek Watershed Regional Detention Basin "Phase II" – A Feasibility study is in progress. The results will be presented during Old Business.
10. City of Beaufort and SCDOT Partnership Projects – The County staff is working with the City and SCDOT to cost share on improvements to Hamar St. We are working on obtaining a needed easement and estimating costs and negotiating the cost share relationship.

11. Plantation Business Park Drainage Assessment – Evaluation of the condition of the stormsewer system is still in progress. We experienced weather delays. The Report should be available in February.
12. Town of Hilton Head Island Stormwater staff reports only routine operations and maintenance projects for the month of January.

MS4 Coordinator's Report to SWMU Board

January 27, 2016

1. Public Education – SWIC is gearing up for a strong start to upcoming educational events.

   January 15- Beaufort Co.-Dataw Health Fair, 9-noon (Est. attend. – 300+)
   March 13 – HHI – Broad Creek Cleanup, HH Outdoors – 10am -2pm (100)
   April 2 – City of Beaufort – Kidfest Cross Creek Parking Lot – 10am -2pm (5,000)
   April 16 –Town of Port Royal – Soft Shell Crab Fest – Paris Avenue - noon-5-(5,000)
   April 16, 23, or 30 – Town of Port Royal - Earth Day –Farmers market – 9 –noon (300+)
   April 16 or 30th – Beaufort County - Hunting Island Beach Sweep
   April 23 – Town of Bluffton – River Sweep (AM)/ Earth Day (into PM) – Oyster Factory
   June 4 –World Oceans Day – It is anticipated that Port Royal Sound Foundation will host this event in their Okatie location.

2. Public Outreach and Involvement – SWIC is preparing to request volunteers to install 50 drain markers in every area of the County. Maps of proposed areas are included in the report.(Backup)

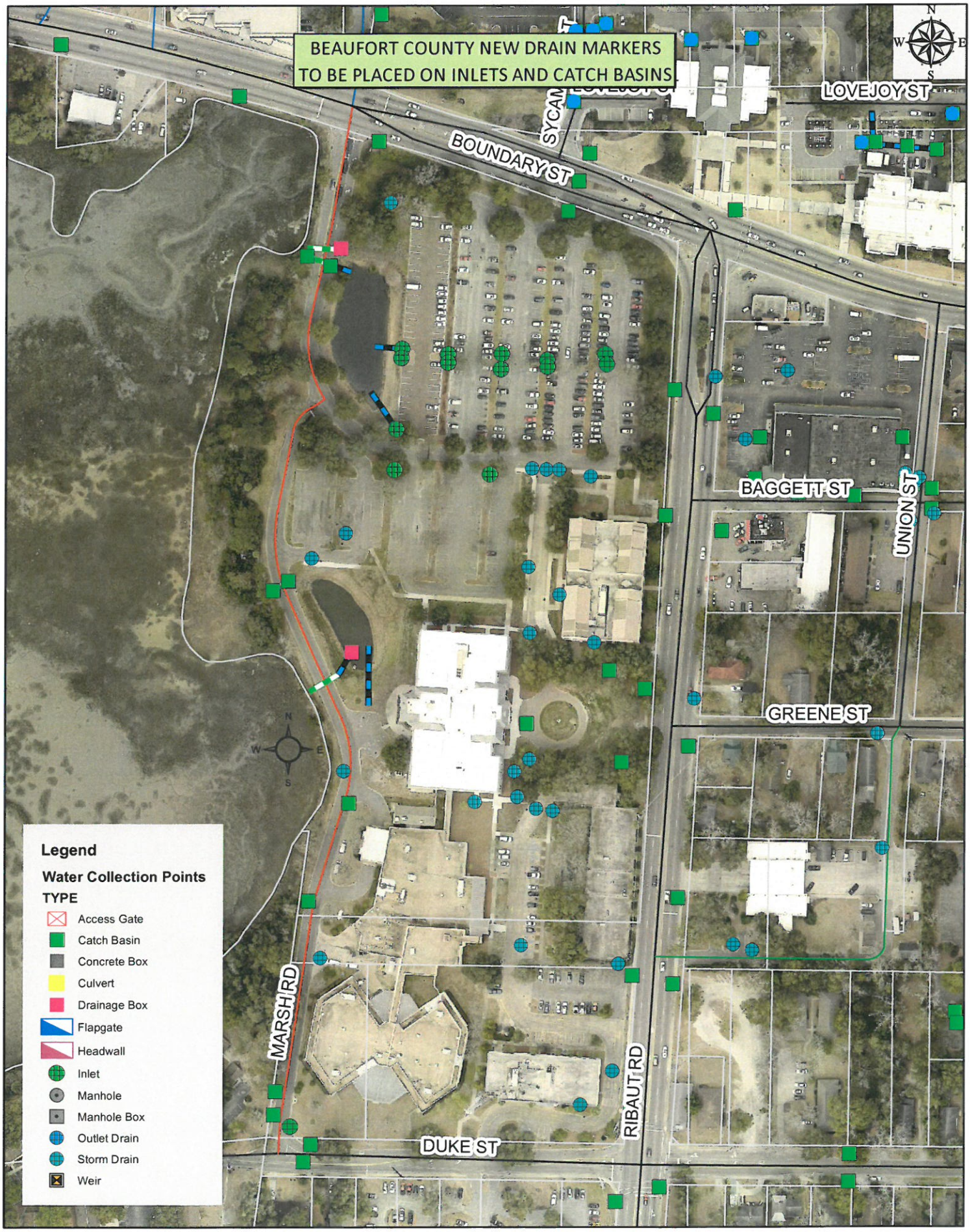
3. Illicit Discharge, Detection, and Elimination (IDDE) - There have been several existing construction sites that have drawn attention to the IDDE and DHEC procedures. This has been very helpful in creating our BMP Manual. The BMP Manual is currently being revised and a task is under review with ATM for the assistance with technical drawings and specifications required for the BMP Manual.

4. Post – Construction Best Management Practices (PC-BMP) – Staff is in the process of creating a stormwater permit and inspection data base through Munis that is going to assist in pre and post construction BMP's. Projected completion date for data base is October 2016.

5. Construction Run-Off – Staff is creating a development review inspection process to assist in the transition of the current procedures and the new MS4 permit procedures. This has also been very helpful in creating a team effort in implementing the BMP manual and ordinances for the MS4.

6. Good Housekeeping in Municipal Operations – Staff is in the process of scheduling a certification class on the disposal of hazardous materials and new MS4 requirements for relevant county employees. Example: All facilities that have potential to have an illicit discharge such as oil, grease and chemical will have a certified staff member to inspect their areas on a weekly basis and will be inspected on an annual basis by Stormwater staff.

7. Staff has reviewed 13 projects for County Staff Review Team.


BEAUFORT COUNTY NEW DRAIN MARKERS
TO BE PLACED ON INLETS AND CATCH BASINS
BOUNDARY ST
LOVEJOY ST
BAGGETT ST
UNION ST
GREENE ST
MARSH RD
RIBAUT RD
DUKE ST
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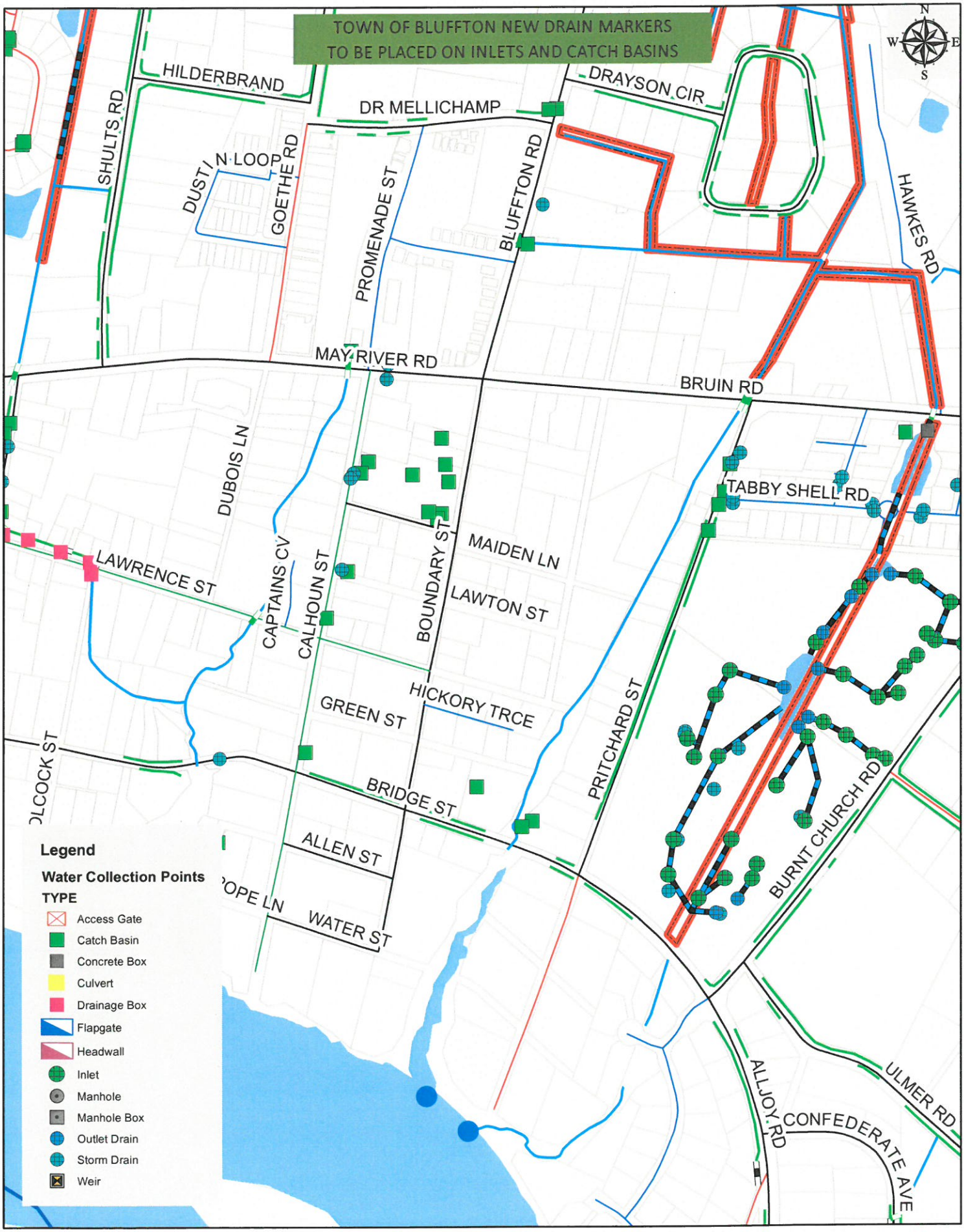
W
Legend
Water Collection Points
TYPE
Access Gate
Catch Basin
Concrete Box
Culvert
Drainage Box
Flapgate
Headwall
Inlet
Manhole
Manhole Box
Outlet Drain
Storm Drain
Weir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BLUFFTON RD
HAWKES RD
MAY RIVER RD
BRUIN RD
DUBOIS LN
TABBY SHELL RD
LAWRENCE ST
CAPTAINS CV
CALHOUN ST
BOUNDARY ST
MAIDEN LN
LAWTON ST
HICKORY TRCE
GREEN ST
PRITCHARD ST
BRIDGE ST
BURNT CHURCH RD
ALLEN ST
WATER ST
ALLJOY RD
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ULMER RD
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Water Collection Points
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Access Gate
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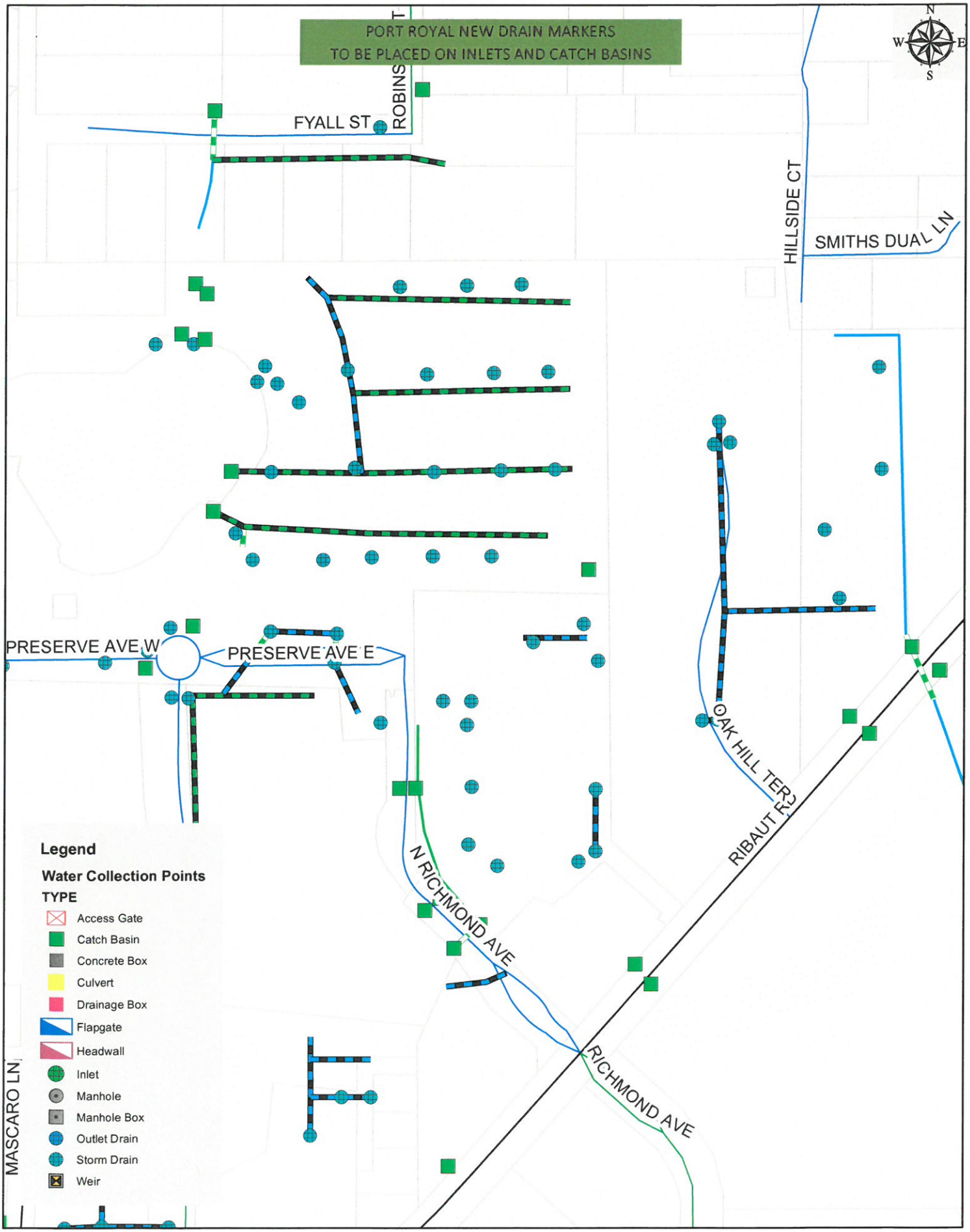
PORT ROYAL NEW DRAIN MARKERS
TO BE PLACED ON INLETS AND CATCH BASINS
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MASCARO LN
Legend
Water Collection Points
TYPE
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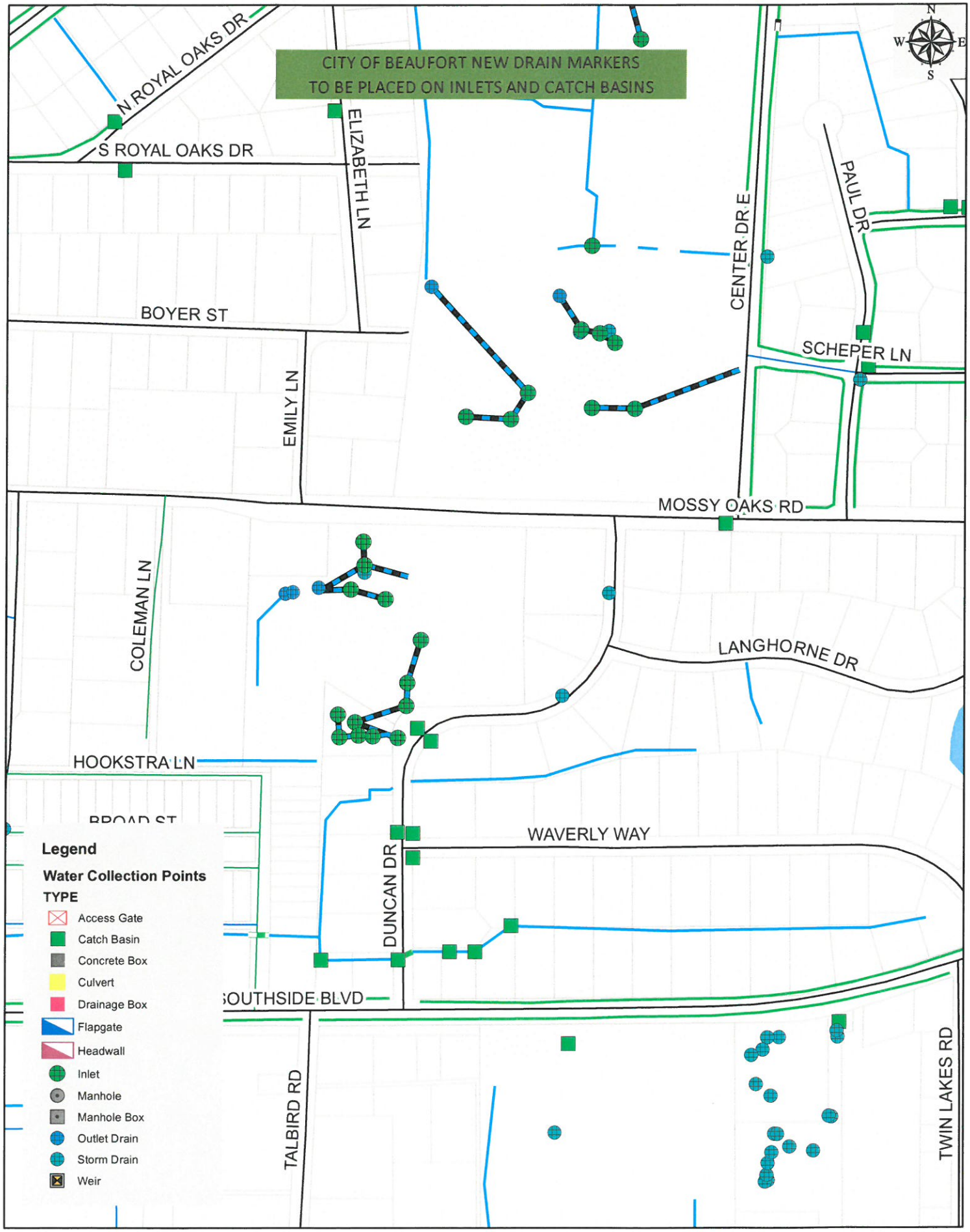
CITY OF BEAUFORT NEW DRAIN MARKERS
TO BE PLACED ON INLETS AND CATCH BASINS
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S ROYAL OAKS DR
ELIZABETH LN
BOYER ST
EMILY LN
CENTER DR E
PAUL DR
SCHEPER LN
MOSSY OAKS RD
COLEMAN LN
LANGHORNE DR
HOOKSTRA LN
WAVERLY WAY
DUNCAN DR
SOUTHSIDE BLVD
TALBIRD RD
TWIN LAKES RD
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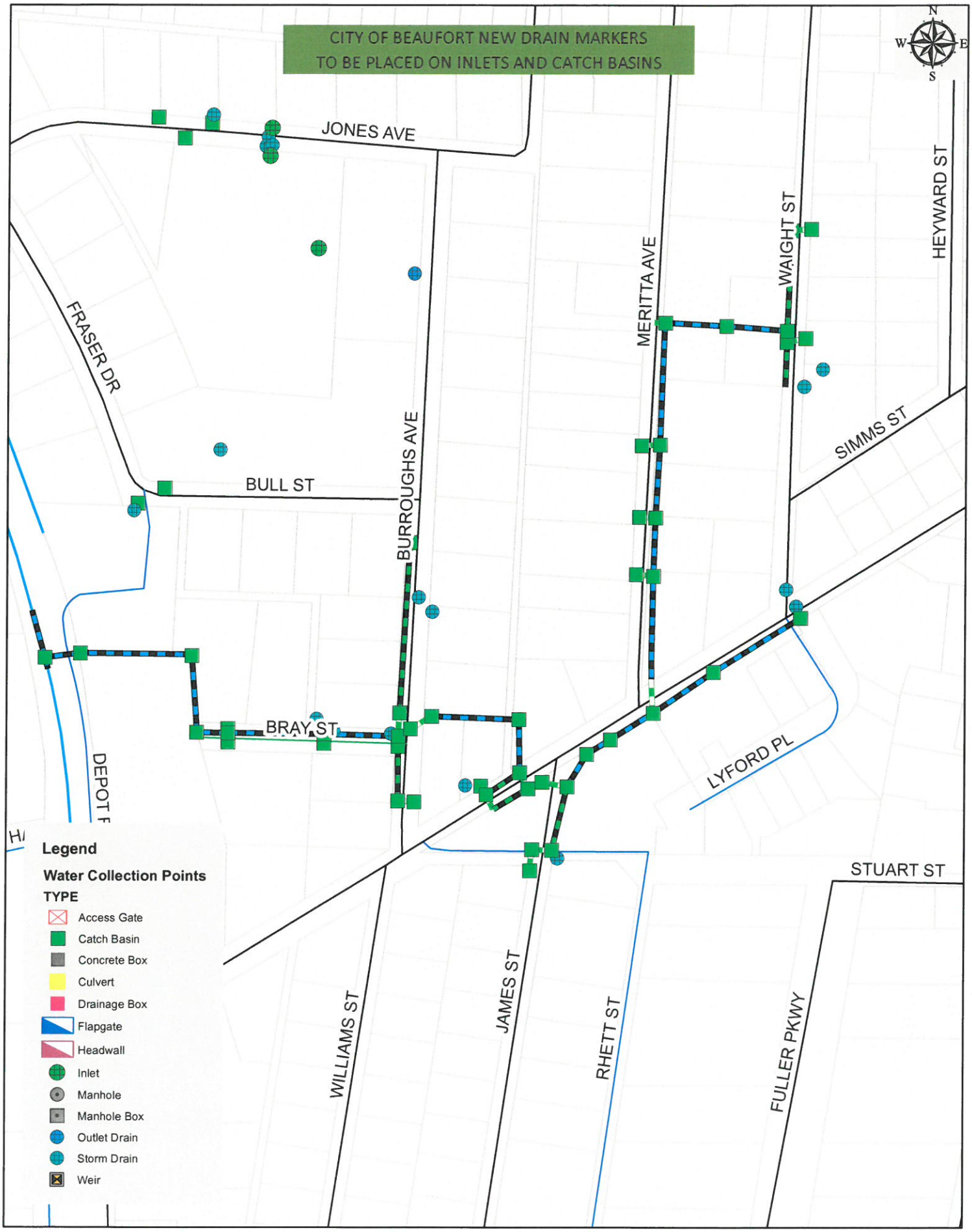
CITY OF BEAUFORT NEW DRAIN MARKERS
TO BE PLACED ON INLETS AND CATCH BASINS
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FRASER DR
BULL ST
BURROUGHS AVE
MERITTA AVE
WAIGHT ST
HEYWARD ST
SIMMS ST
BRAY ST
DEPOT
LYFORD PL
STUART ST
WILLIAMS ST
JAMES ST
RHETT ST
FULLER PKWY
Legend
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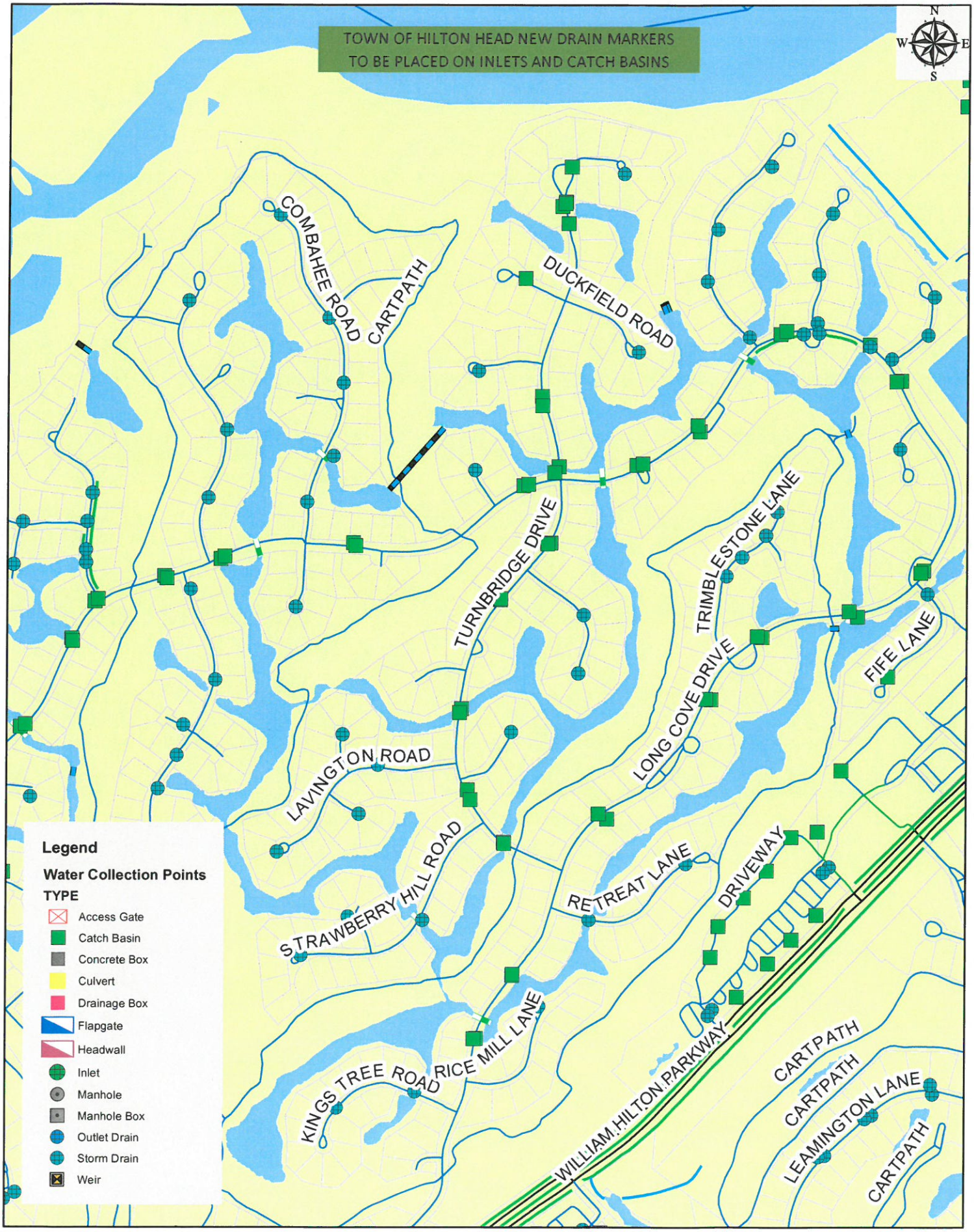
TOWN OF HILTON HEAD NEW DRAIN MARKERS
TO BE PLACED ON INLETS AND CATCH BASINS
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COMBAHEE ROAD
CARTPATH
DUCKFIELD ROAD
TURNBRIDGE DRIVE
TRIMBLESTONE LANE
FIFE LANE
LONG COVE DRIVE
LAVINGTON ROAD
STRAWBERRY HILL ROAD
RETREAT LANE
DRIVEWAY
KINGS TREE ROAD
RICE MILL LANE
WILLIAM HILTON PARKWAY
CARTPATH
CARTPATH
LEAMINGTON LANE
CARTPATH
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Manhole
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Outlet Drain
Storm Drain
Weir

MEMORANDUM

Date: January 27, 2016

To: Stormwater Management Utility Board

From: Dave Wilhelm, Public Works Director

Re: **Maintenance Project Report**

This report will cover four major and nine minor or routine projects. The Project Summary Reports are attached.

Major Projects – Storm Drainage System Improvements:

- **St. Paul's Church Road/Josephine Drive:** Scope of work for this location included cleaning out 6,019 feet of roadside ditch, replacing 24 feet of driveway pipe, and jet cleaning various pipes. Work was completed January 2016. The total cost of the project was **$44,578.72.**
- **Old Salem Road - Driveway:** The project scope included replacing 104 feet of driveway pipe, reconstructing roadside concrete curb, building a paved swale for runoff, and placing rip rap for erosion control. Work was completed November 2015. The total cost of the project was **$30,533.12.**
- **Old Salem Road – Roadside:** Scope of work for this location included cleaning out 2,182 feet of roadside ditch and jet cleaning various pipes. Work was completed August 2015.The total cost of the project was **$15,473.41**
- **Thomas Sumter Street and Gator Lane:** The project scope improved 2,147 feet of drainage system including 508 feet of roadside ditch and 1,134 feet of channel. Additional work included jet cleaning various pipes and clearing blocked flow lines. Work was completed November 2015. The total cost of the project was **$17,652.32.**

Minor or Routine Projects:

- **Horse Island Pond:** Drainage improvement work to lower elevation in three ponds. Work included installing a new crossline pipe, jet cleaning one pipe, and placing rip rap. The total cost was **$10,264.46.**
- **Vacuum Truck – Lady's Island:** Project scope included jet cleaning 896 feet of various pipes and 46 catch basins**.** The total cost was **$8,397.31**.
- **Mount Pisgah Church Road Channel #1:** The project scope included cleaning out 607 feet of channel and 60 feet of roadside ditch. The total cost was **$5,985.47**

- **Vacuum Truck – St. Helena Island:** Project scope included jet cleaning 40 feet of various pipes and 21 catch basins**.** The total cost was **$5,503.37**.
- **Vacuum Truck – Sheldon:** Project scope included jet cleaning various pipes**.** The total cost was **$4,993.85**.
- **McGarvey's Corner Pond:** The pond was dewatered in order to reconstruct the existing weir. The total cost was **$3,246.52.**
- **Rivers End Subdivision – Ashepoo Drive:** The project scope included installing an inlet drain for drainage runoff and sod for erosion control. The total cost was **$3,131.41**
- **St. Helena Island – Washout/Sinkhole Repair:** Crew repaired one catch basin and backfilled sinkhole. The total cost was **$2,028.59.**
- **Arnold Lane:** Crew cleaned out 100 feet of channel by hand and an existing catch basin. The total cost was **$494.66**

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: St Pauls Church Road/Josephine Drive

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Jan-16

Project improved 6,043 L.F. of drainage system. Cleaned out 6,019 L.F. of roadside ditch. Replaced 24 L.F. of driveway pipe. Jetted (2) access pipes, (4) crossline pipes and (15) driveway pipes.

2016-545 / St Pauls Church Rd/Josephine Dr	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
ASBUILT / Asbuilt - Project	16.0	$363.78	$30.06	$8.50	$0.00	$223.50	$625.84
AUDIT / Audit Project	1.0	$23.49	$0.00	$0.00	$0.00	$13.23	$36.72
CLPJT / Crossline Pipe - Jetted	32.0	$732.16	$138.88	$53.27	$0.00	$475.20	$1,399.51
DPJT / Driveway Pipe - Jetted	52.0	$1,190.28	$225.68	$91.54	$0.00	$772.62	$2,280.12
DPRPL / Driveway Pipe - Replaced	50.0	$1,121.20	$85.29	$161.95	$0.00	$698.10	$2,066.54
HAUL / Hauling	202.0	$4,498.54	$1,534.08	$766.26	$0.00	$2,912.84	$9,711.72
HYDR / Hydroseeding	16.0	$356.52	$51.48	$507.56	$0.00	$221.88	$1,137.44
ONJV / Onsite Job Visit	73.0	$2,324.19	$249.73	$59.50	$0.00	$1,452.73	$4,086.14
RSDCL / Roadside Ditch - Cleanout	526.0	$11,925.68	$1,842.79	$422.20	$0.00	$7,529.43	$21,720.09
TC / Traffic Control - Jobsite	21.0	$496.89	$53.10	$34.39	$0.00	$326.43	$910.81
UC / Utility Coordination	8.0	$254.81	$24.86	$6.80	$0.00	$156.57	$443.04
UTLOC / Utility locates	3.0	$95.00	$3.62	$1.70	$0.00	$60.42	$160.74
2016-545 / St Pauls Church Rd/Josephine Dr Sub Total	**1,000.0**	**$23,382.53**	**$4,239.57**	**$2,113.67**	**$0.00**	**$14,842.95**	**$44,578.72**
Grand Total	**1,000.0**	**$23,382.53**	**$4,239.57**	**$2,113.67**	**$0.00**	**$14,842.95**	**$44,578.72**

Before

During

After

Project: St Pauls Church Road/ Josephine Drive Map 1

Activity: Routine/ Preventive Maintenance

Project #: 2016-545

Township: Port Royal Island

Completed: January 2016

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 80 160 320 480 640 Feet

1 inch = 330 feet

Prepared By: BC Stormwater Management Utility
Date Print:01/05/16
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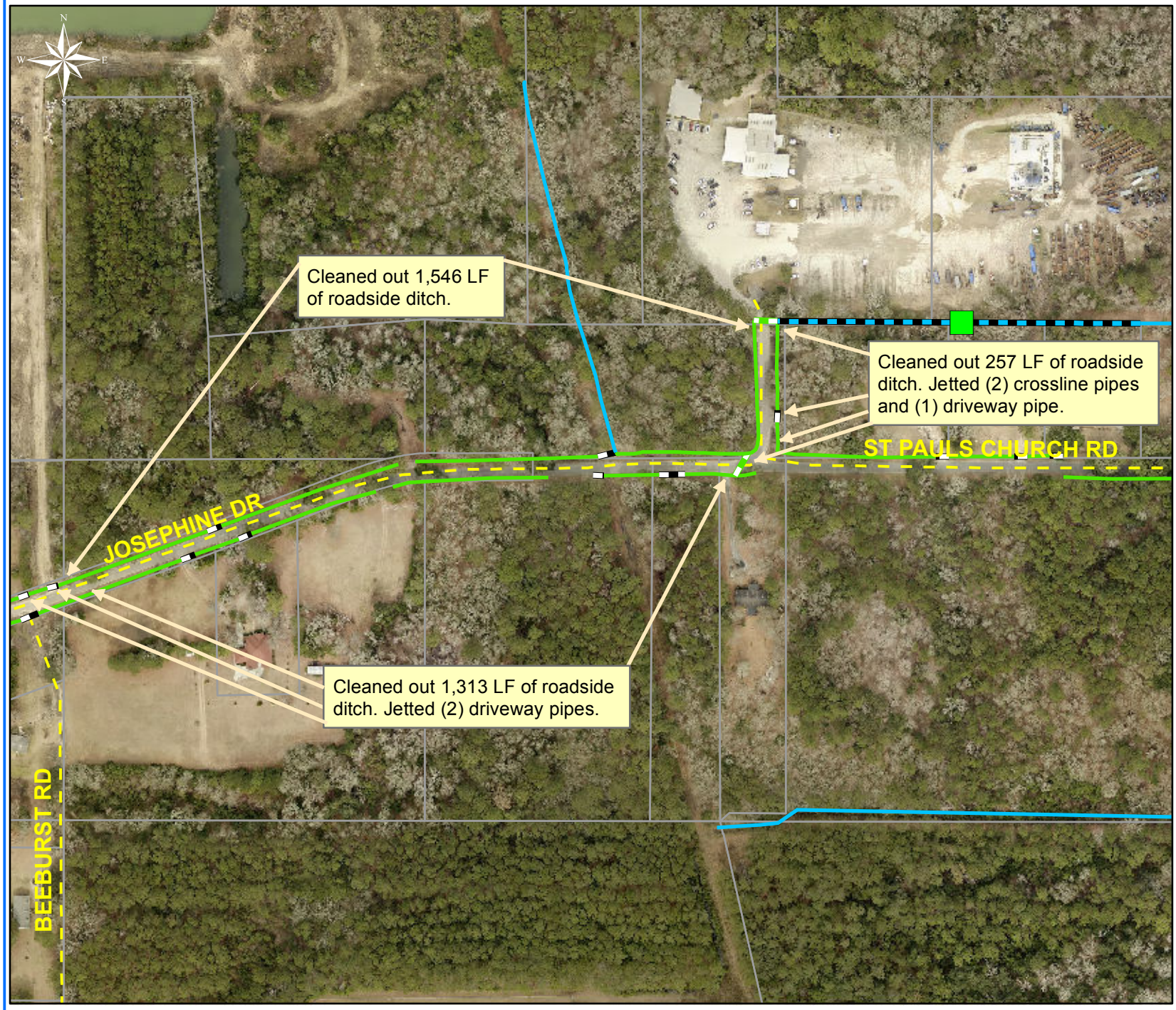

Project: St Pauls Church Road/ Josephine Drive Map 2

Activity: Routine/ Preventive Maintenance

Project #: 2016-545

Township: Port Royal Island

Completed: January 2016

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 60 120 240 360 480 Feet

1 inch = 250 feet

Prepared By: BC Stormwater Management Utility
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Project: St Pauls Church Road/ Josephine Drive Map 3

Activity: Routine/ Preventive Maintenance

Project #: 2016-545

Township: Port Royal Island

Completed: January 2016

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print:01/05/16
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Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Old Salem Road

Activity: Drainage Improvement

Narrative Description of Project:

Completion: Nov-15

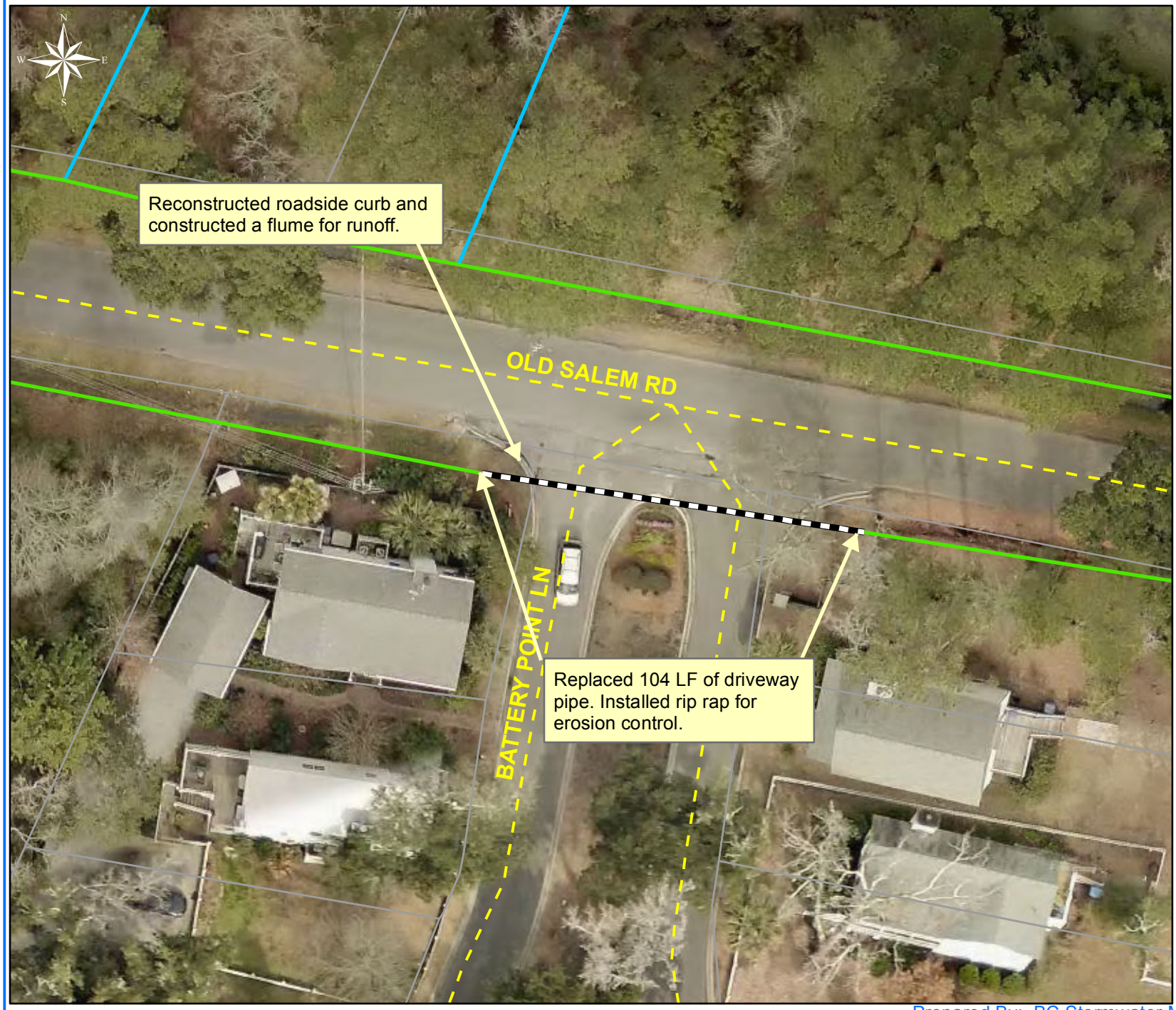
Project improved 104 L.F. of drainage system. Replaced 104 L.F. of driveway pipe. Reconstructed roadside curb and constructed a flume for runoff. Installed rip rap for erosion control.

2016-534 / Old Salem Road	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
ARR / Add rock	27.0	$606.16	$102.95	$25.70	$0.00	$390.30	$1,125.11
AUDIT / Audit Project	1.0	$23.49	$0.00	$0.00	$0.00	$13.23	$36.72
DPINP / Driveway Pipe - Inspected	6.0	$140.95	$86.48	$3.62	$0.00	$88.24	$319.29
DPR / Driveway Pipe - Repaired	50.0	$1,097.20	$52.03	$40.10	$0.00	$677.70	$1,867.03
ERCON / Erosion control	16.0	$372.04	$49.52	$23.31	$0.00	$234.32	$679.19
FC / Flume - Constructed	6.0	$134.16	$7.08	$213.47	$0.00	$86.28	$440.99
HAUL / Hauling	99.0	$2,204.73	$791.01	$1,648.17	$0.00	$1,427.58	$6,071.49
LM / Loading Materials	21.0	$475.89	$81.77	$12.67	$0.00	$302.46	$872.79
MEET / Meetings	2.0	$91.20	$43.44	$3.40	$0.00	$67.92	$205.96
ONJV / Onsite Job Visit	38.0	$1,256.55	$135.24	$39.10	$0.00	$834.31	$2,265.20
PL / Project Layout	1.0	$45.60	$3.62	$1.70	$0.00	$33.96	$84.88
PP / Project Preparation	28.0	$637.42	$41.41	$5.43	$0.00	$396.06	$1,080.32
PROFS / Professional Services	0.0	$0.00	$0.00	$0.00	$6,710.44	$0.00	$6,710.44
RPWO / Repaired Washout	19.0	$557.37	$69.35	$12.34	$0.00	$352.65	$991.71
RSPI / Roadside Pipe - Installed	100.0	$2,351.50	$239.24	$1,011.34	$0.00	$1,458.10	$5,060.18
SD / Soft Digging	5.0	$123.50	$43.40	$11.86	$0.00	$82.35	$261.11
SG / Shoot Grade	12.0	$279.57	$0.00	$25.15	$0.00	$182.49	$487.21
TC / Traffic Control - Jobsite	50.0	$1,143.30	$70.80	$17.00	$0.00	$742.40	$1,973.50
2016-534 / Old Salem Road Sub Total	**481.0**	**$11,540.63**	**$1,817.34**	**$3,094.36**	**$6,710.44**	**$7,370.35**	**$30,533.12**
Grand Total	**481.0**	**$11,540.63**	**$1,817.34**	**$3,094.36**	**$6,710.44**	**$7,370.35**	**$30,533.12**

Before

During

After



Project: Old Salem Road

Activity: Drainage Improvement

Project #: 2016-534

Township: Port Royal Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 5 10 20 30 40 Feet

1 inch = 33 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/23/2015
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Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Old Salem Road

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Aug-15

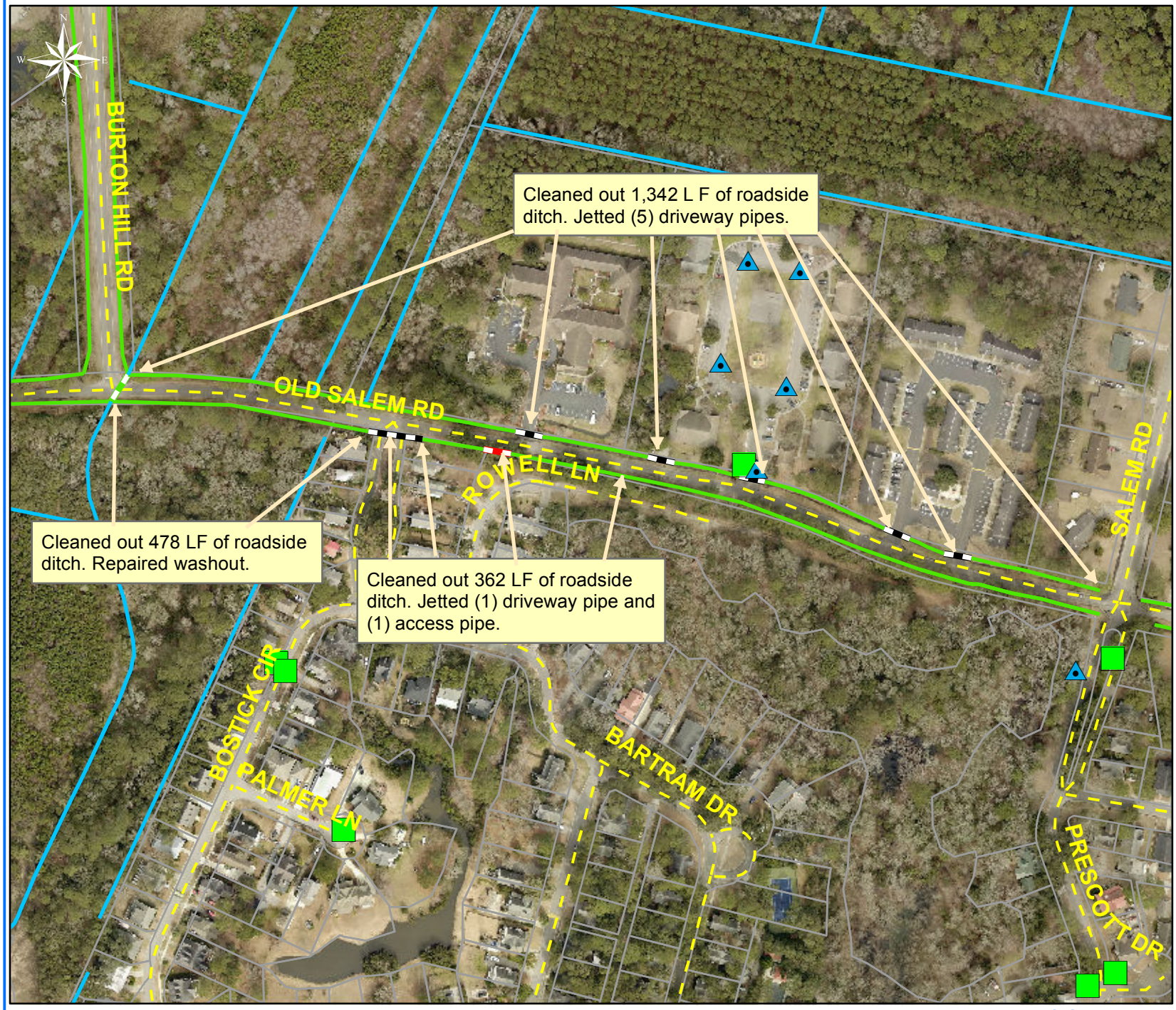
Project improved 2,182 L.F. of drainage system. Cleaned out 2,182 L.F. roadside ditch. Repaired washout. Jetted (6) driveway pipes and (1) access pipe.

2016-523 / Old Salem Road	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	1.0	$23.49	$0.00	$0.00	$0.00	$13.23	$36.72
CLPJT / Crossline Pipe - Jetted	6.0	$137.30	$26.04	$24.24	$0.00	$89.10	$276.68
DPJT / Driveway Pipe - Jetted	12.0	$274.59	$52.08	$26.74	$0.00	$178.20	$531.61
HAUL / Hauling	87.0	$1,954.09	$639.20	$752.58	$0.00	$1,246.21	$4,592.07
ONJV / Onsite Job Visit	31.0	$1,067.53	$110.06	$58.28	$0.00	$727.89	$1,963.76
PI / Project Inspection	3.0	$136.80	$10.86	$1.88	$0.00	$101.88	$251.42
RPWO / Repaired Washout	8.0	$178.20	$23.71	$1.88	$0.00	$114.36	$318.15
RSDCL / Roadside Ditch - Cleanout	185.0	$4,145.09	$576.12	$116.14	$0.00	$2,665.65	$7,503.00
2016-523 / Old Salem Road Sub Total	**333.0**	**$7,917.08**	**$1,438.07**	**$981.74**	**$0.00**	**$5,136.52**	**$15,473.41**
Grand Total	**333.0**	**$7,917.08**	**$1,438.07**	**$981.74**	**$0.00**	**$5,136.52**	**$15,473.41**

Before

During

After



Project: Old Salem Road

Activity: Routine/ Preventive Maintenance

Project #: 2016-523

Township: Port Royal Island

Completed: August 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 60 120 240 360 480 Feet

1 inch = 250 feet

Prepared By: BC Stormwater Management Utility
Date Print:08/13/15
File:C:\project summaries map/Old Salem Road_2016-523

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Thomas Sumpter Street and Gator Lane

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Nov-15

Project improved 2,147 L.F. of drainage system. Dewatered and Bush hogged perimeter of ponds. Removed blockages from flowline and 125 L.F. by hand. Cleaned out 508 .F. of roadside ditch and 1,134 L.F. of channel. Jetted (3) crossline pipes, (4) driveway pipes, 40 L.F. of roadside pipe and 340 L.F. of channel pipe.

2016-551 / Thomas Sumpter St/Gator Lane	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CBH / Channel- bushhogged	30.0	$692.68	$278.38	$53.12	$0.00	$452.30	$1,476.48
CCO / Channel - cleaned out	80.0	$1,758.00	$283.67	$59.89	$0.00	$1,123.20	$3,224.76
CLPJT / Crossline Pipe - Jetted	11.0	$251.68	$47.74	$43.96	$0.00	$163.35	$506.73
CPJ / Channel Pipe - Jetted	5.0	$114.40	$21.70	$21.98	$0.00	$74.25	$232.33
DPJT / Driveway Pipe - Jetted	4.0	$91.52	$17.36	$27.23	$0.00	$59.40	$195.51
HAUL / Hauling	76.5	$1,722.06	$583.87	$238.37	$0.00	$1,100.12	$3,644.42
ONJV / Onsite Job Visit	49.0	$1,497.06	$173.86	$79.90	$0.00	$1,234.00	$2,984.82
PL / Project Layout	10.0	$456.00	$36.20	$20.40	$0.00	$339.60	$852.20
PM / Ponds - Maintenance	28.0	$597.15	$89.70	$53.04	$0.00	$378.62	$1,118.51
RB / Remove blockage from flowline	6.0	$136.08	$7.08	$5.10	$0.00	$87.90	$236.16
RSDCL / Roadside Ditch - Cleanout	26.0	$561.06	$146.42	$16.44	$0.00	$356.10	$1,080.02
SG / Shoot Grade	56.0	$1,230.60	$49.56	$15.63	$0.00	$786.24	$2,082.03
2016-551 / Thomas Sumpter St/Gator Lane Sub Total	**382.0**	**$9,120.03**	**$1,735.54**	**$635.05**	**$0.00**	**$6,161.69**	**$17,652.32**
Grand Total	**382.0**	**$9,120.03**	**$1,735.54**	**$635.05**	**$0.00**	**$6,161.69**	**$17,652.32**

Before

During

After

Project: Thomas Sumter Street and Gator Lane Map1

Activity: Routine/ Preventive Maintenance

Project #: 2016-551

Township: Lady's Island

Completed: November 2015

Legend

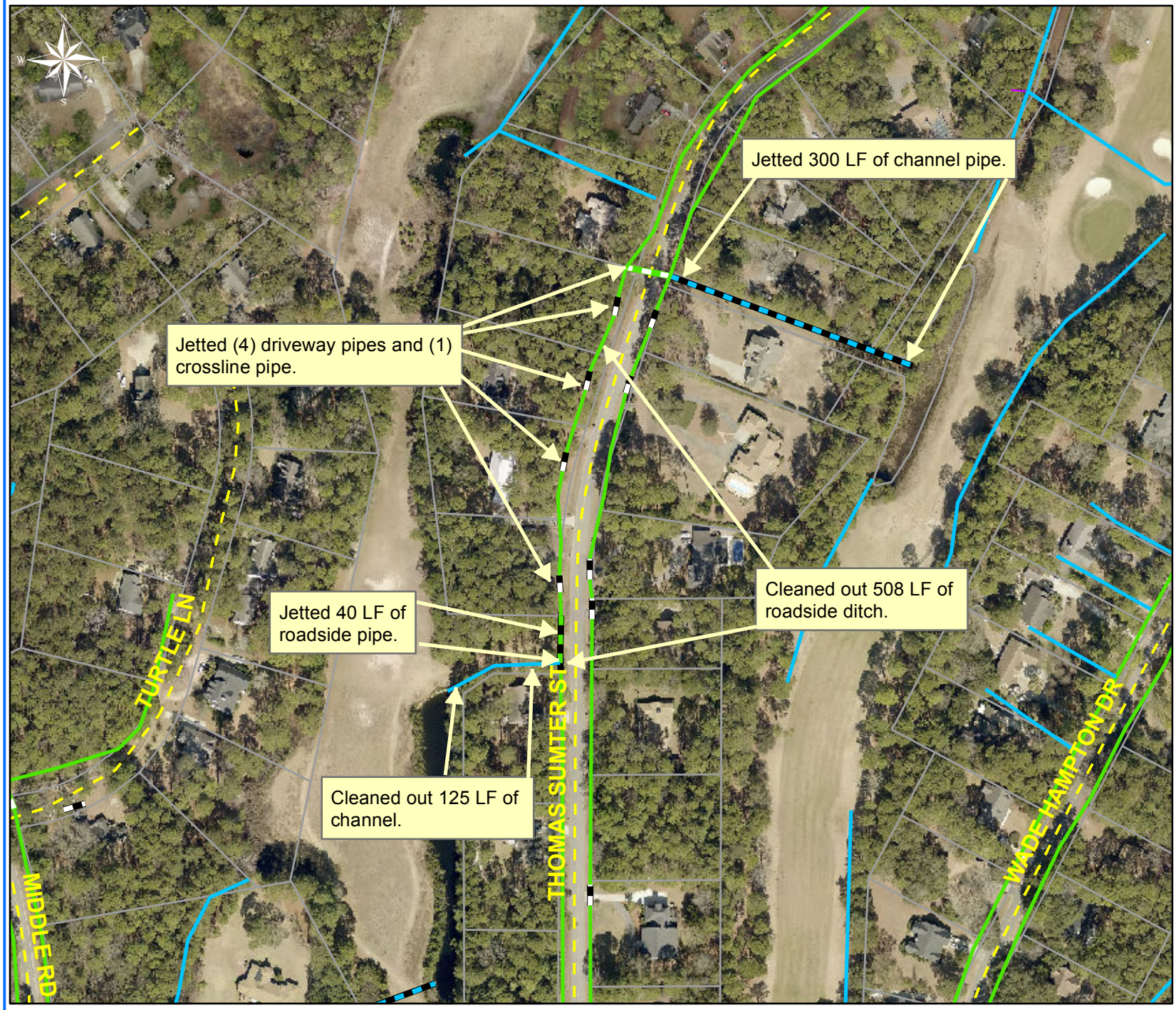
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 100200 400 600 800 Feet

1 inch = 420 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/19/15
File:C:\project summaries map/Thomas Sumter Street and Gator LaneMap 1_2016-551



Project: Thomas Sumter Street and Gator Lane Map 2

Activity: Routine/ Preventive Maintenance

Project #: 2016-551

Township: Lady's Island

Completed: November 2015

Legend

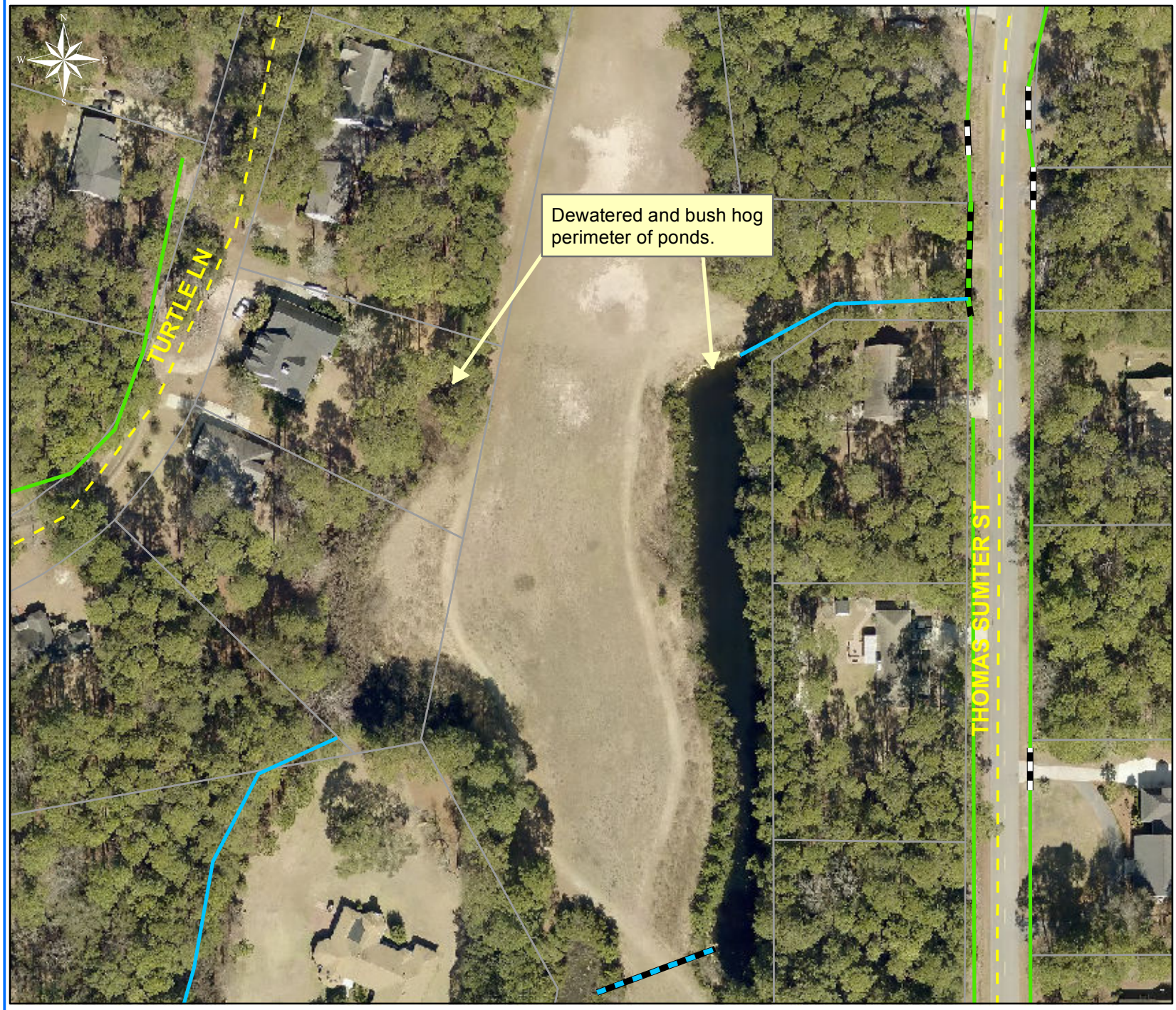
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 50 100 200 300 400 Feet

1 inch = 210 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/19/2015
File:C:\project summaries map/Thomas Sumter Street and Gator Lane Map 2_2016-551



Project: Thomas Sumter Street and Gator Lane
Map 3

Activity: Routine/ Preventive Maintenance

Project #: 2016-551

Township: Port Royal Island

Completed: November 2015

Legend

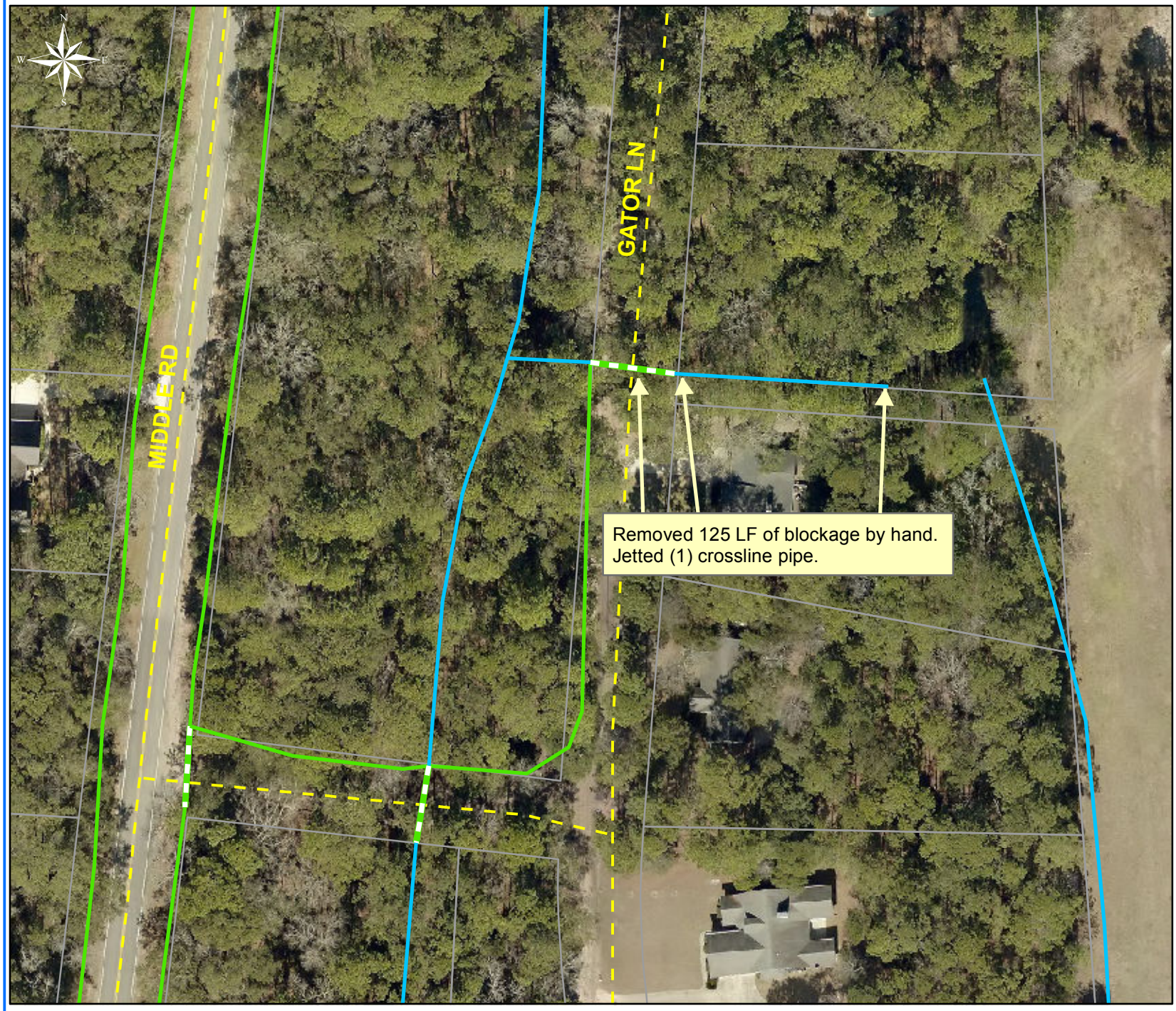
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/19/15
File:C:\project summaries map/Thomas Sumter Street and Gator Lane Map 3_2016-551



Project: Thomas Sumpter Street and Gator Lane
Map 4

Activity: Routine/ Preventive Maintenance

Project #: 2016-551

Township: Port Royal Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 20 40 80 120 160 Feet

1 inch = 83 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/19/15
File:C:\project summaries map/Thomas Sumpter Street and Gator Lane_ Map 4_2016-551

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Horse Island Pond

Activity: Drainage Improvement

Narrative Description of Project:

Completion: Nov-15

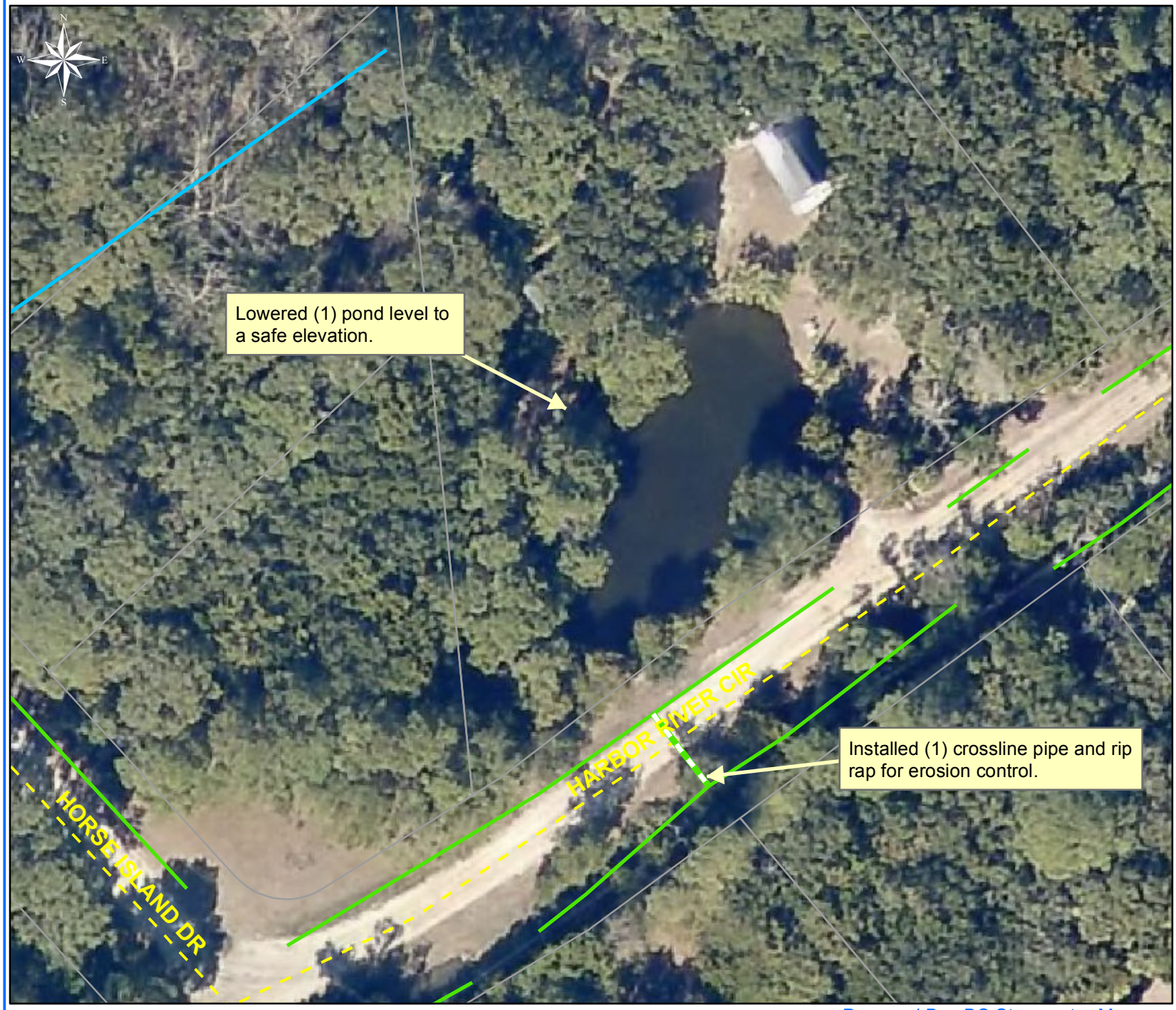
Lowered (3) pond levels to a safe elevation. Replaced 4 L.F. of crossline pipe. Installed (1) crossline pipe and rip rap for erosion control. Jetted (1) crossline pipe.

2016-324 / Horse Island Pond	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CLPINP / Crossline Pipe - Inspected	8.0	$175.80	$7.08	$6.88	$0.00	$112.32	$302.08
CLPINS / Crossline Pipe - Installed	32.0	$703.20	$28.32	$304.90	$0.00	$449.28	$1,485.70
DWP / Dewatered Pond	57.5	$1,388.19	$69.00	$104.81	$0.00	$847.35	$2,409.35
FLAPGATE / Flapgate - Installed	9.0	$215.85	$10.62	$178.65	$0.00	$136.05	$541.17
HAUL / Hauling	20.0	$445.40	$159.80	$1,018.87	$0.00	$288.40	$1,912.47
ONJV / Onsite Job Visit	29.5	$958.58	$97.35	$44.72	$0.00	$631.39	$1,732.03
PM / Ponds - Maintenance	41.0	$903.98	$77.88	$33.94	$0.00	$577.47	$1,593.27
PRRECON / Project Reconnaissance	3.0	$92.25	$10.62	$8.60	$0.00	$54.69	$166.16
SVCREQ / Service Request	1.0	$45.60	$3.62	$1.72	$0.00	$33.96	$84.90
UTLOC / Utility locates	0.5	$12.35	$0.00	$0.00	$0.00	$6.62	$18.97
2016-324 / Horse Island Pond Sub Total	**202.0**	**$4,952.94**	**$464.29**	**$1,703.09**	**$0.00**	**$3,144.13**	**$10,264.46**
Grand Total	**202.0**	**$4,952.94**	**$464.29**	**$1,703.09**	**$0.00**	**$3,144.13**	**$10,264.46**

Before

During

After



Project: Horse Island Pond Map 1

Activity: Drainage Improvement

Project #: 2016-324

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Horse Island Pond Map1_2016-324

Project: Horse Island Pond Map 2

Activity: Drainage Improvement

Project #: 2016-324

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Horse Island Pond Map2_2016-324

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Lady's Island Vacuum Truck - Friendship Lane, Honeysuckle Lane, Milton Way, Faculty Drive, Fairfield Road, Old Distant Island Road, Paul Heyward Drive, Ashley Drive, Woodbine Drive, Factory Creek Road, Rue Du Bois, Dog Creek Road and Marsh Drive.

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Nov-15

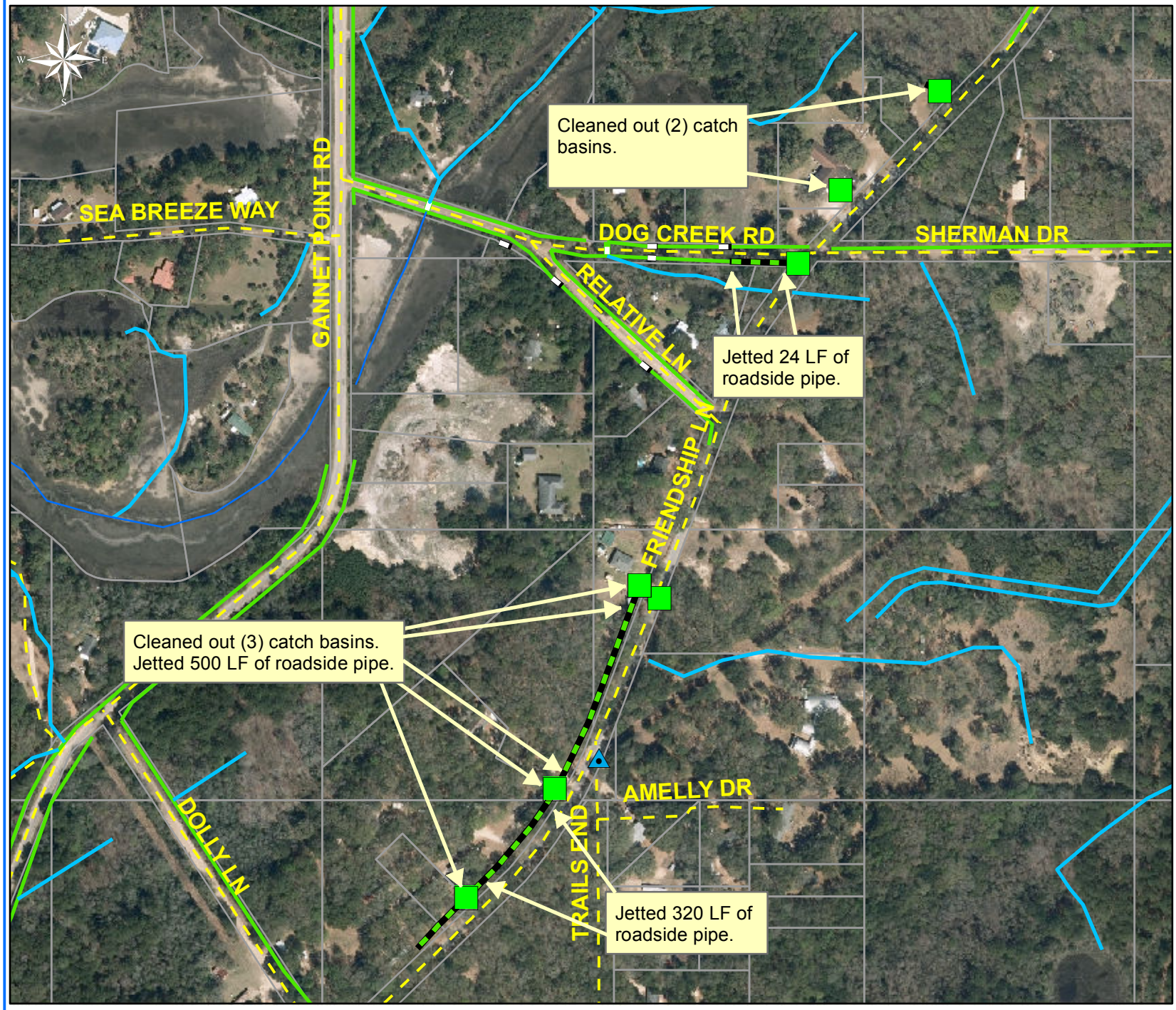
Project improved 896 L.F. of drainage system. Cleaned out (46) catch basins. Jetted (18) crossline pipes, 8 L.F. of channel pipe and 888 L.F. of roadside pipe.

2016-307 / Ladys Island Vacuum Truck	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
ASBUILT / Asbuilt - Project	4.0	$89.13	$17.36	$9.59	$0.00	$57.36	$173.45
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CBCO / Catch basin - clean out	158.0	$3,593.81	$685.72	$539.77	$0.00	$2,327.94	$7,147.23
CLPJT / Crossline Pipe - Jetted	24.0	$549.13	$104.16	$48.58	$0.00	$356.40	$1,058.27
2016-307 / Ladys Island Vacuum Truck Sub Total	**186.5**	**$4,243.81**	**$807.24**	**$597.94**	**$0.00**	**$2,748.31**	**$8,397.31**
Grand Total	**186.5**	**$4,243.81**	**$807.24**	**$597.94**	**$0.00**	**$2,748.31**	**$8,397.31**

Before

During

After



Project: Lady's Island Vacuum Truck- Friendship Lane and Dog Creek Road Map 1

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

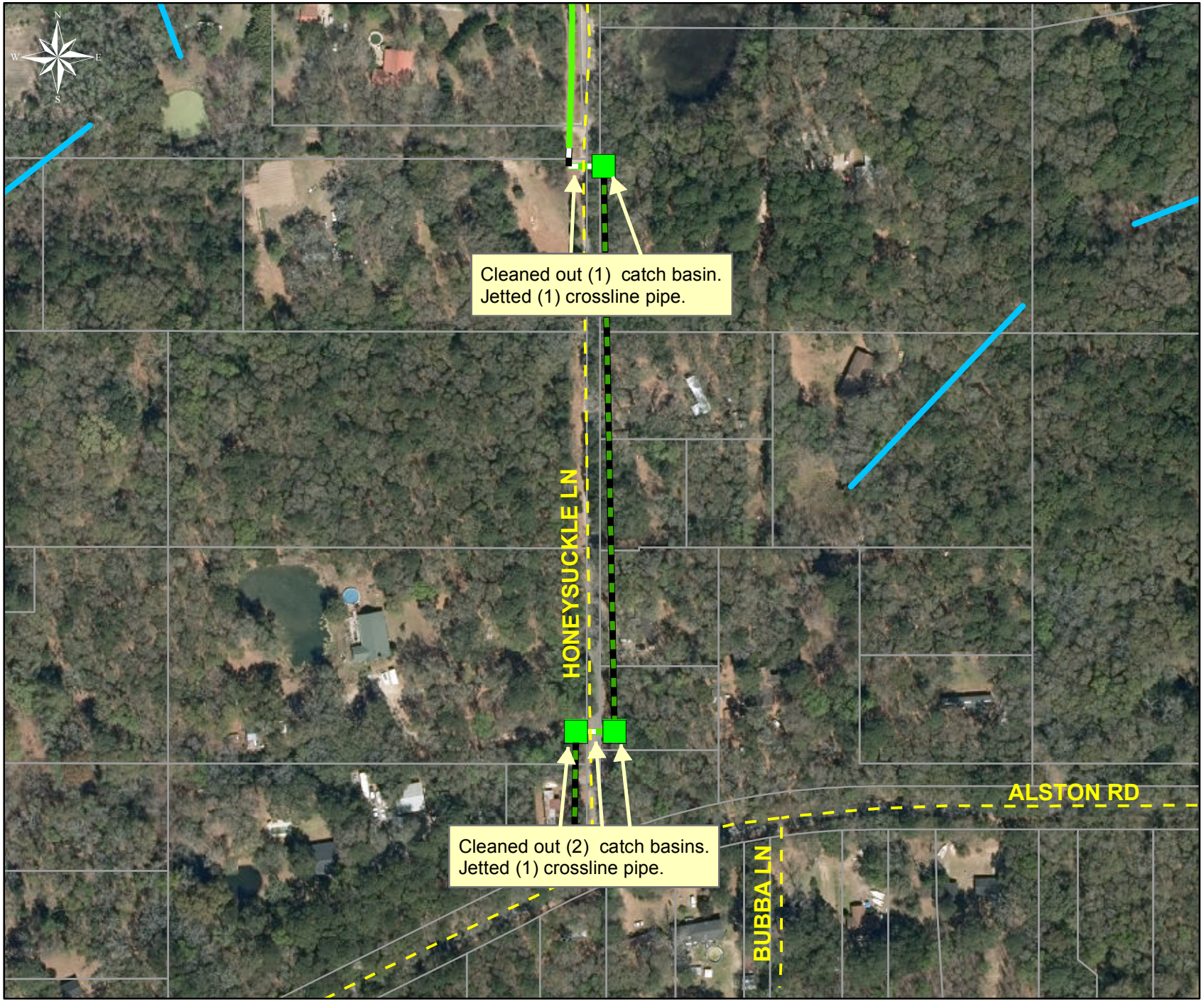
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 80 160 320 480 640 Feet

1 inch = 330 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck- Friendship Lane Map 1 2016-307



Project: Lady's Island Vacuum Truck-Honeysuckle Lane
Map 2

Activity: Vacuum Truck

Project #: 2016-307

Township: Ladys Island

Completed: November 2015

Legend

Drainage Type

- River
- Stream
- Channel
- Lateral
- Lateral Pipe
- Roadside
- Roadside Pipe
- Road Pipe
- Crossline
- D/W
- Access
- Piped
- Bleeder

0 50 100 200 300 400 Feet

1 inch = 210 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/2015
File:C:\project summaries map/Lady's Island Vacuum Truck- Honeysuckle Lane Map 2_2016-307

Project: Lady's Island Vacuum Truck- Milton Way Map 3

Activity: Vacuum Truck

Project #: 2016-307

Township: Ladys Island

Completed: November 2015

Legend

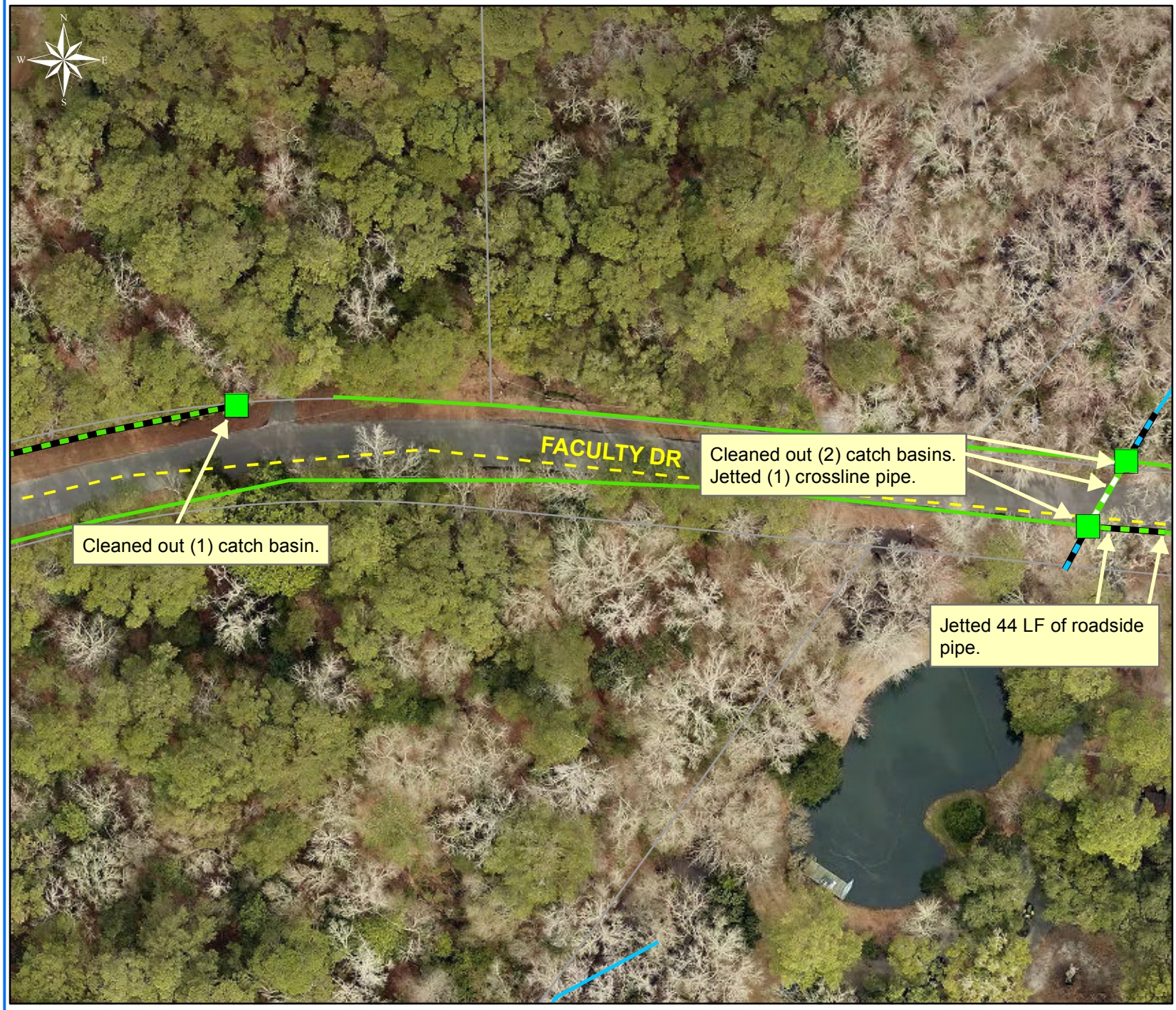
Drainage Type

- River
- Stream
- Channel
- Lateral
- Lateral Pipe
- Roadside
- Roadside Pipe
- Road Pipe
- Crossline
- D/W
- Access
- Piped
- Bleeder

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island VacuumTruck- Milton Way Map 3_2016-307



Project: Lady's Island Vacuum Truck- Faculty Drive Map 4

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

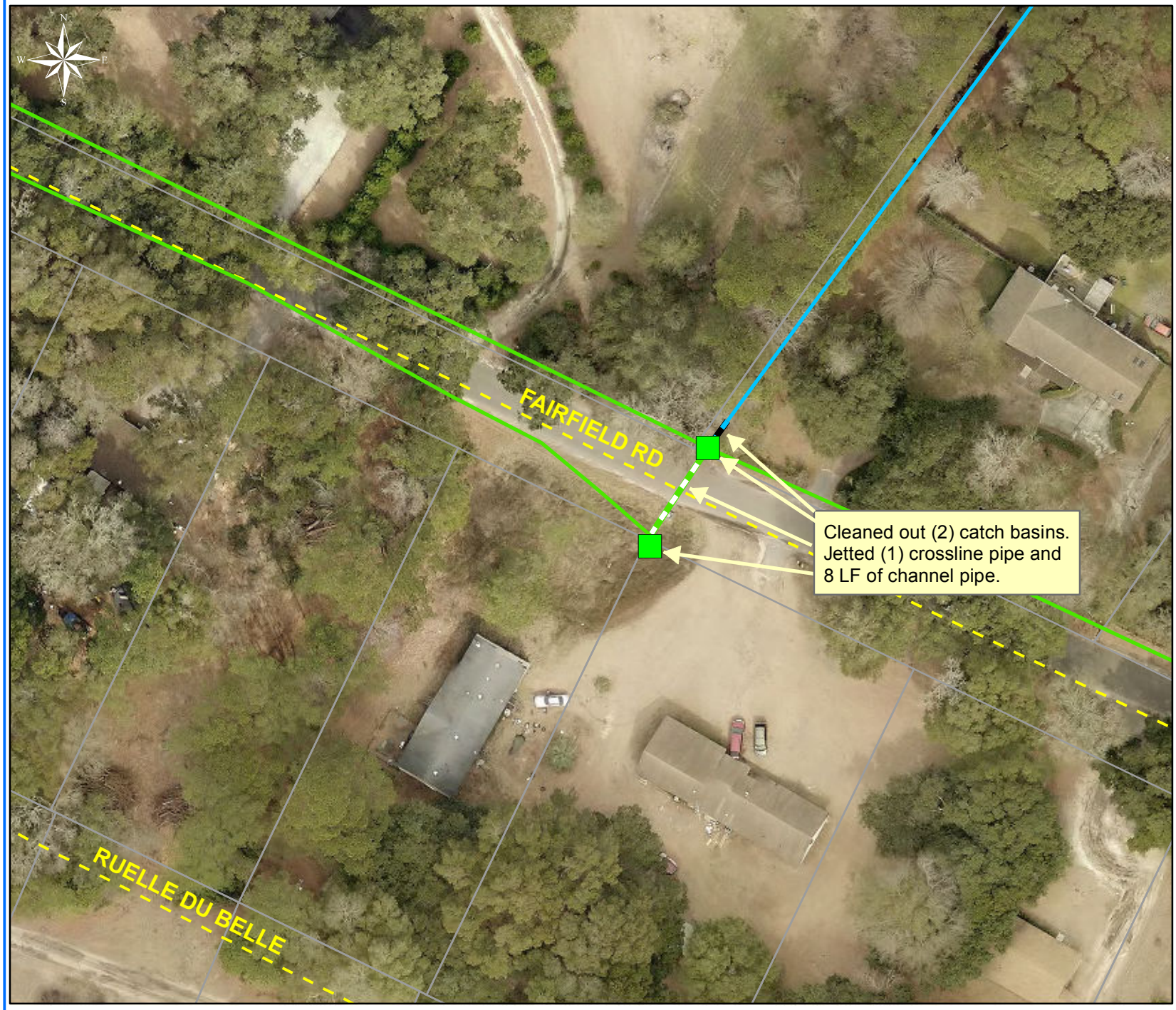
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 15 30 60 90 120 Feet

1 inch = 67 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck Faculty Drive Map 4_2016-307



Project: Lady's Island Vacuum Truck- Fairfield Road
Map 5

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

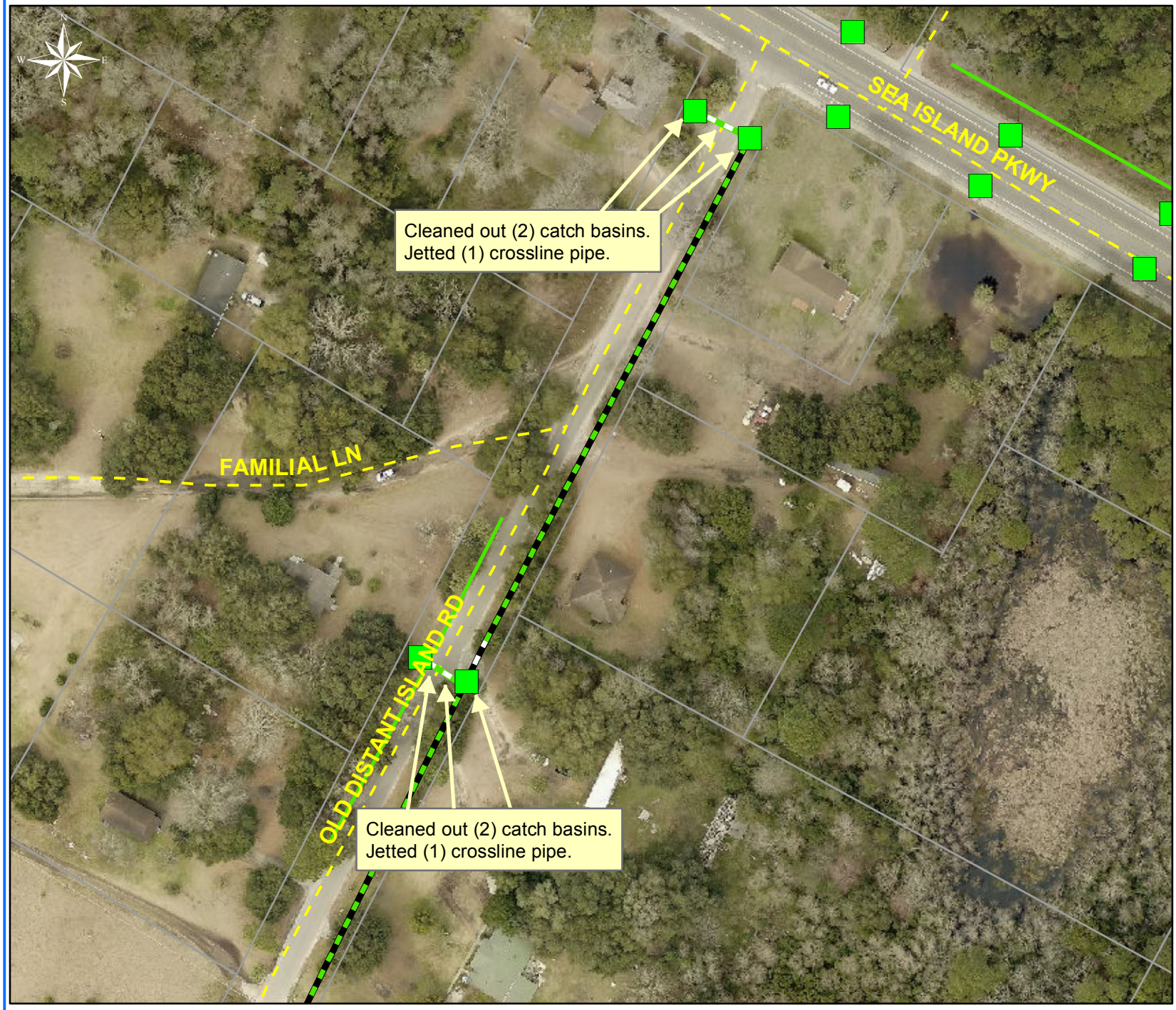
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 15 30 60 90 120 Feet

1 inch = 67 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck Fairfield Road Map 5_2016-307



Project: Lady's Island Vacuum Truck- Old Distant Island Road Map 6

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

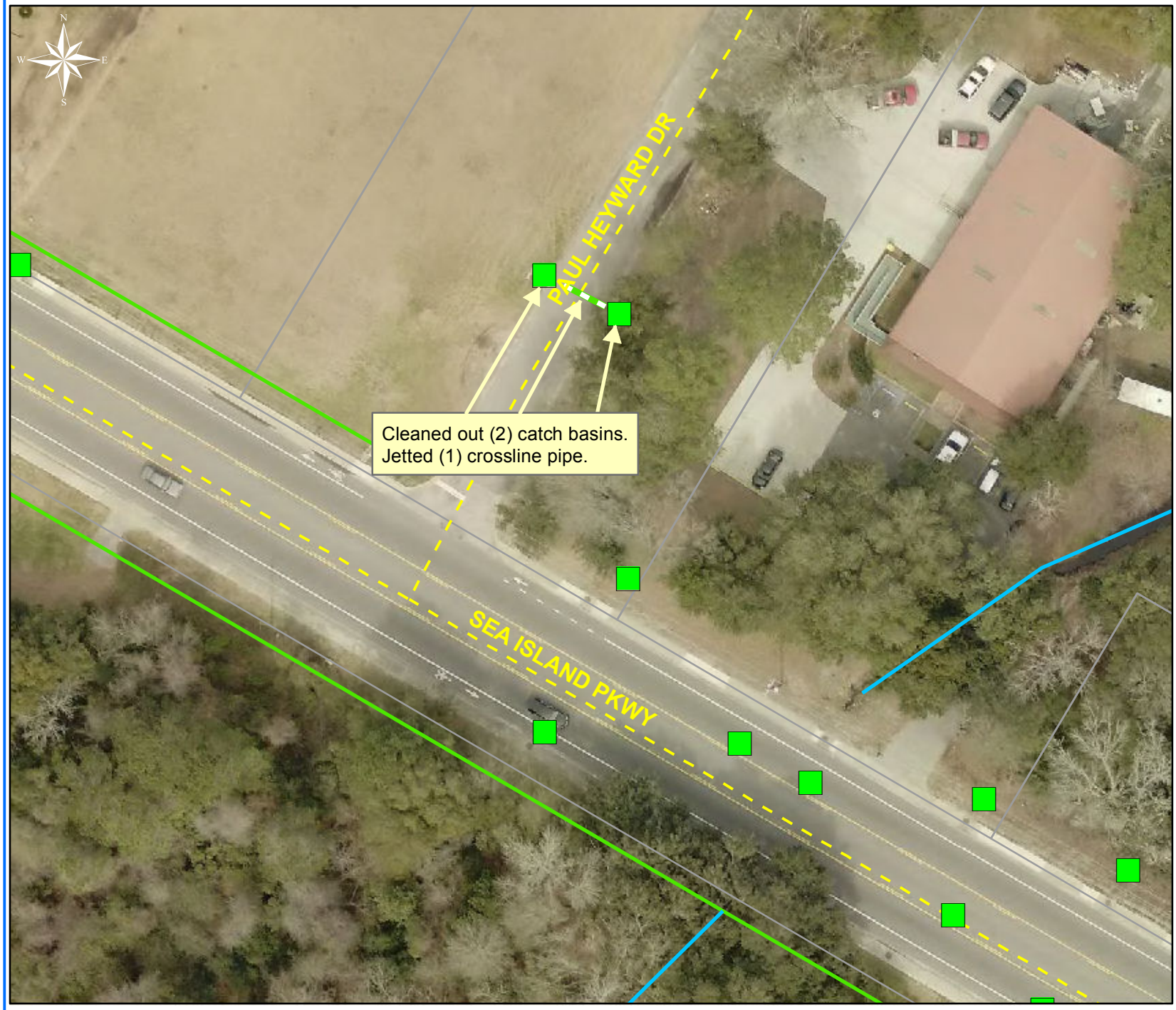
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck Old Distant Island Road Map 6_2016-307



Project: Lady's Island Vacuum Truck- Paul Heyward Drive Map 7

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

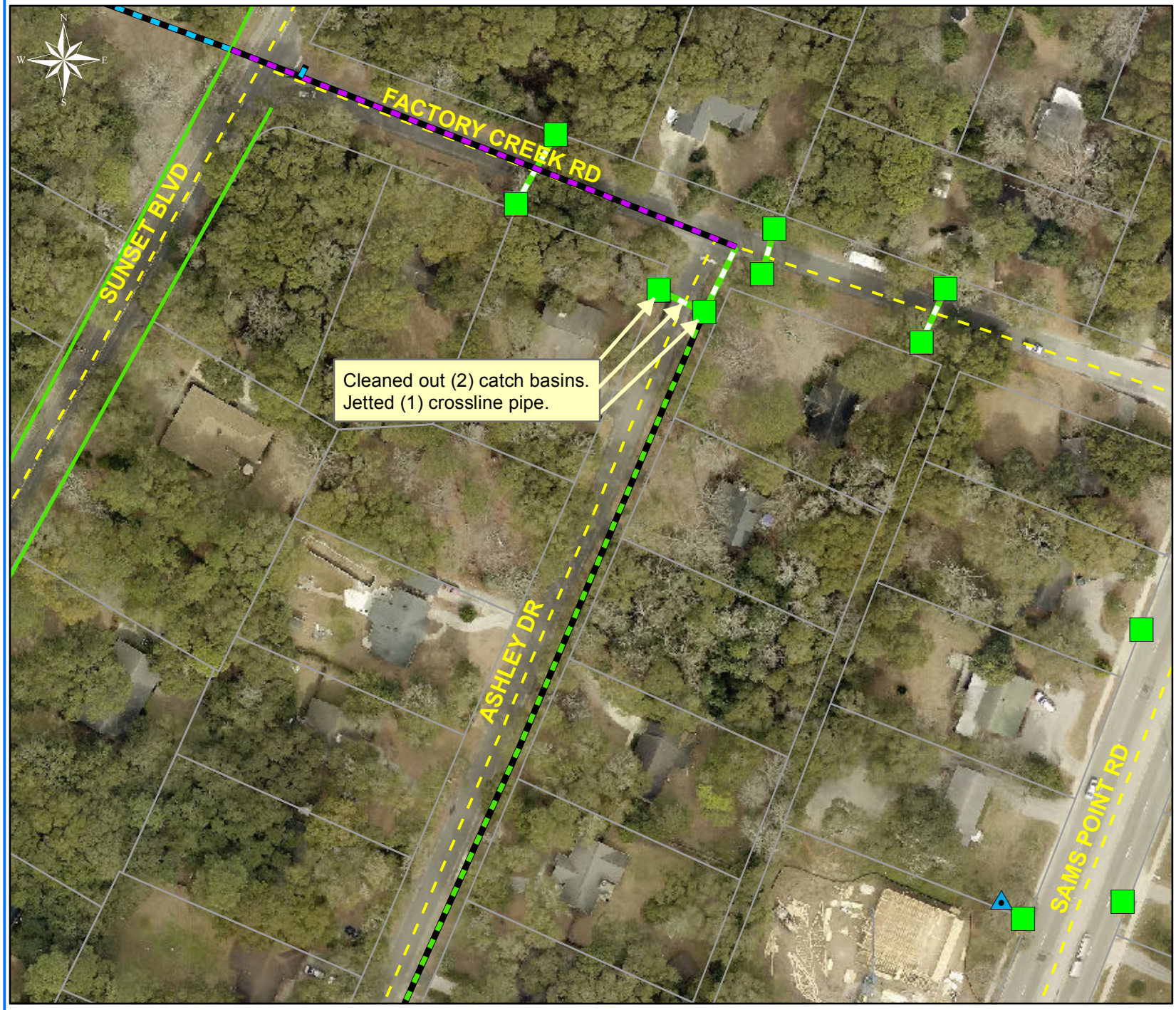
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck-Paul Heyward Drive Map 7_2016-307



Project: Lady's Island Vacuum Truck- Ashley Drive Map 8

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

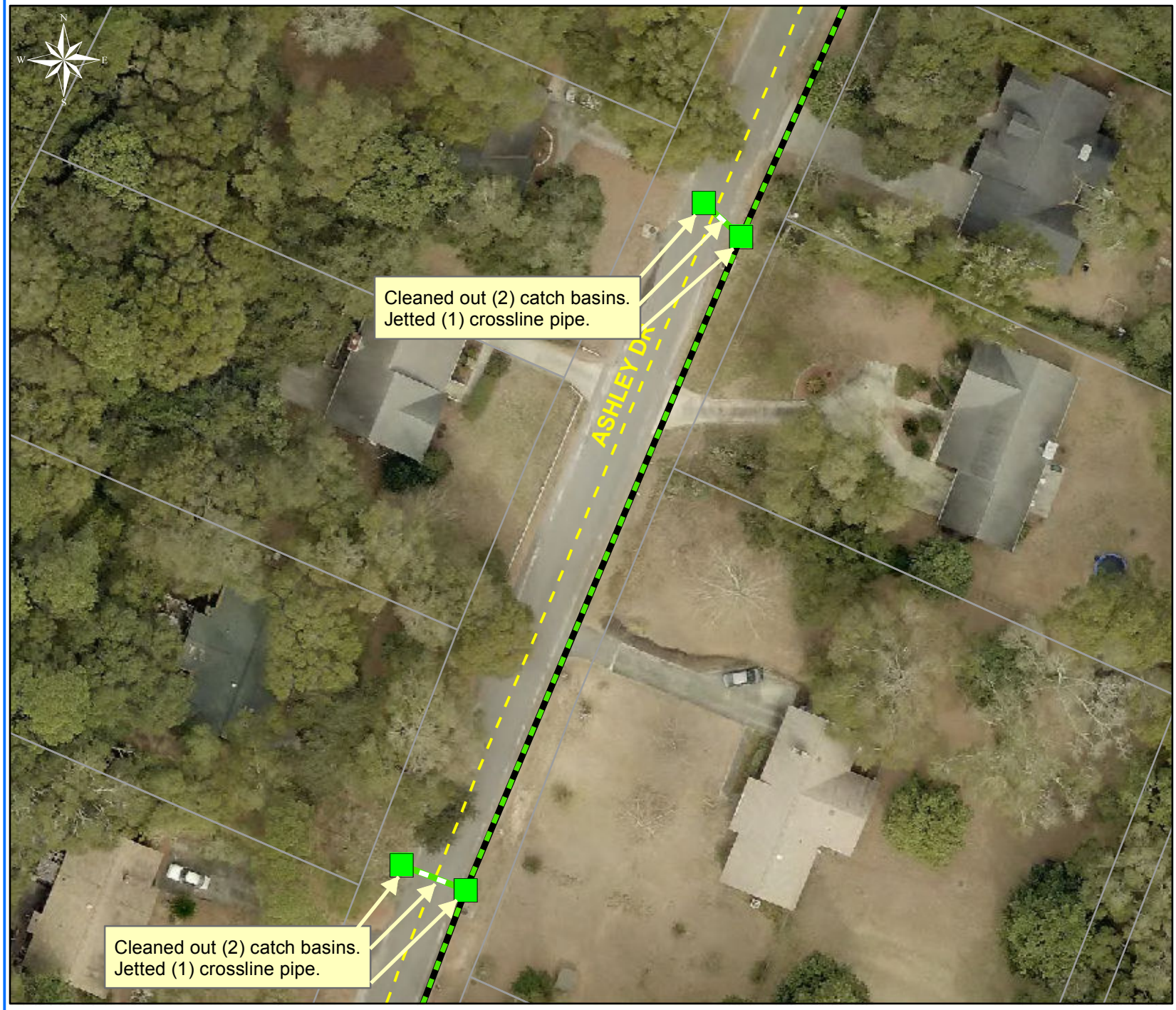
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/16
File:C:\project summaries map/Lady's Island vacuum Truck- Ashley Drive Map 8_2016-307



Project: Lady's Island Vacuum Truck- Ashley Drive Map 9

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

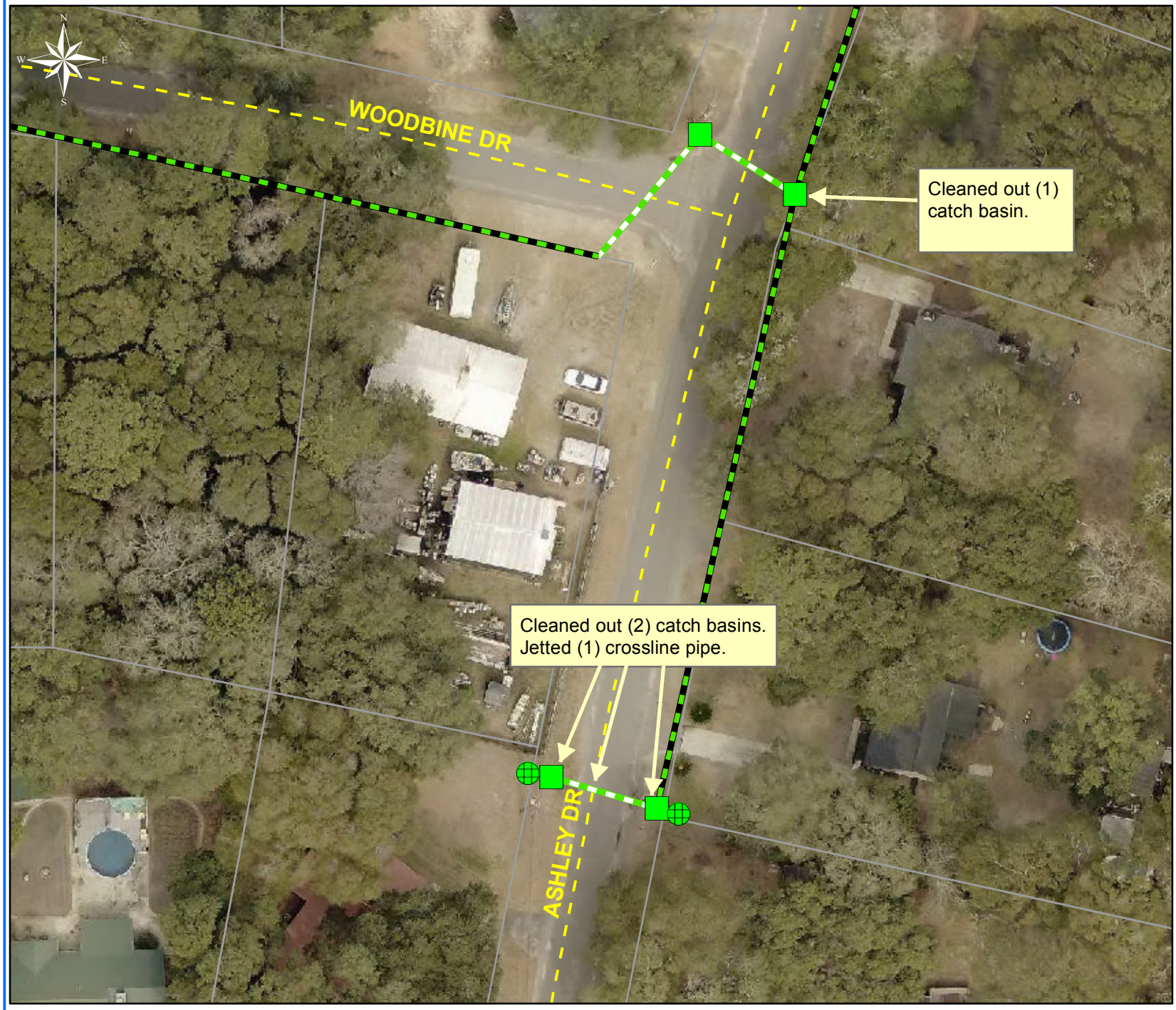
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck- Ashley Drive Map 9_2016-307



Project: Lady's Island Vacuum Truck- Ashley Drive Map 10

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

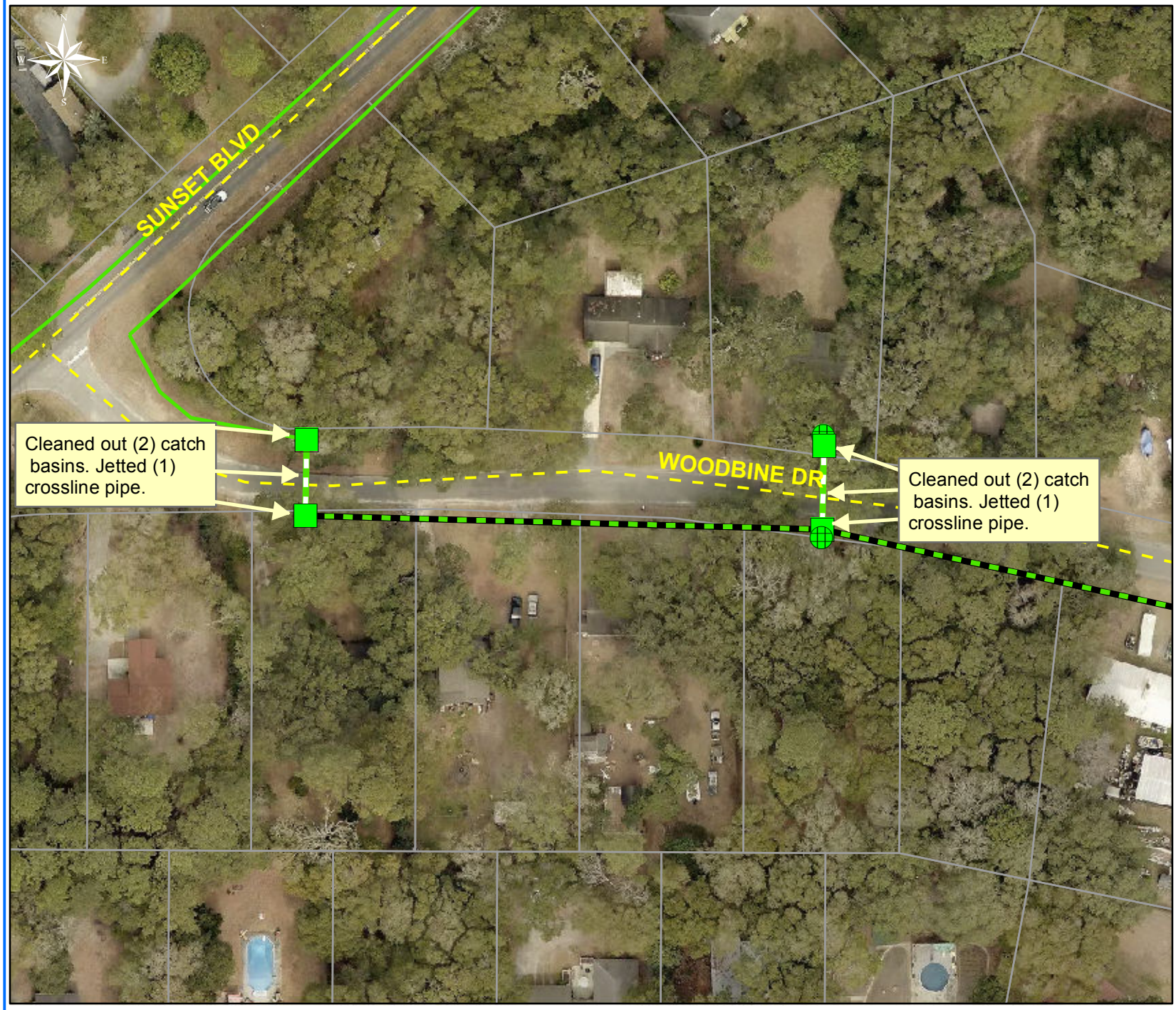
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck- Ashley Drive Map 10_2016-307



Project: Lady's Island Vacuum Truck- Woodbine Drive
Map 11

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

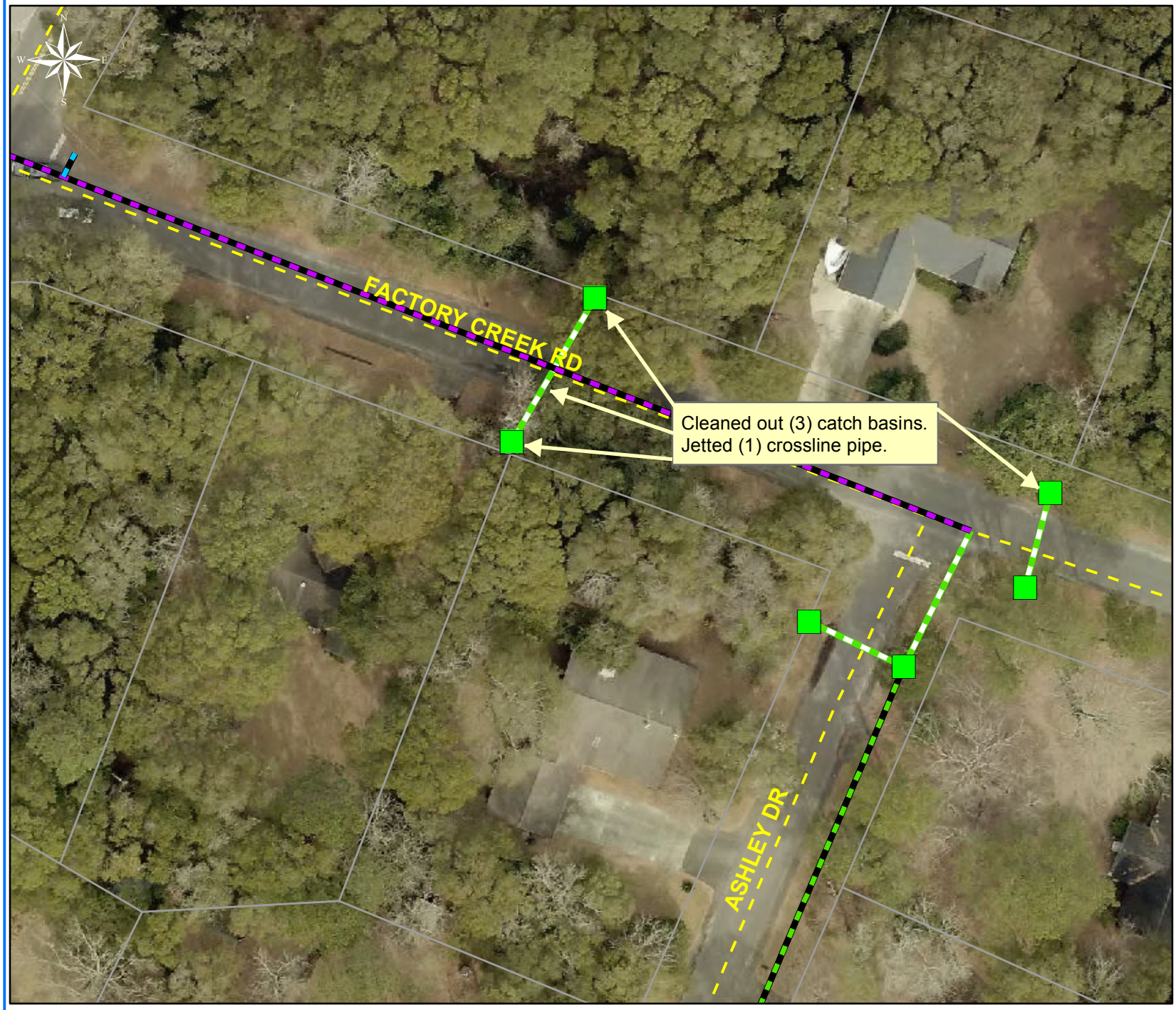
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 20 40 80 120 160 Feet

1 inch = 83 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck- Woodbine Drive Map 11_2016-307



Project: Lady's Island Vacuum Truck- Factory Creek Road Map 12

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

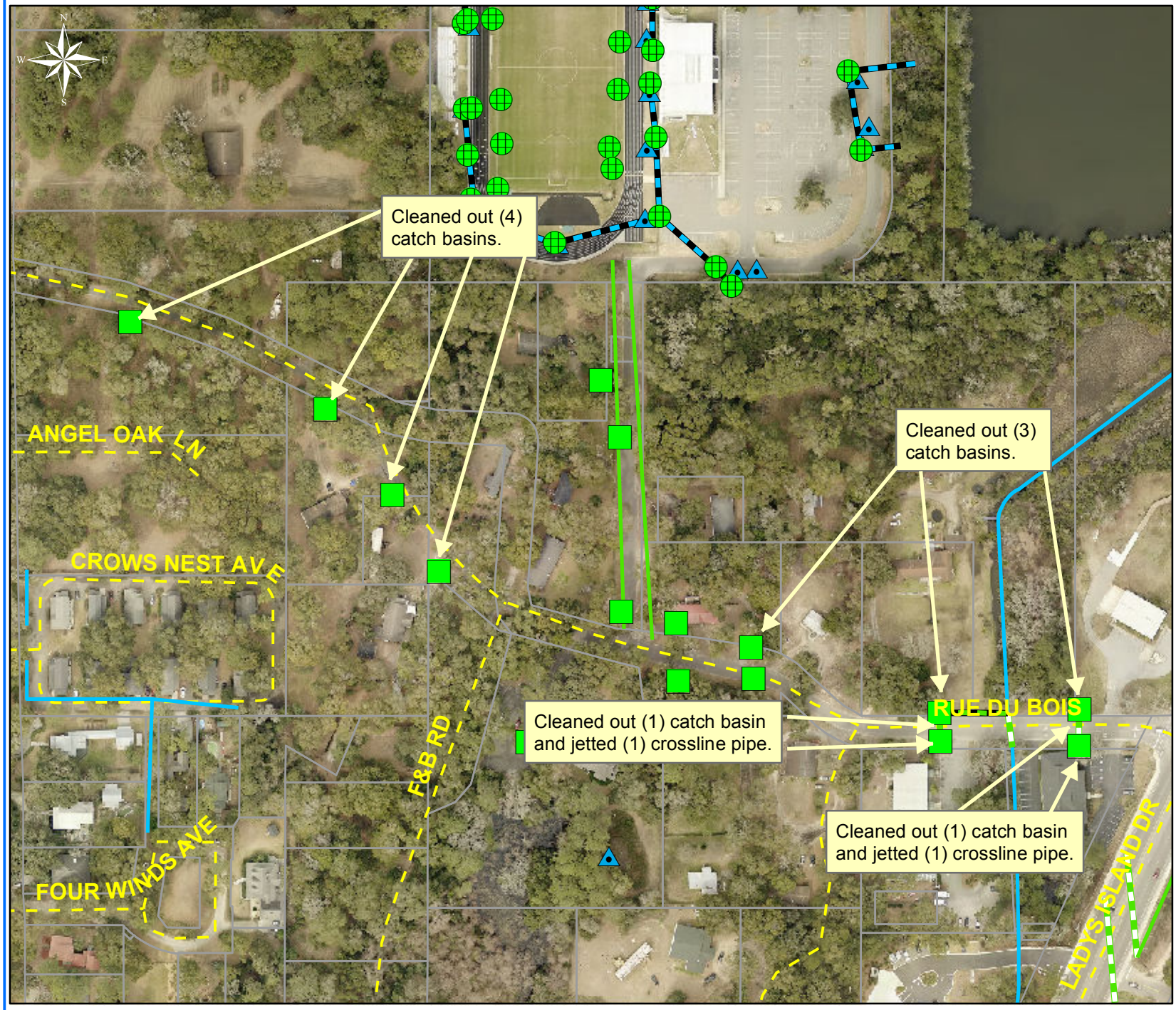
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck- Factory Creek Road Map12_2016-307



Project: Lady's Island Vacuum Truck- Rue Du Bois Map13

Activity: Vacuum Truck

Project #: 2016-307

Township: Lady's Island

Completed: November 2015

Legend

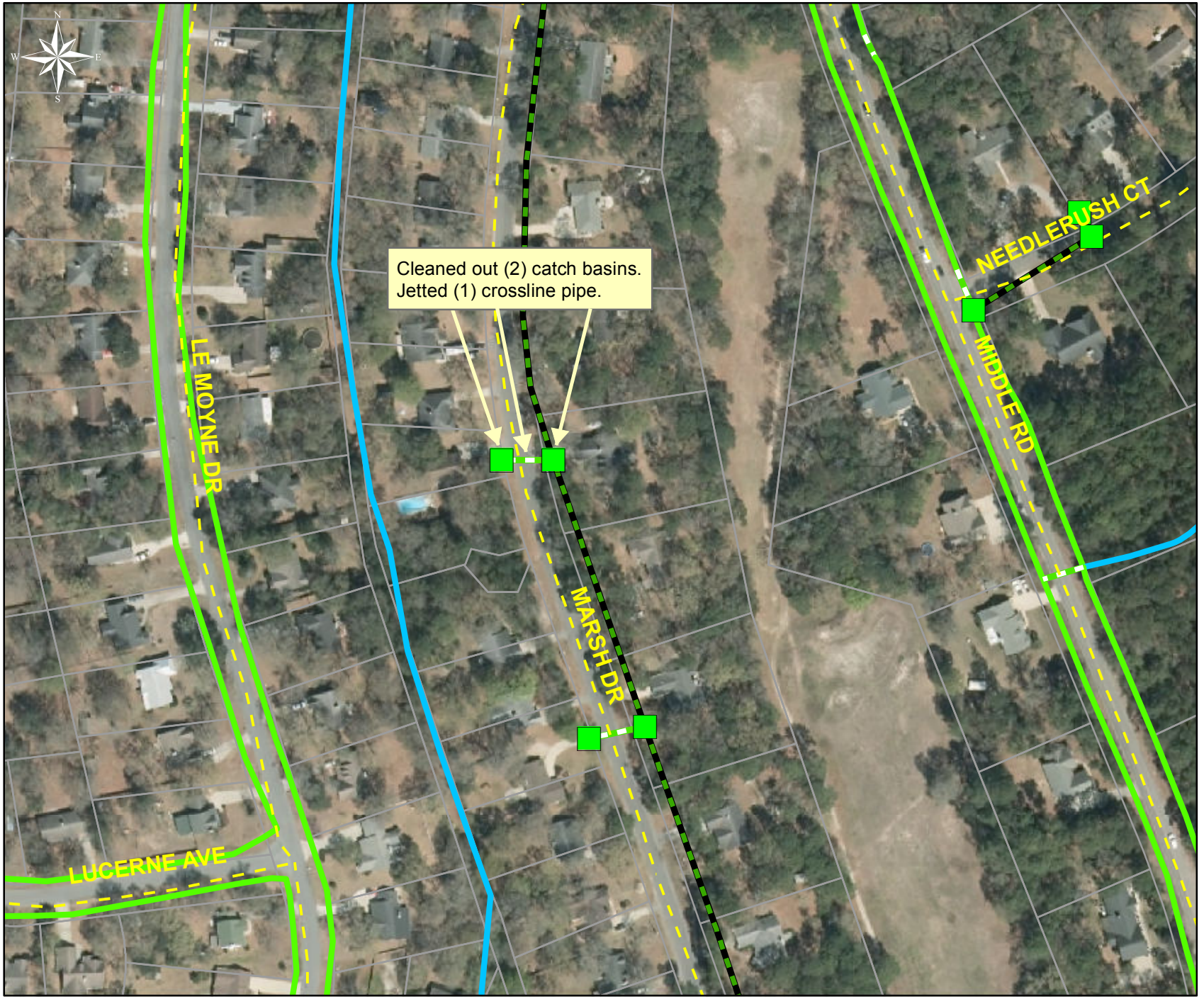
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 50 100 200 300 400 Feet

1 inch = 210 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/Lady's Island Vacuum Truck Rue Du Bois Map13_2016-307



Project: Lady's Island Vacuum Truck- Marsh Drive
Map 14

Activity: Vacuum Truck

Project #: 2016-307

Township: Ladys Island

Completed: November 2015

Legend

Drainage Type

- River
- Stream
- Channel
- Lateral
- Lateral Pipe
- Roadside
- Roadside Pipe
- Road Pipe
- Crossline
- D/W
- Access
- Piped
- Bleeder

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print: 11/16/2016
File:C:\project summaries map/Lady's Island Vacuum Truck- Marsh Drive Map 14_2016-307

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Mount Pisgah Church Road Channel #1

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Sep-15

Project improved 667 L.F.of drainage system. Cleaned out 60 L.F. of roadside ditch and 607 L.F. of channel.

2016-528 / Mt Pisgah Church Rd Ch #1	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CCO / Channel - cleaned out	43.0	$926.54	$224.94	$30.62	$0.00	$588.39	$1,770.49
HAUL / Hauling	43.5	$950.74	$227.72	$72.57	$0.00	$609.42	$1,860.44
ONJV / Onsite Job Visit	11.0	$362.26	$38.94	$18.70	$0.00	$244.21	$664.11
PP / Project Preparation	10.0	$222.83	$24.72	$10.62	$0.00	$143.40	$401.57
RSDCL / Roadside Ditch - Cleanout	29.0	$628.00	$200.97	$41.78	$0.00	$399.75	$1,270.50
2016-528 / Mt Pisgah Church Rd Ch #1 Sub Total	**137.0**	**$3,102.11**	**$717.29**	**$174.29**	**$0.00**	**$1,991.78**	**$5,985.47**
Grand Total	**137.0**	**$3,102.11**	**$717.29**	**$174.29**	**$0.00**	**$1,991.78**	**$5,985.47**

Before

During

Project:Mount Pisgah Church Road Channel #1

Activity: Routine/ Preventive Maintenance

Project #: 2016-528

Township: Sheldon

Completed: September 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:09/02/15
File:C:\project summaries map/Mt. Pisgah Church Road Channel #1_2016-528

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: St. Helena Island Vacuum Truck - Luther Warren Drive, Levant Byas Road, John Fripp Circle, David Green Road, Mattis Drive, and Tombee Road,

Activity: Routine/Preventive Maintenance

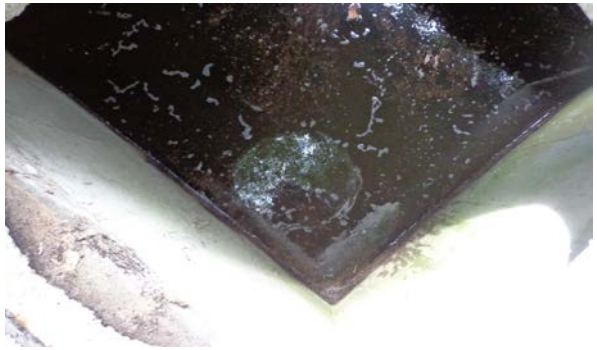
Narrative Description of Project:

Completion: Nov-15

Project improved 40 L.F. of drainage system. Cleaned out (21) catch basins. Jetted (10) crossline pipes, (8) driveway pipes, (1) access pipe and 40 L.F. of channel pipe.

2016-309 / St. Helena Island Vacuum Truck	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CBCO / Catch basin - clean out	58.0	$1,303.21	$251.72	$258.68	$0.00	$840.90	$2,654.51
CLPJT / Crossline Pipe - Jetted	33.0	$773.38	$186.62	$107.20	$0.00	$506.25	$1,573.45
DPJT / Driveway Pipe - Jetted	22.0	$503.42	$95.48	$58.94	$0.00	$326.70	$984.54
SD / Soft Digging	6.0	$137.28	$26.04	$20.10	$0.00	$89.10	$272.52
2016-309 / St. Helena Island Vacuum Truck Sub Total	**119.5**	**$2,729.02**	**$559.86**	**$444.92**	**$0.00**	**$1,769.57**	**$5,503.37**
Grand Total	**119.5**	**$2,729.02**	**$559.86**	**$444.92**	**$0.00**	**$1,769.57**	**$5,503.37**

Before



During

After

Project: St.Helena Island Vacuum Truck- David Green Road

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

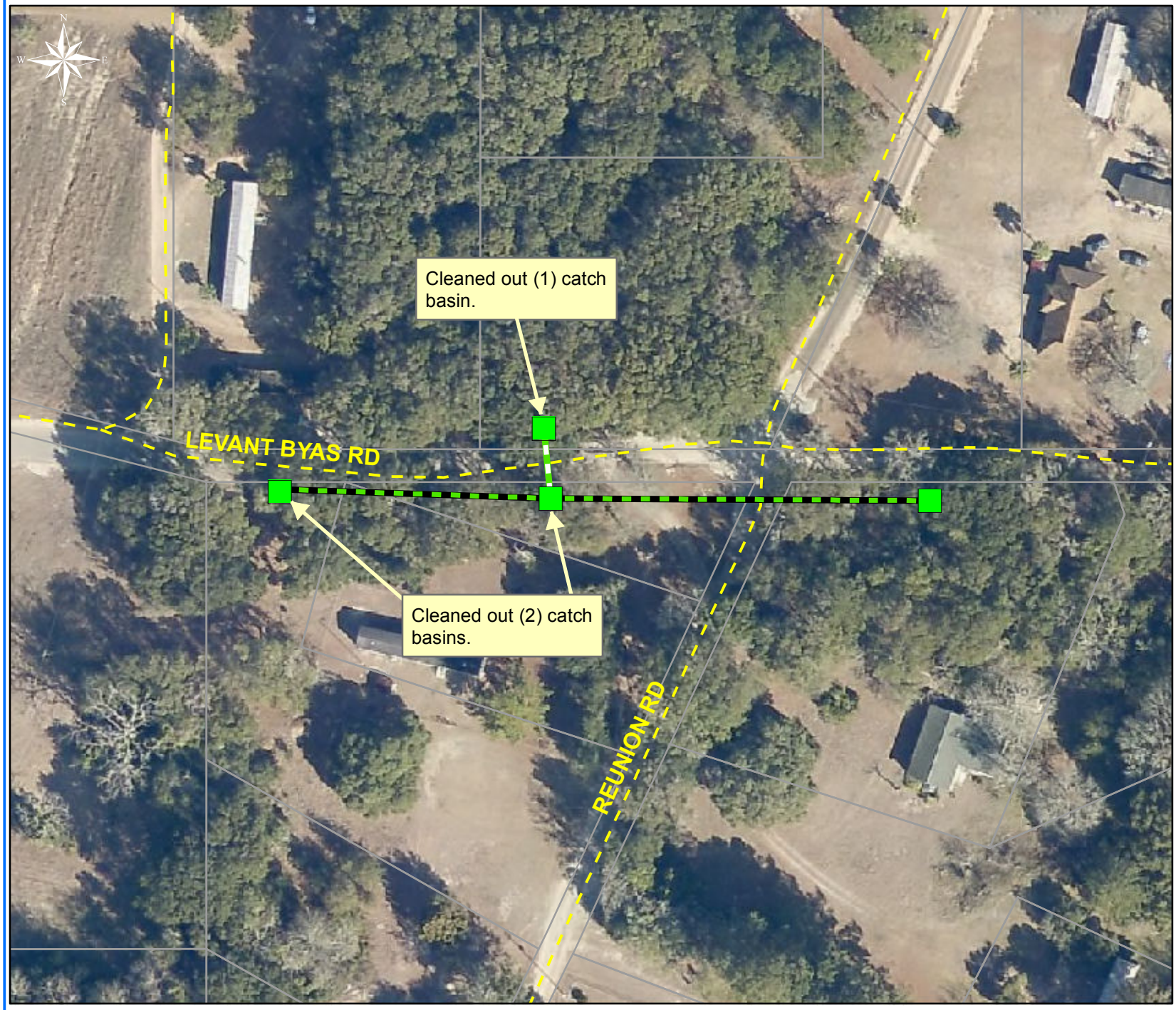
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck- David Green Road_2016-309



Project: St.Helena Island Vacuum Truck- Levant Byas Road

Activity: Vacuum Truck

Project #: 2015-309

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 20 40 80 120 160 Feet

1 inch = 83 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck- Levant Byas Road

Project: St.Helena Island Vacuum Truck- John Fripp Circle

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck- John Fripp Circle_2016-309

Project: St.Helena Island Vacuum Truck- Luther Warren Drive Map 1

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 5 10 20 30 40 Feet

1 inch = 34 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck-Luther Warren_2016-309

Project: St.Helena Island Vacuum Truck- Luther Warren Drive Map 2

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

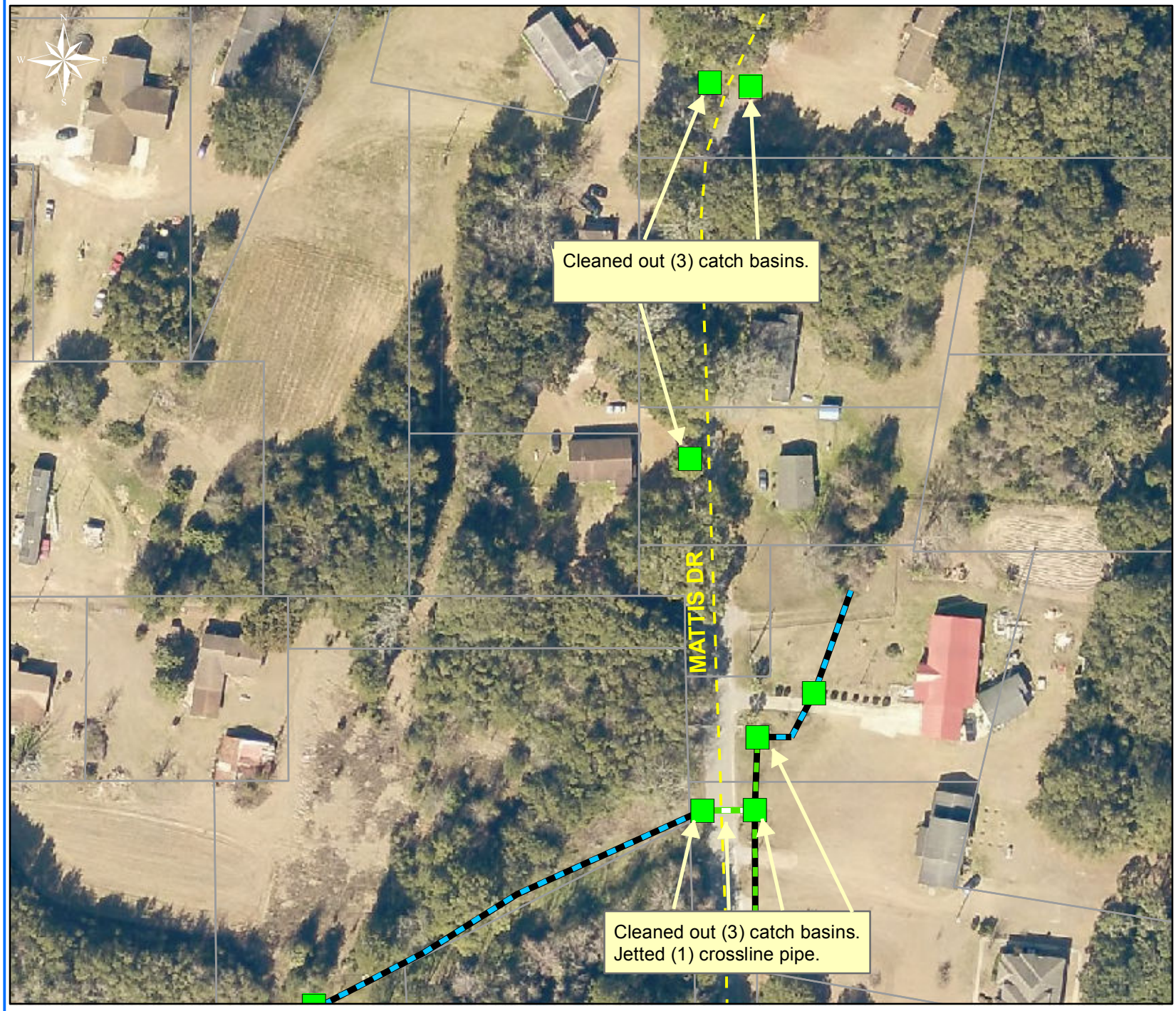
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 5 10 20 30 40 Feet

1 inch = 34 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck-Luther Warren Map2_2016-309



Project: St.Helena Island Vacuum Truck- Mattis Drive Map1

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

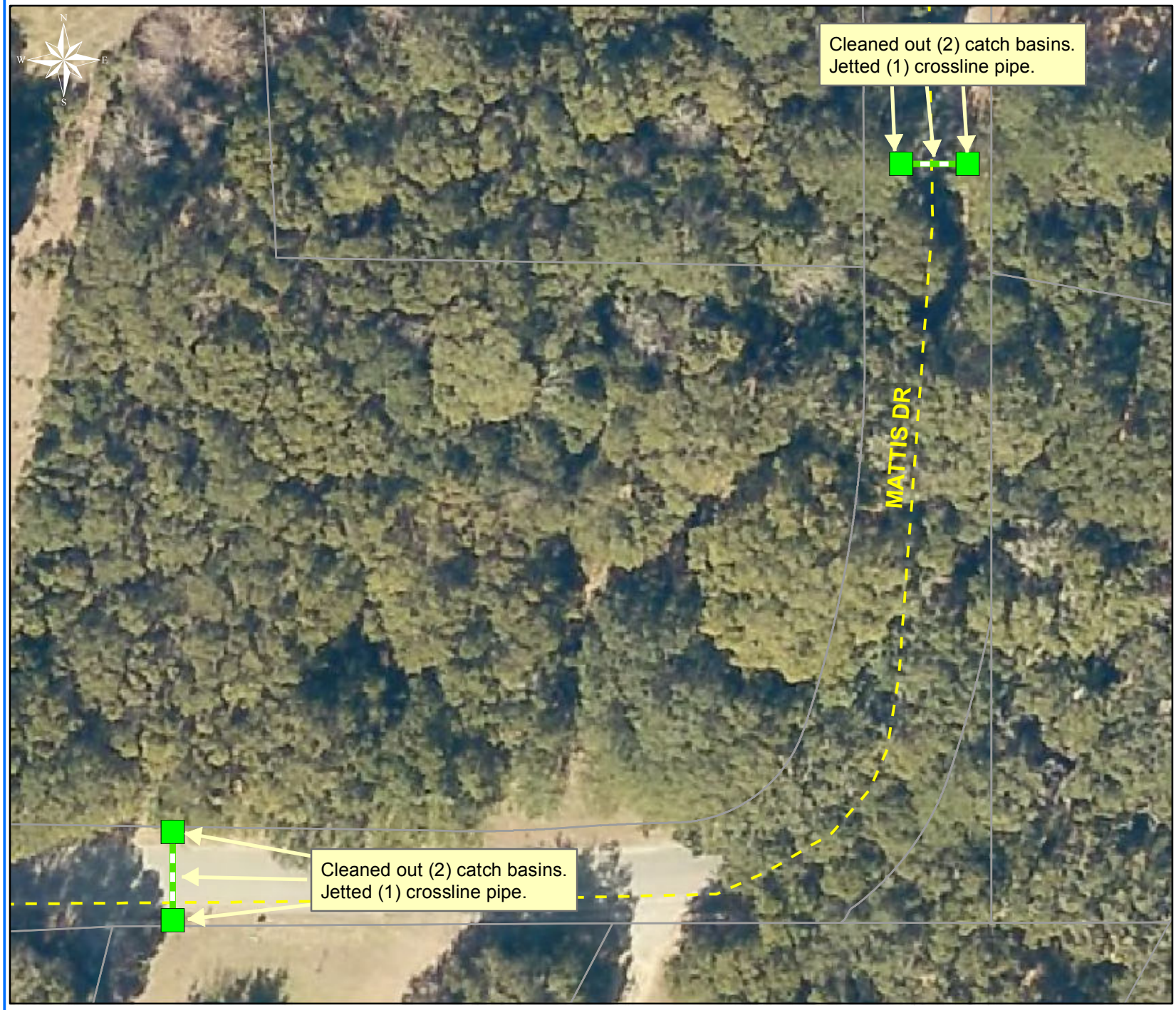
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck-Mattis Drive Map1_2016-309



Project: St.Helena Island Vacuum Truck- Mattis Drive Map 2

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck-Mattis Drive Map 2_2016-309

Project: St.Helena Island Vacuum Truck- Tombee Road

Activity: Vacuum Truck

Project #: 2016-309

Township: St. Helena Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/16/15
File:C:\project summaries map/St. Helena Island Vacuum Truck- Tombee Road_2016-309

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Sheldon Vacuum Truck - Coker Lane, Half Moon Island Road, Paige Point Bluff, Smalls Drive and Bailey Circle.

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Jetted (1) access pipe, (5) crossline pipes and (8) driveway pipes.

Completion: Nov-15

2016-308 / Sheldon Vacuum Truck	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
APJT / Access pipe - jetted	14.0	$322.17	$60.76	$47.15	$0.00	$209.37	$639.45
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CLPJT / Crossline Pipe - Jetted	44.0	$994.82	$121.52	$92.73	$0.00	$643.20	$1,852.27
DPJT / Driveway Pipe - Jetted	46.0	$1,040.57	$199.64	$119.28	$0.00	$672.90	$2,032.38
SD / Soft Digging	10.0	$230.12	$43.40	$28.32	$0.00	$149.55	$451.39
2016-308 / Sheldon Vacuum Truck Sub Total	**114.5**	**$2,599.42**	**$425.32**	**$287.47**	**$0.00**	**$1,681.63**	**$4,993.85**
Grand Total	**114.5**	**$2,599.42**	**$425.32**	**$287.47**	**$0.00**	**$1,681.63**	**$4,993.85**

Before

During

After

Project: Sheldon Vacuum Truck- Coker Lane

Activity: Vacuum Truck

Project #: 2016-308

Township: Sheldon

Completed: November 2015

Legend

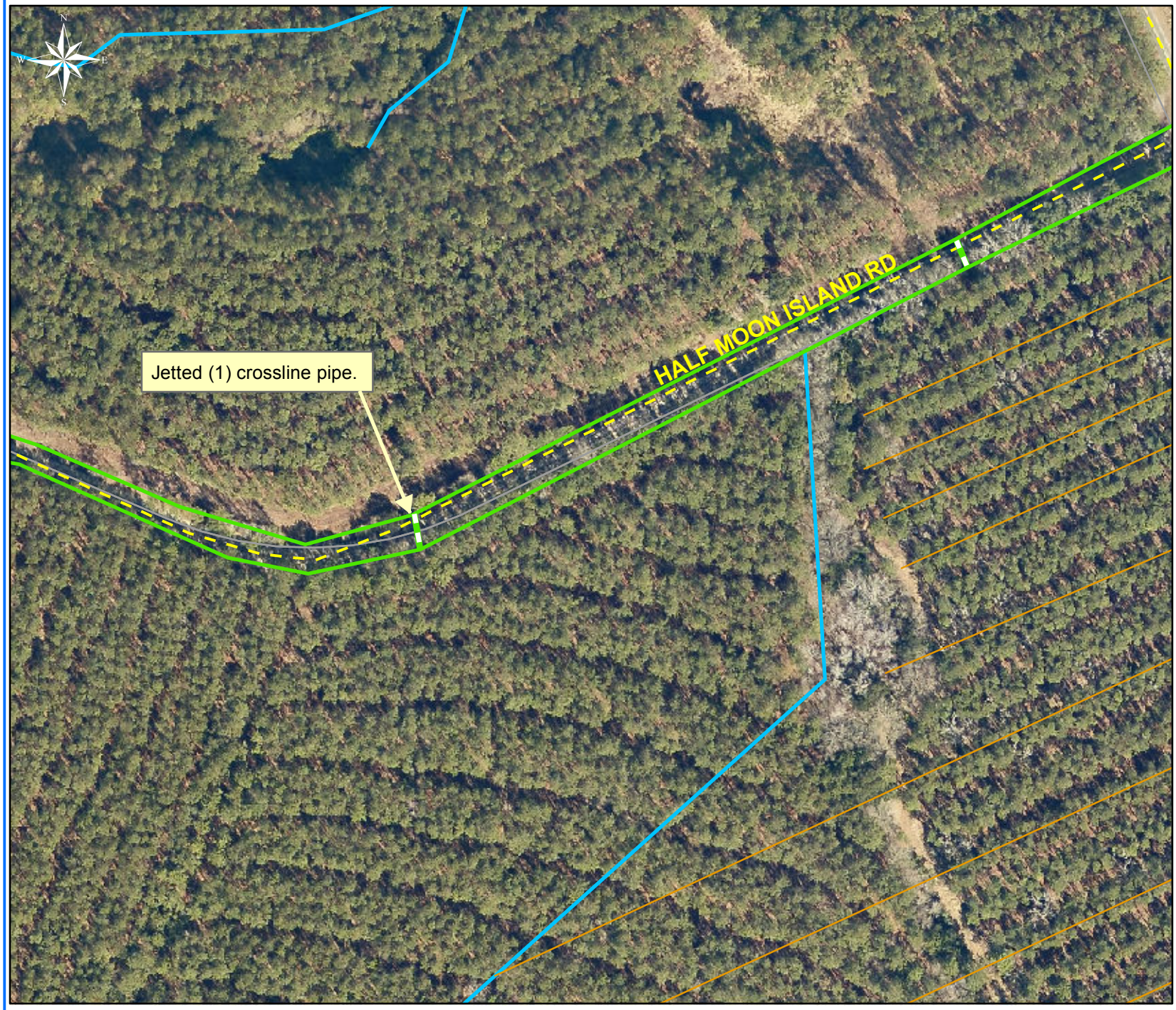
Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Sheldon Vacuum Truck- Coker Lane_2016-308



Project: Sheldon Vacuum Truck- Half Moon Island Road

Activity: Vacuum Truck

Project #: 2016-308

Township: Sheldon

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 40 80 160 240 320 Feet

1 inch = 170 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Sheldon Vacuum Truck- Half Moon Island Road_2016-308

Project: Sheldon Vacuum Truck-Bailey Circle

Activity: Vacuum Truck

Project #: 2016-308

Township: Sheldon

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 60 120 240 360 480 Feet

1 inch = 250 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Sheldon Vacuum Truck-Bailey Circle_2016-308

Project: Sheldon Vacuum Truck- Paige Point Bluff Map 1

Activity: Vacuum Truck

Project #: 2016-308

Township: Sheldon

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Sheldon Vacuum Truck- Paige Point Bluff Map 1_2016-308

Project: Sheldon Vacuum Truck- Paige Point Bluff Map 2

Activity: Vacuum Truck

Project #: 2016-308

Township: Sheldon

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 50 100 200 300 400 Feet

1 inch = 210 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Sheldon Vacuum Truck- Paige Point Bluff Map 2_2016-308

Project: Sheldon Vacuum Truck- Smalls Drive

Activity: Vacuum Truck

Project #: 2016-308

Township: Sheldon

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 25 50 100 150 200 Feet

1 inch = 100 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/18/15
File:C:\project summaries map/Sheldon Vacuum Truck- Smalls Drive_2016-308

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: McGarveys Corner Pond

Activity: Pond Maintenance

Narrative Description of Project:
Dewatered pond. Reconstructed existing weir.

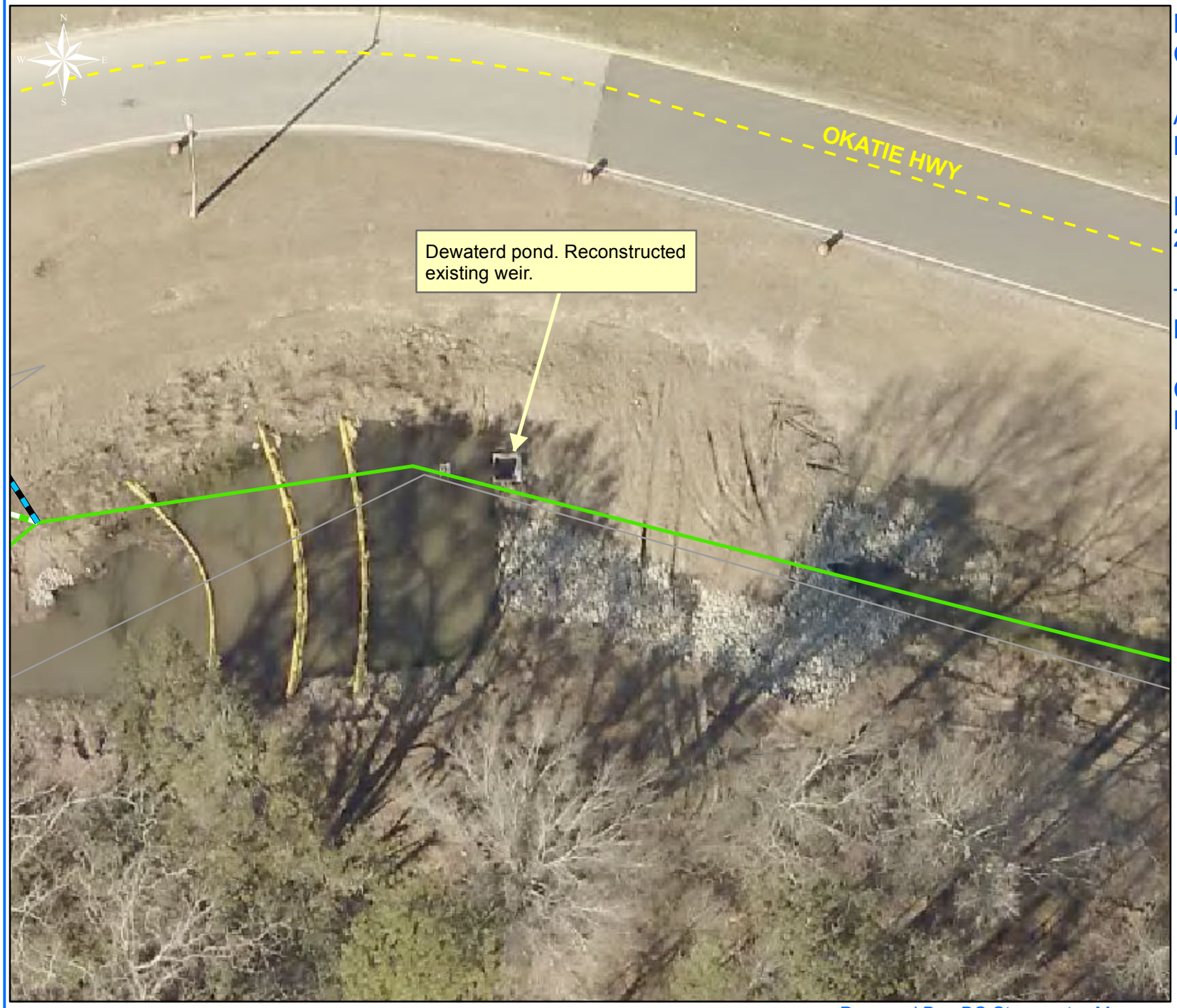
Completion: Nov-15

2016-323 / McGarveys Corner Pond	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
DWP / Dewatered Pond	12.0	$297.96	$21.24	$10.86	$0.00	$198.84	$528.90
HAUL / Hauling	3.0	$66.81	$23.97	$9.05	$0.00	$43.26	$143.09
ONJV / Onsite Job Visit	3.0	$125.38	$10.78	$8.50	$0.00	$92.39	$237.05
PM / Ponds - Maintenance	9.0	$204.12	$65.94	$8.72	$0.00	$131.85	$410.63
PRRECON / Project Reconnaissance	8.0	$175.80	$7.08	$6.80	$0.00	$112.32	$302.00
SC / Sediment Control	12.0	$263.70	$10.62	$8.50	$0.00	$168.48	$451.30
SG / Shoot Grade	17.0	$375.07	$22.15	$12.01	$0.00	$240.08	$649.31
SVCREQ / Service Request	6.0	$273.60	$21.72	$6.80	$0.00	$203.76	$505.88
2016-323 / McGarveys Corner Pond Sub Total	**70.5**	**$1,794.19**	**$183.50**	**$71.24**	**$0.00**	**$1,197.60**	**$3,246.52**
Grand Total	**70.5**	**$1,794.19**	**$183.50**	**$71.24**	**$0.00**	**$1,197.60**	**$3,246.52**

Before

During

After



Project: McGarveys Corner Pond

Activity: Pond Maintenance

Project #: 2016-323

Township: Buffton

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 5 10 20 30 40 Feet

1 inch = 25 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/24/15
File:C:\project summaries map/McGarveys Corner Pond_2016-323

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Rivers End Subdivision - Ashepoo Drive

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Nov-15

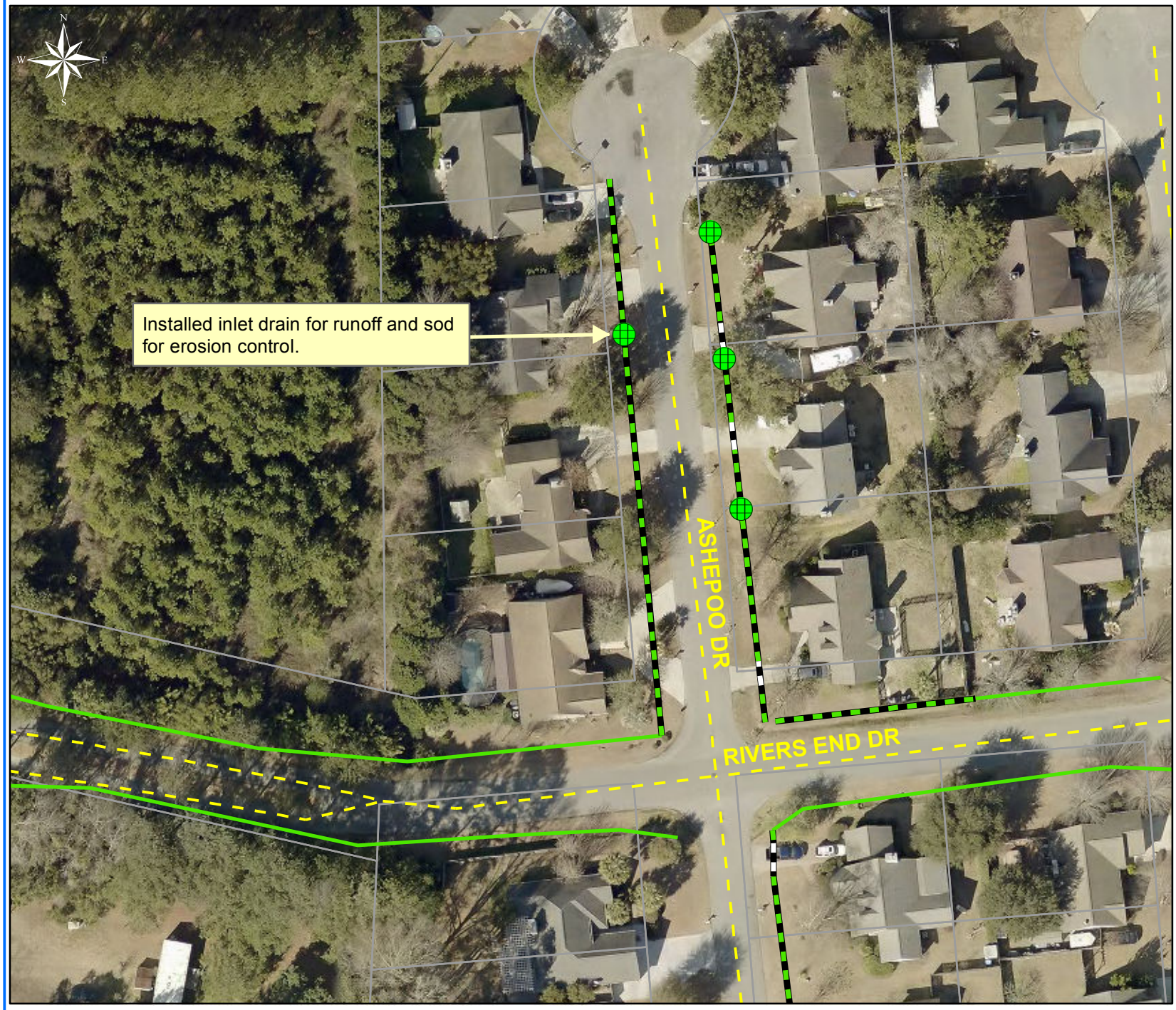
Installed inlet drain for runoff and sod for erosion control.

2016-538 / Rivers End Subdivision	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CBINS / Catch basin - installed	12.0	$263.70	$10.62	$283.11	$0.00	$168.48	$725.91
HAUL / Hauling	2.0	$44.54	$15.98	$21.47	$0.00	$28.84	$110.83
ONJV / Onsite Job Visit	8.0	$284.86	$28.40	$20.64	$0.00	$205.25	$539.15
PRRECON / Project Reconnaissance	33.0	$726.70	$24.78	$12.04	$0.00	$465.22	$1,228.74
SD / Soft Digging	4.0	$91.52	$17.36	$18.10	$0.00	$59.40	$186.38
SI / Sod - Installation	8.0	$178.20	$7.08	$3.44	$0.00	$114.36	$303.08
UTLOC / Utility locates	0.5	$12.35	$0.00	$0.00	$0.00	$6.62	$18.97
2016-538 / Rivers End Subdivision Sub Total	**68.0**	**$1,613.62**	**$104.22**	**$358.80**	**$0.00**	**$1,054.78**	**$3,131.41**
Grand Total	**68.0**	**$1,613.62**	**$104.22**	**$358.80**	**$0.00**	**$1,054.78**	**$3,131.41**

Before

During

After



Project: Rivers End Subdivision- Ashepoo Drive

Activity: Routine/ Preventive Maintenance

Project #: 2016-538

Township: Buffton

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 15 30 60 90 120 Feet

1 inch = 67 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/10/15
File:C:\project summaries map/Rivers End Subdivision-Ashepoo Drive_2016-323

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: St. Helena Island Washout/Sinkhole Repair - Mattis Drive

Activity: Routine/Preventive Maintenance

Narrative Description of Project:
Repaired catch basin and sinkhole.

Completion: Sep-15

2016-501 / St. Helena Island Washout/Sinkhole Repair	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Contractor Cost	Indirect Labor	Total Cost
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
HAUL / Hauling	2.5	$55.68	$19.98	$129.72	$0.00	$36.05	$241.42
ONJV / Onsite Job Visit	5.0	$170.90	$17.70	$11.90	$0.00	$122.35	$322.85
SD / Soft Digging	10.0	$228.83	$43.40	$32.28	$0.00	$148.50	$453.00
SR / Sinkhole repair	25.0	$564.35	$38.30	$36.35	$0.00	$353.95	$992.95
2016-501 / St. Helena Island Washout/Sinkhole Repair Sub Total	**43.0**	**$1,031.50**	**$119.38**	**$210.25**	**$0.00**	**$667.46**	**$2,028.59**
Grand Total	**43.0**	**$1,031.50**	**$119.38**	**$210.25**	**$0.00**	**$667.46**	**$2,028.59**

Before

During

After

Project: St.Helena Island Washout / SinkholeRepair-Mattis Drive

Activity: Routine/ Preventive Maintenance

Project #: 2016-501

Township: St. Helena Island

Completed: September 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 10 20 40 60 80 Feet

1 inch = 50 feet

Prepared By: BC Stormwater Management Utility
Date Print:9/3/15
File:C:\project summaries map/St. Helena Island Washout/Sinkhole Repair_2016-501

Beaufort County
Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Arnold Lane

Activity: Routine/Preventive Maintenance

Narrative Description of Project:

Completion: Nov-15

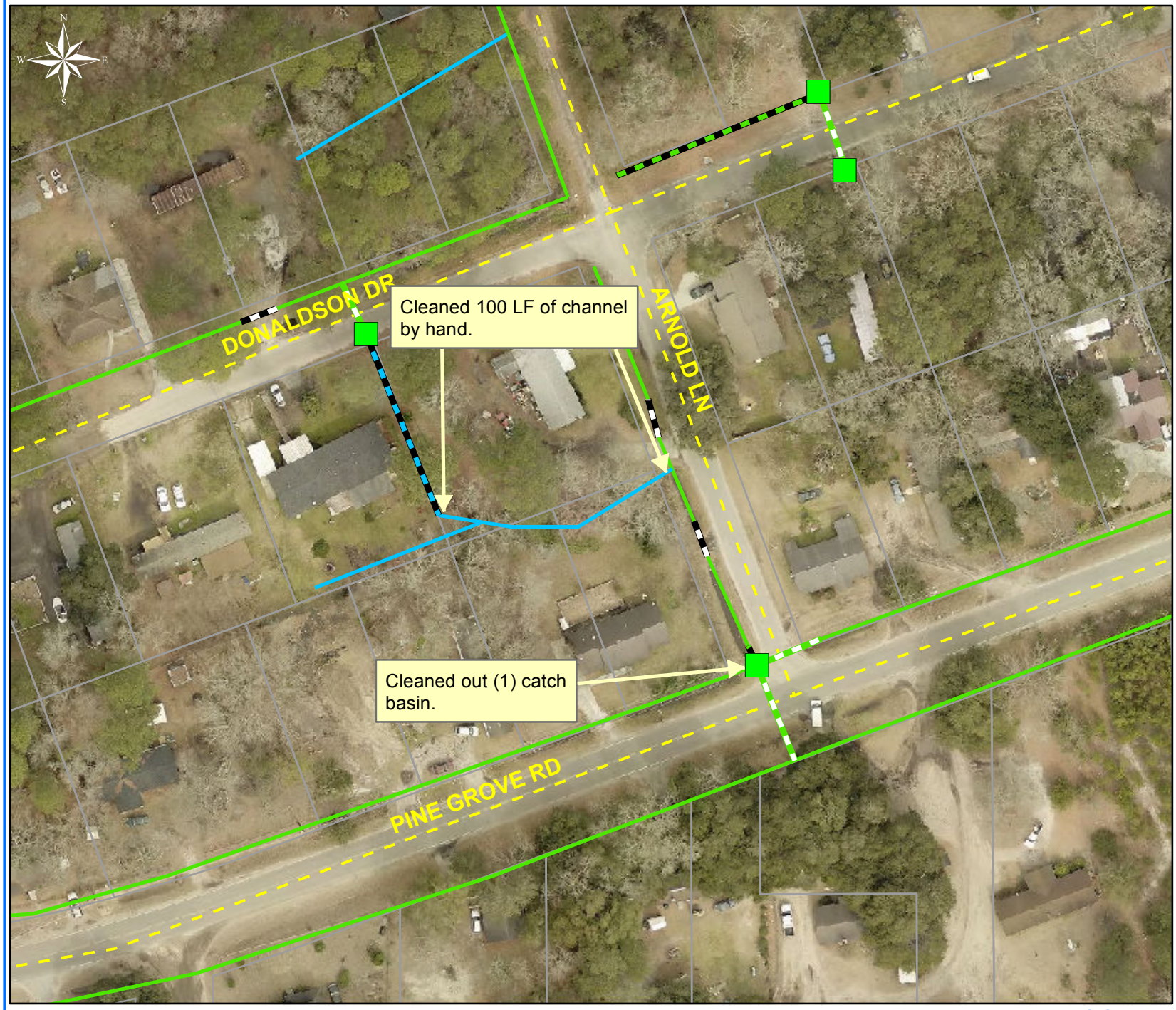
Project improved 100 L.F. of drainage system. Cleaned out 100 L.F. of channel by hand and (1) catch basin.

2016-571 / Arnold Lane	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$11.75	$0.00	$0.00	$0.00	$6.62	$18.36
CBCO / Catch basin - clean out	4.0	$91.52	$17.36	$9.38	$0.00	$59.40	$177.66
CCO / Channel - cleaned out	8.0	$175.80	$7.08	$3.44	$0.00	$112.32	$298.64
2016-571 / Arnold Lane Sub Total	**12.5**	**$279.07**	**$24.44**	**$12.82**	**$0.00**	**$178.34**	**$494.66**
Grand Total	**12.5**	**$279.07**	**$24.44**	**$12.82**	**$0.00**	**$178.34**	**$494.66**

Before

During

After



Project: Arnold Lane

Activity: Routine/ Preventive Maintenance

Project #: 2016-571

Township: Port Royal Island

Completed: November 2015

Legend

Drainage Type

- Access Pipe
- Bleeder Pipe
- Channel Pipe
- Channel
- Stream
- Crossline Pipe
- Driveway Pipe
- Lateral
- Lateral Pipe
- River
- Road Pipe
- Roadside
- Roadside Pipe

0 20 40 80 120 160 Feet

1 inch = 88 feet

Prepared By: BC Stormwater Management Utility
Date Print:11/10/2015
File:C:\project summaries map/Arnold Lane_2015-571

BEAUFORT COUNTY
STORMWATER MANAGEMENT UTILITY BOARD
Wednesday, January 27, 2016
2:00 p.m.
Executive Conference Room 170, 100 Ribaut Road, Beaufort, SC

Agenda Item 6. New Business

A. Special Report – Kevin Pitts, Bill Weiss, Al Stokes, and Stephen Borgianini – Discussion of monitoring needs to measure impacts to local marine organisms.
B. Video Links
    1. http://www.planktonchronicles.org/en/episode/plankton
    2. http://www.planktonchronicles.org/en/episode/embryos-and-larvae

Marine and Estuarine Plankton

Importance, Identification, and Ecology

Beaufort County Stormwater Board

Bill Weiss

January 27, 2016

Plankton Categories

By Type

Plankton:
- Greek “wanderer,” “drifter”
- Small organisms suspended in the water
- Neither attached to the bottom (benthic) nor able to swim effectively against most currents (nektonic).

Phytoplankton: Photosynthetic unicellular protozoans and bacteria.

Zooplankton: Unicellular and multicellular animals.

Holoplankton: Organisms that spend entire lives in the plankton.

Meroplankton: Zooplankton that spend only a part of their life cycle in the water column, usually as larval stages (include ichthyoplankton, i.e., fish eggs and larvae).

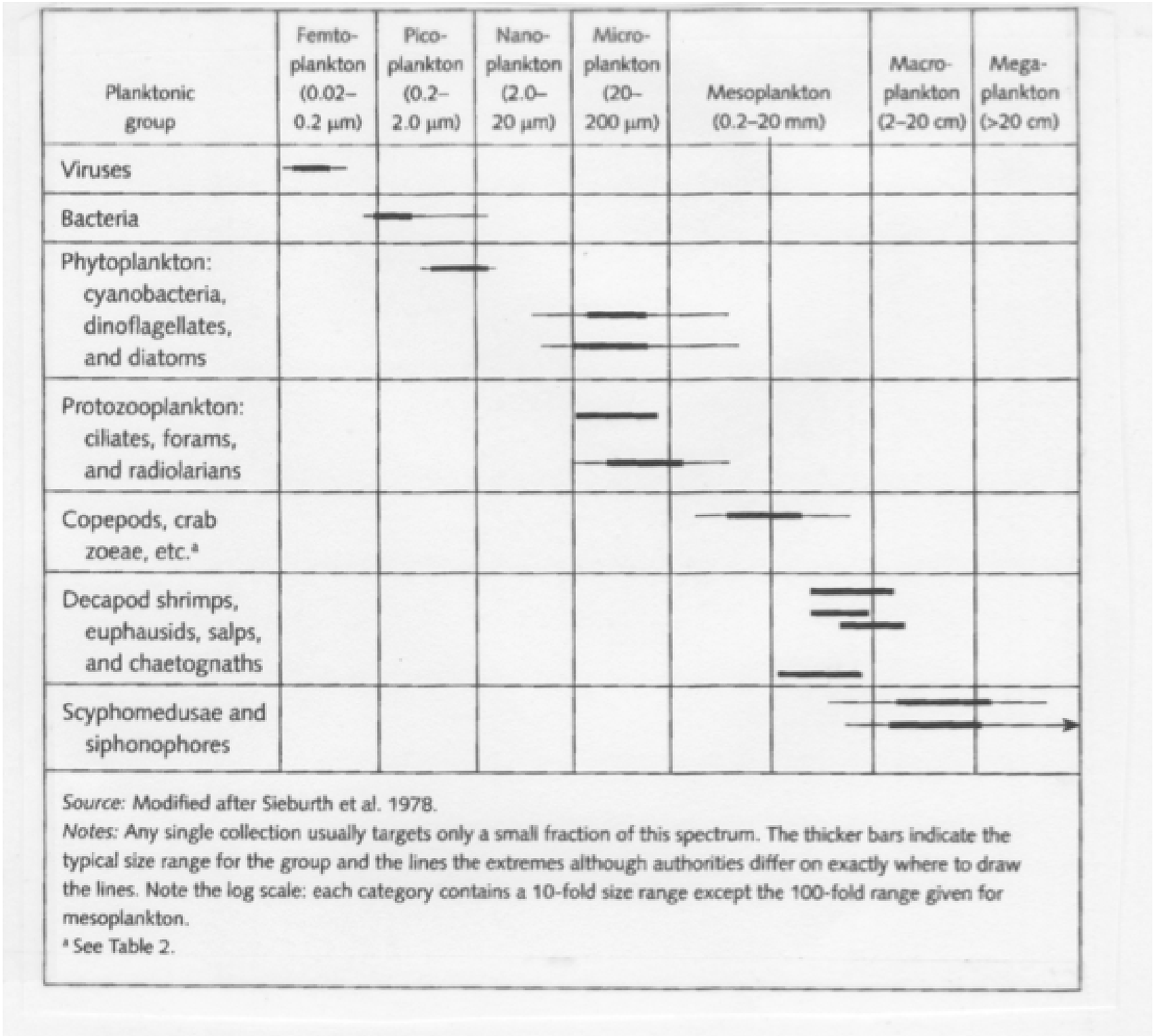
Demersal zooplankton: Spend much of their time on or near the bottom but periodically swim upward into the water column, especially at night.

Neuston: Planktonic organisms associated with uppermost layer of water column, either at or just below the surface.

Plankton Size Classes

(Johnson and Allen 2012)

1 mm = 1000 um	**1 cm = 10 mm**
1 um = 0.001 mm	**1 mm = 0.1 cm**



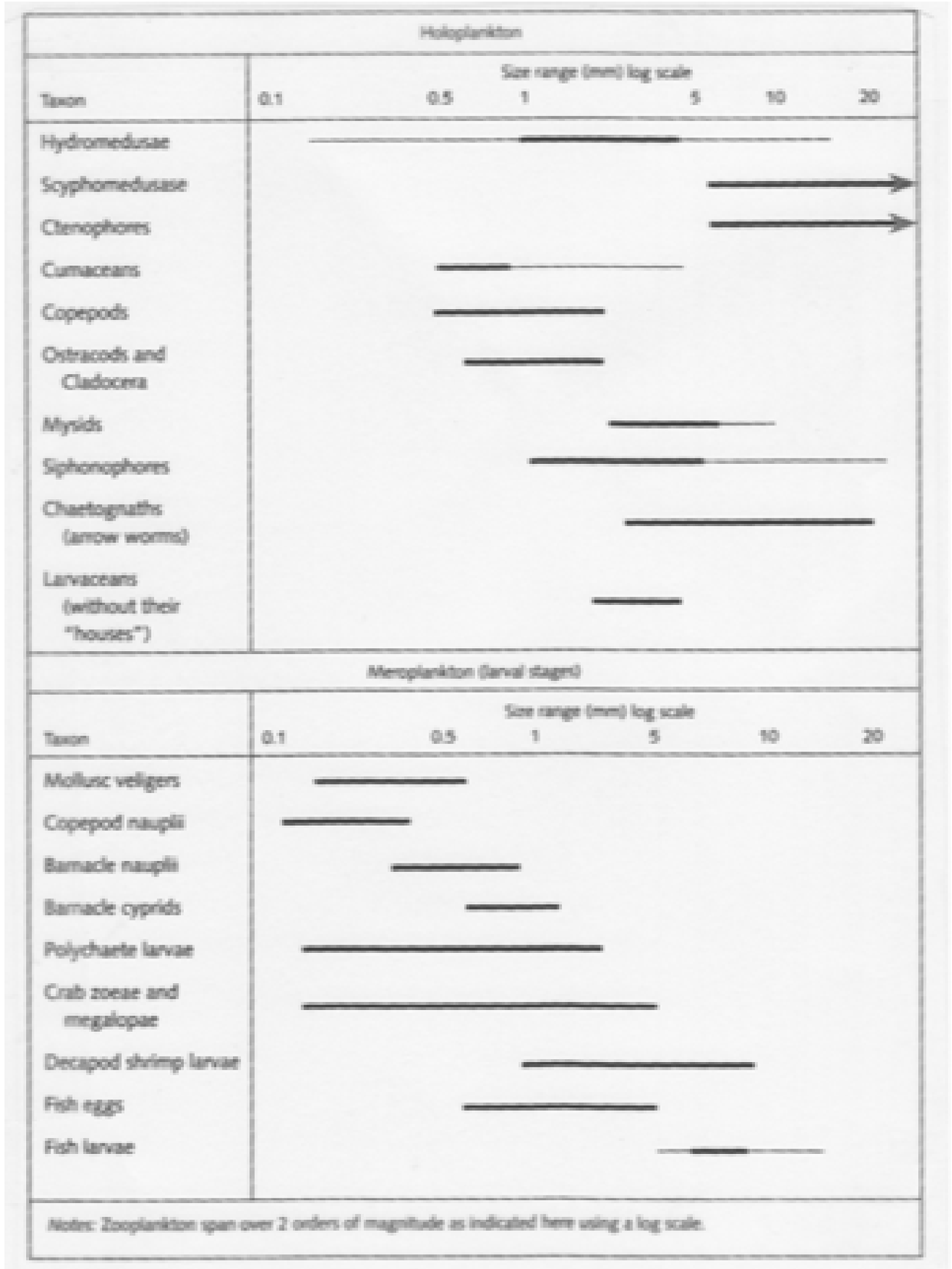
Source: Modified after Sieburth et al. 1978.

Notes: Any single collection usually targets only a small fraction of this spectrum. The thicker bars indicate the typical size range for the group and the lines the extremes although authorities differ on exactly where to draw the lines. Note the log scale: each category contains a 10-fold size range except the 100-fold range given for mesoplankton.

[a] See Table 2.

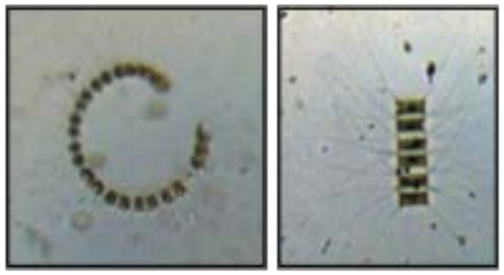
Mesozooplankton Size Ranges

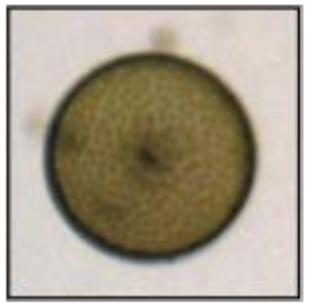
(Johnson and Allen 2012)



Phytoplankton Types

Diatoms





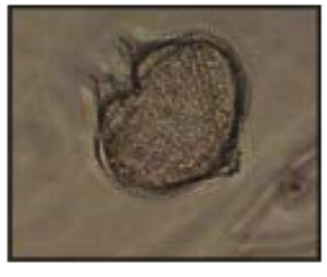






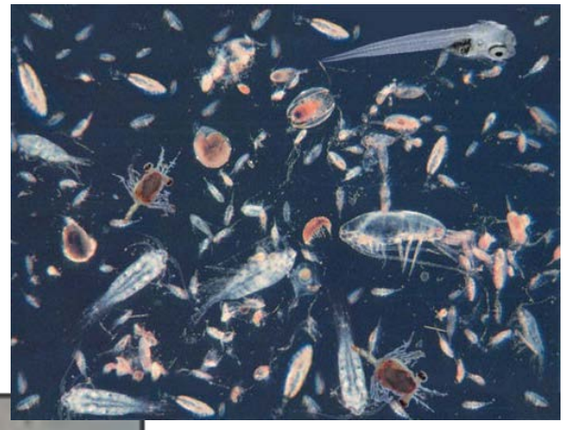


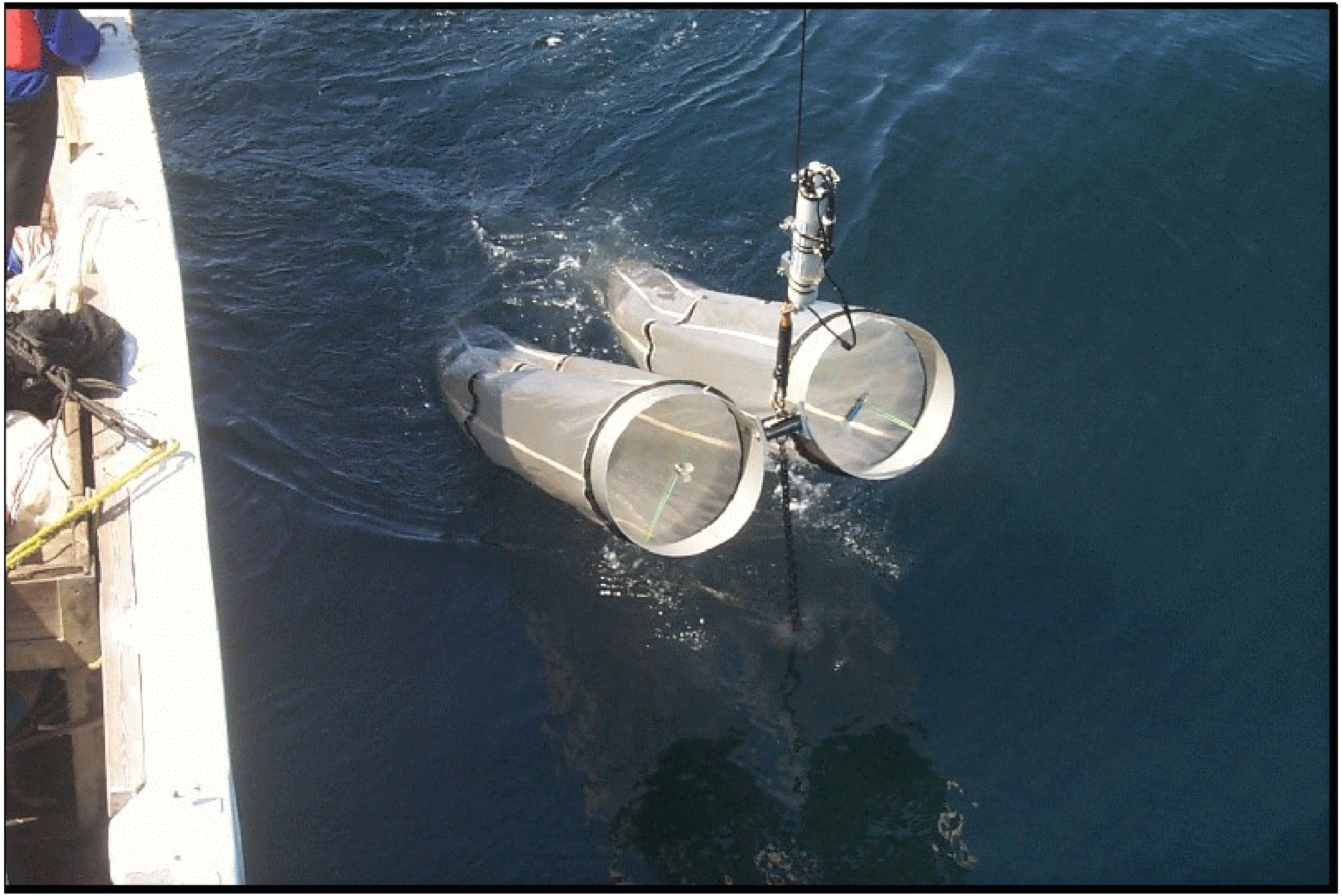
Dinoflagellates

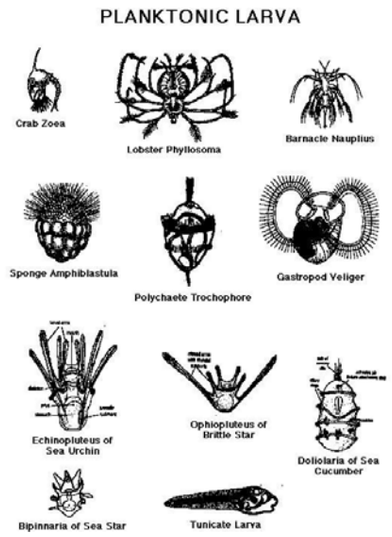

Cyanobacteria (blue-green algae) Trichodesmium

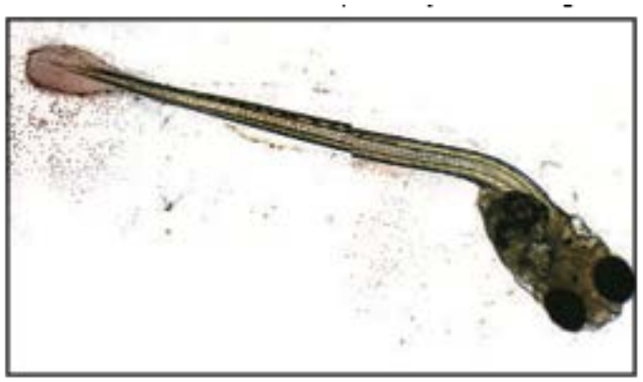
Holoplankton Types

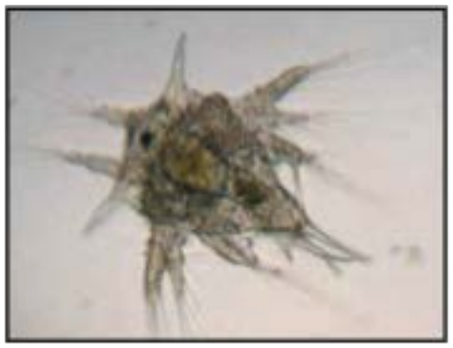


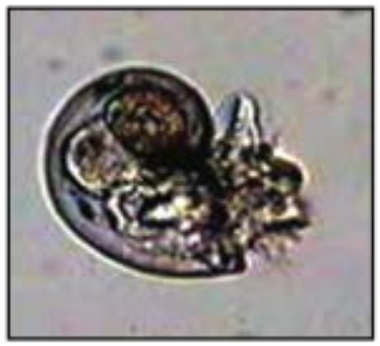


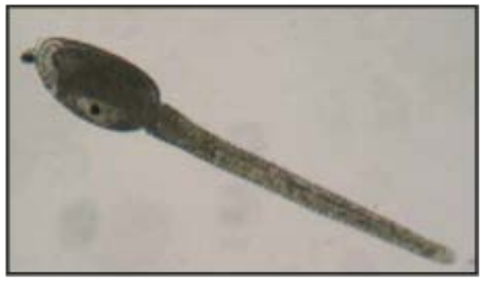
Meroplankton Types

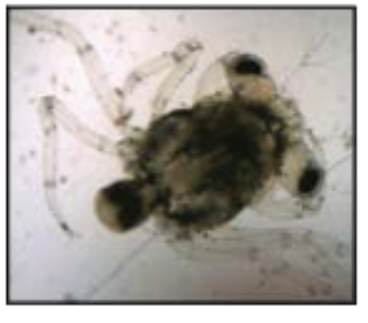












Plankton Ecology

Phytoplankton

Ecological Importance:

- Critical role in primary production, nutrient cycling, and food webs.
- Make up significant proportion of the primary production in aquatic ecosystems.
- Coastal and oceanic systems: primary production almost entirely a function of the phytoplankton.
- Salt marsh estuaries: where vascular plant biomass can greatly exceed that of algae, phytoplankton contribute substantially to overall primary production.
- Phytoplankton communities generally in SE estuaries: 67-375 grams carbon per square meter per year.
- Phytoplankton community in Wassaw Sound, Georgia: 600-700 grams carbon per square meter per year.
- Compared w/ SC & GA Spartina marsh net production: 1573 grams carbon per square meter per year (~half metabolized in marsh, half exported by tidal action); macro algae net production: 180 grams carbon per square meter per year.
- These values are very high compared with other ecosystems, e.g., rice field: 4 grams carbon per square meter per year.

Ecology:

- Most phytoplankton are motile to some degree, but movement in water column mostly through transport by currents.
- Must be in the photic (sun-lit) zone of water column to photosynthesize.
- Primarily rely on different adaptations to move or remain in photic zone: physical factors (water viscosity, convection cells, wind-induced rotations), morphological features (branching frustules, colony formation, bladder-like or needles-like cell shape), and physiological adaptations (production of mucilage and accumulation of lighter ions/reduction of heavier ions or compounds within cell) to reduce sinking rates.
- Some (cyanobacteria) contain gas vacuoles that act to increase flotation and buoyancy.
- Motile species can swim toward light.
- Phytoplankton are food source for numerous organisms, especially zooplankton.
- Phytoplankton growth and productivity affected by limiting factors, including light, temperature, nutrients, circulation, and grazing, all which are seasonal.

Plankton Ecology

Zooplankton

- Include both unicellular and multicellular organisms.
- Although at mercy of currents, many zooplankton are effective swimmers capable of complex feeding and evasive maneuvers.

Feeding

- Most of primary production in water column is in the form of small particles (phytoplankton and suspended organic particles (detritus) and associated microbes) less than 1 mm in length.
- Most coastal zooplankton graze on these particles by collecting or concentrating the food - “suspension feeding.”
- Most suspension feeders use cilia, which create feeding currents to move water and entrained small particles over a mucous-covered surface where it becomes trapped - cilia then move the mucous and trapped food to the mouth.
- Crustaceans grazers sweep their setae (bristle- or hair-like structures) through the water and remove phytoplankton and detritus particles.
- Active, mobile predators (e.g., larger crustaceans, chaetognaths, and larval fishes) detect and attack individual prey.
- Hydromedusae and ctenophores are more passive “ambush” or “entanglement” feeders, but also equally efficient predators using their tentacles to subdue and collect zooplankton.

Locomotion

- Although zooplankton are swept back and forth by water currents, they are not typically passive drifters.
- Many are active swimmers capable of rapid escape movements and extensive vertical migration.
- Overall swimming speeds seldom exceed 5 cm/sec, but these speeds are high in relation to the size of the animal and viscosity of water limiting effect which greatly increases as body size increases, e.g.,:
  - ciliates and rotifers: propelled by cilia, can attain body speeds >10 body lengths/sec.
  - copepods: can swim at speeds >100 body lengths/sec when in escape mode.
- Mechanisms and structures for zooplankton movement varies by group, but each group has a distinctive form of locomotion including: cilia, jointed appendages, or whole body contractions for swimming.

Plankton Ecology

Zooplankton

Vertical migration

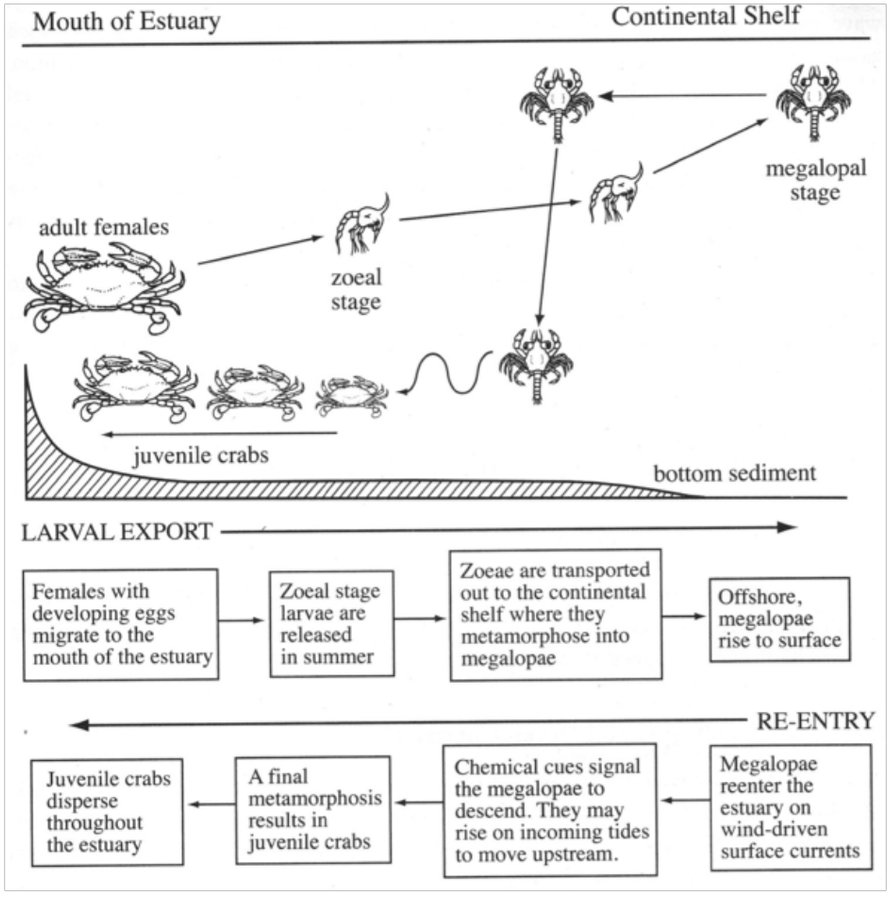
- Most zooplankton can actively control their vertical position through directed swimming or slight changes in buoyancy.
- Many species aggregate near the bottom during the day and rise into water column at night:
  - Restricting time in water column during the day may reduce predation by visual feeders.
  - Some epibenthic crustaceans (e.g., mysids, copepods, larval shrimps) time-share, engaging in nocturnal migrations for feeding.- Other primary benthic animals leave the bottom specifically for mating (e.g., polychaete worms, amphipods,cumacaeans).
- Many zooplankton have photoreceptors apparently using light intensity for vertical migration.
- Moonlight may provide enough illumination to cause vertical migration and to permit some predators to feed near the surface, where there is more available food.

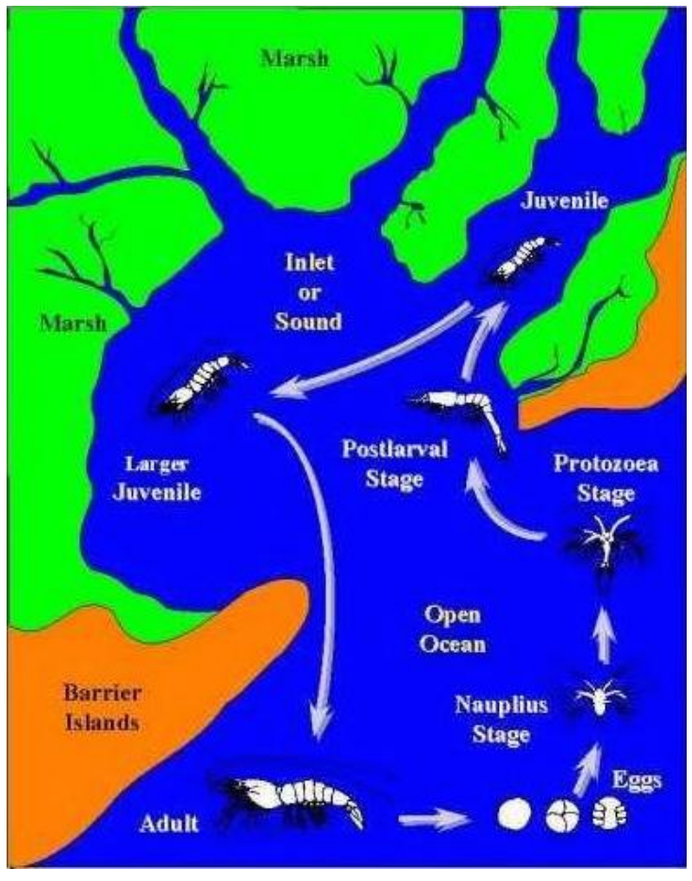
Plankton Ecology

Zooplankton

Selective Tidal Transport

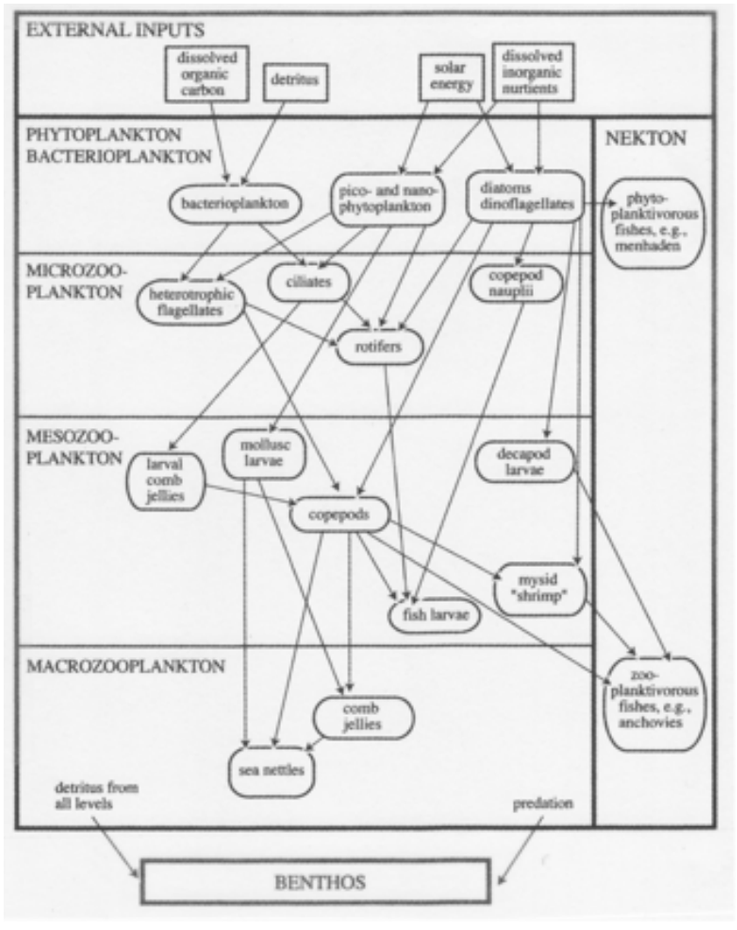
- Both holoplankton and meroplankton use vertical positioning to take advantage of favorable currents for migration or to retain position within estuaries.
- Larval fishes produced in offshore spawning areas undergo vertical migrations that place them in offshore currents transporting them into nursery grounds in estuaries.
- Blue crab (from Johnson and Allen, 2012) and penaeid shrimp (from SC DNR, NOAA, Ace Basin studies) adult and larval migrations between coastal/ocean waters and estuaries are also well known:





Importance of Estuaries and Plankton

- Estuaries and nearshore areas are among the most biologically productive marine environments and the plankton communities in these areas are a critical component of the aquatic food chain.
- Estuaries and the planktonic life-cycle are essential to the successful reproduction and growth of most coastal species of marine fish and commercially and recreationally important crabs, shrimp, and oysters.
- Because of their ecological importance, and high levels of abundance and biomass, zooplankton provide a key link in transferring the primary phytoplankton production from photosynthesis to higher trophic levels.



Importance of Estuaries and Plankton

- Healthy plankton communities are dependent on the chemical quality and health of the aquatic environment.
- Chemical pollution from industrial, agricultural, and residential community sources can and is causing significant degradation of aquatic environments.
- Protection and conservation of aquatic environments like Port Royal Sound and its tributary rivers and creeks is urgently needed.
- This comes from active involvement and understanding from the citizenry in the local community.

Ongoing Zooplankton Studies: Okatie, Colleton, and Chechessee Rivers and Lower Port Royal Sound

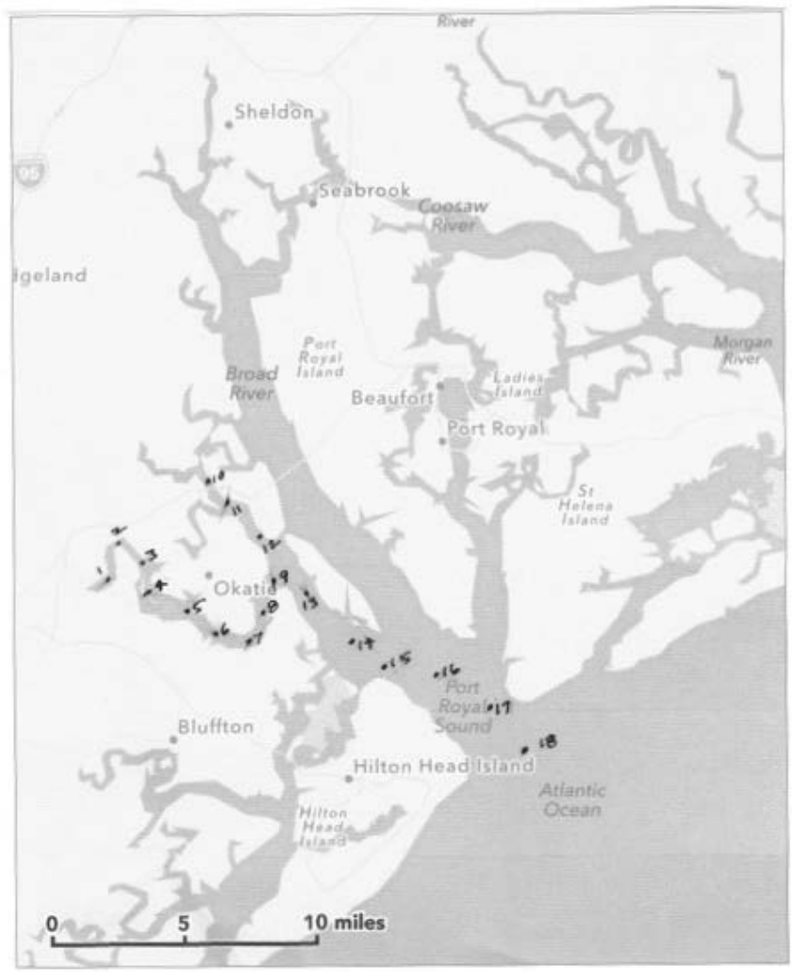


Figure 2. Location of zooplankton sampling stations in Port Royal Sound during 2015.

Table 3. Holoplankton collected in Port Royal Sound during 2015.

Taxon	Period of Occurrence (POC)	Months of Peak Abundance	POC Mean Density (No./100m^3)	POC Maximum Density (No./100m^3)
HOLOPLANKTON			**27057**	
HYDROZOANS	Mar-Oct	Jun, Sep, Oct	**95**	688
CLADOCERANS	Apr, Sep	Apr, Sep	**1**	1
OSTRACODS	May-Sep	May	**3**	34
COPEPODS			**26775**	
Acartia tonsa	Mar-Oct	Jun-Aug	6044	117071
Tortanus setacaudatus	Apr-Oct	Jul	3007	18704
Pseudodiaptomus pelagicus	Mar-Oct	Jun, Aug	16433	351214
Labidocera aestiva	Mar-Oct	Jun,Sep-Oct	233	1937
Centropages furcatus	May-Jul, Sep-Oct	May	168	656
Centropages hamatus	Mar-May, Oct	Apr	663	4876
Calanopia americana	Mar, Aug-Oct	Oct	5	223
Temora turbinata	May, Oct	Oct	82	2678
Temora stylifera	May, Oct	Oct	127	2678
Pontella mimocerami	May	May	1	3
Subeucalanus pileatus	Apr-May, Sep-Oct	Oct	12	669
MYSIDS	Mar-Oct	Sep	**102**	1672
SERGESTID SHRIMP			**35**	
Acetes	Apr-May, Aug, Sep-Oct	Oct	4	186
Lucifer faxoni	May, Sep-Oct	Oct	31	1350
REPRODUCTIVE ADULT POLYCHAETES	Mar-Oct	Jun,Oct	**5**	18
CHAETOGNATHS	Mar-Oct	Jun-Jul	**41**	189

Table 4. Meroplankton collected in Port Royal Sound during 2015.

Category or Taxon	Period of Occurrence (POC)	Months of Peak Abundance	POC Mean Density (No./100m^3)	POC Maximum Density (No./100m^3)
MEROPLANKTON			**18675**	
SCHYPHOZOANS	Apr-Jun, Sep	May	**1**	14
ASCIDIANS	May-Jun, Aug-Oct	May4	**9**	91
ECHINODERMS	Apr, Aug-Sep	Apr, Aug	**1**	9
BRACHIOPODS	May-Jun	Jun	**1**	4
CEPHALOPODS				
Lolliguncula brevis	Apr, Sep, Oct	Apr, Sep, Oct	**1**	2
PENAEID SHRIMP			**78**	
Farfantepenaeus aztecus	Apr, May	Apr, May	1	2
Farfantepenaeus duorarum	Jun, Jul-Sep	Jul, Aug	6	47
Litopenaeus setiferus	Jun-Aug	Jul, Aug	35	250
Rimapenaeus	May, Oct	Oct	14	354
Sicyonia	Oct	Oct	22	304
CARIDEAN SHRIMP			**896**	
Palaemonetes	Apr-Oct	Jun, Sep	515	2053
Cuapetes americanus	Sep	Sep	31	94
Alpheus	Apr-Oct	Apr, Jun	235	1320
Ogyrides	Aug-Oct	Sep	56	562
Hippolyte	Apr-May, Sep-Oct	Apr, Sep	40	321
Lysmata	Sep-Oct	Sep	17	94
Thor	Oct	Oct	2	18
MUD SHRIMP				
Upogebia	Apr-Oct	Apr, Jun	**264**	1726
GHOST SHRIMP				
Biffarius	Apr-Oct	Jun, Sep	**36**	471
MANTIS SHRIMP			**192**	
Squilla	Apr-Aug	May	191	3521
Coronis	May	May	1	1

Table 4 (cont.). Meroplankton collected in Port Royal Sound during 2015.

Taxon	Period of Occurrence (POC)	Months of Peak Abundance	POC Mean Density (No./100m^3)	POC Maximum Density (No./100m^3)
MEROPLANKTON (CONT.)			**18675**	
ANOMURAN CRABS			**846**	
***Pagurus* zoea and megalopa**	Mar-Jul, Sep-Oct	May	48	860
***Pagurus* megalopa**	Apr-May, Aug	Aug	2	19
***Clibinarius vittatus* zoea**	May-Oct	May	1	7
***Clibinarius vittatus* megalopa**	Oct	Oct	2	7
***Petrolisthes* zoea and megalopa**	Apr-Oct	May-Jun, Aug	783	3443
***Petrolisthes* megalopa**	May, Jul, Sep-Oct	Oct	8	226
***Albunea* zoea**	Oct	Oct	1	1
***Lepidopa* zoea**	May	May	1	2
BRACHYURAN CRABS			**14916**	
***Libinia* zoea and megalopa**	Apr	Apr	24	65
***Libinia* megalopa**	Apr, Jul-Sep	Aug	22	226
***Callinectes* zoea and megalopa**	Apr	Apr	1	16
***Callinectes* megalopa**	May, Aug-Sep	Aug	1	2
***Dyspanopeus* zoea and megalopa**	Mar-Aug, Sep-Oct	May	939	15096
***Dyspanopeus* megalopa**	May, Jul-Aug, Oct	Aug, Oct	7	15
***Eurypanopeus* zoea and megalopa**	Apr-Oct	May	2838	17364
***Eurypanopeus* megalopa**	May-Oct	Aug	4	8
***Hexapanopeus* zoea and megalopa**	Apr-Oct	May	164	7442
***Hexapanopeus* megalopa**	Apr-Oct	Jun, Aug	36	243
***Menippe* zoea and megalopa**	May-Oct	May-Jun, Sep	114	2013
***Menippe* megalopa**	May-Aug, Oct	Oct	2	30
***Zaops* zoea**	Apr-May, Aug-Oct	May, Sep	228	3182
***Tunidotheres* zoea**	Apr-Oct	May, Jun	199	3846
***Pinnixa* zoea**	Mar-May, Jul-Oct	May, Sep	239	3182
***Uca* zoea and megalopa**	Apr-Oct	May, Jun	10037	92968
***Uca* megalopa**	May-Oct	Jun, Aug	61	399

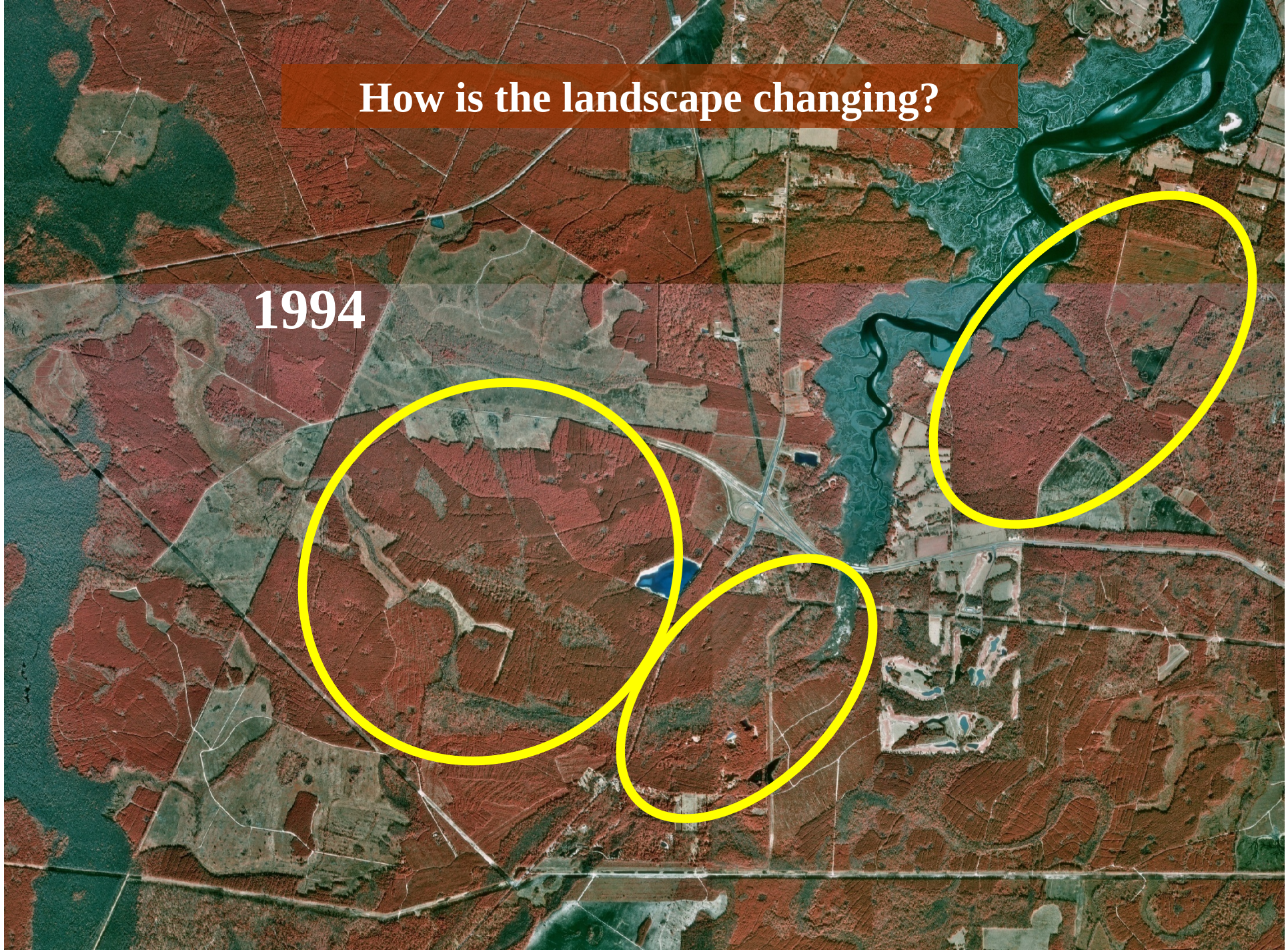
Table 4 (cont.). Meroplankton collected in Port Royal Sound during 2015.

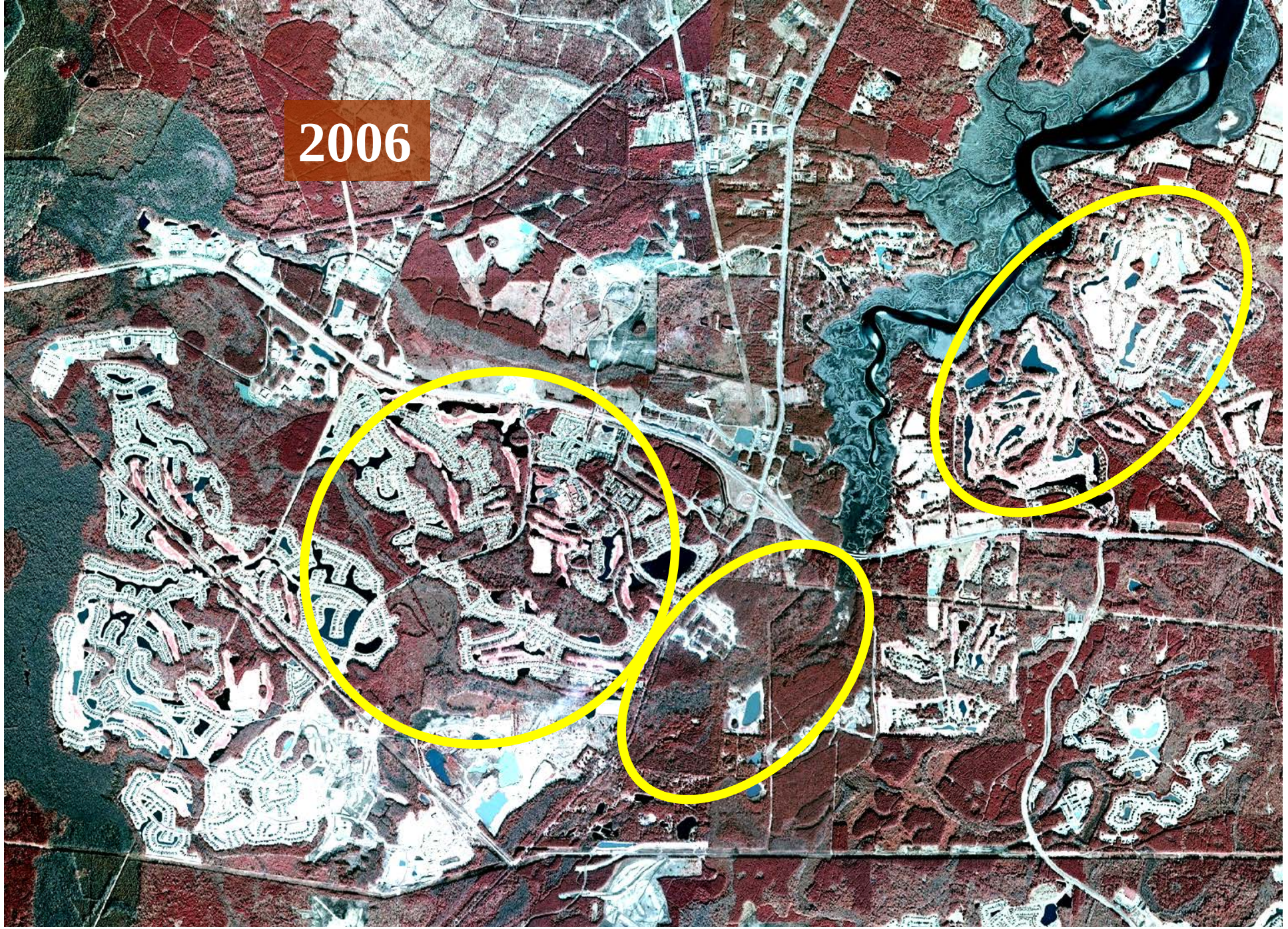
Category or Taxon	Period of Occurrence (POC)	Months of Peak Abundance	POC Mean Density (No./100m^3)	POC Maximum Density (No./100m^3)
MEROPLANKTON (CONT.)			**18675**	
FISH EGGS AND LARVAE			**1434**	
***Anchoa mitchilli* eggs**	Mar-Aug	Apr, May	1049	5593
***Anchoa mitchilli* larvae**	Apr-Aug	Apr	309	2845
***Cynoscion* spp. eggs**	Apr-Jun, Aug-Sep	Apr-May	39	281
***Cynoscion* spp. larvae**	Apr-Oct	Apr	6	75
***Menidia menidia* larvae**	Mar-May	Mar, May	5	29
***Hypsoblennius hentz* larvae**	Apr-Oct	Apr, May	8	10
***Gobiosoma bosc* larvae**	Mar-Oct	Apr, Jun, Aug	10	31
***Syngnathus fuscus* larvae**	Apr-May, Aug-Sep	Apr	1	3
***Strongylura marina* larvae**	Apr-May	Apr-May	1	1
***Sphoeroides maculatus* larvae**	Apr-May	Apr	2	5
Mugil cephalus larvae	Apr-May	Apr, May	2	6
***Trinectes maculatus* larvae**	May-Jun, Aug	Jun	2	12

Waddell Mariculture Center

Waddell Mariculture Center
SCDNR
P.O. Box 809
Bluffton, South Carolina 29910


Storm-water

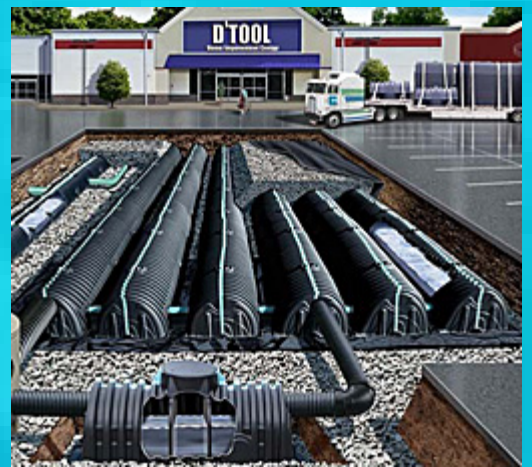

How is the landscape changing?
1994


2006

Natural flow from forested watershed

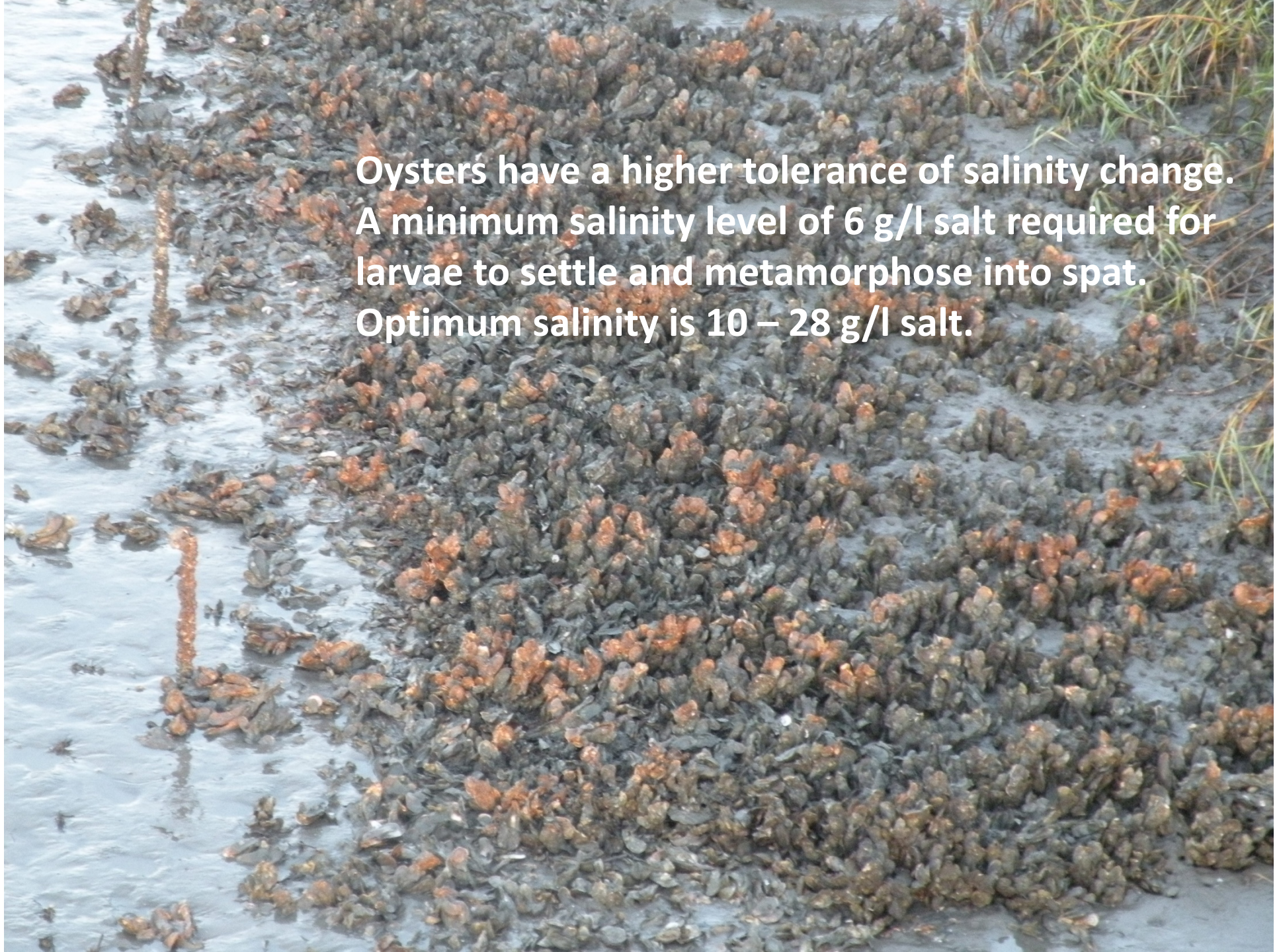
Channeled flow caused by storm-water

Storm-water has significant value. Large volumes of storm-water are now being reclaimed for use by homeowners and government utilities. Storm-water can be used to fight fires and provide irrigation. Storm-water can be used to maintain wetlands and provide recreational activities.



Storm-water provides water for fishing, boating, irrigation and residential fire protection. Some areas use storm-water as a potable water source.

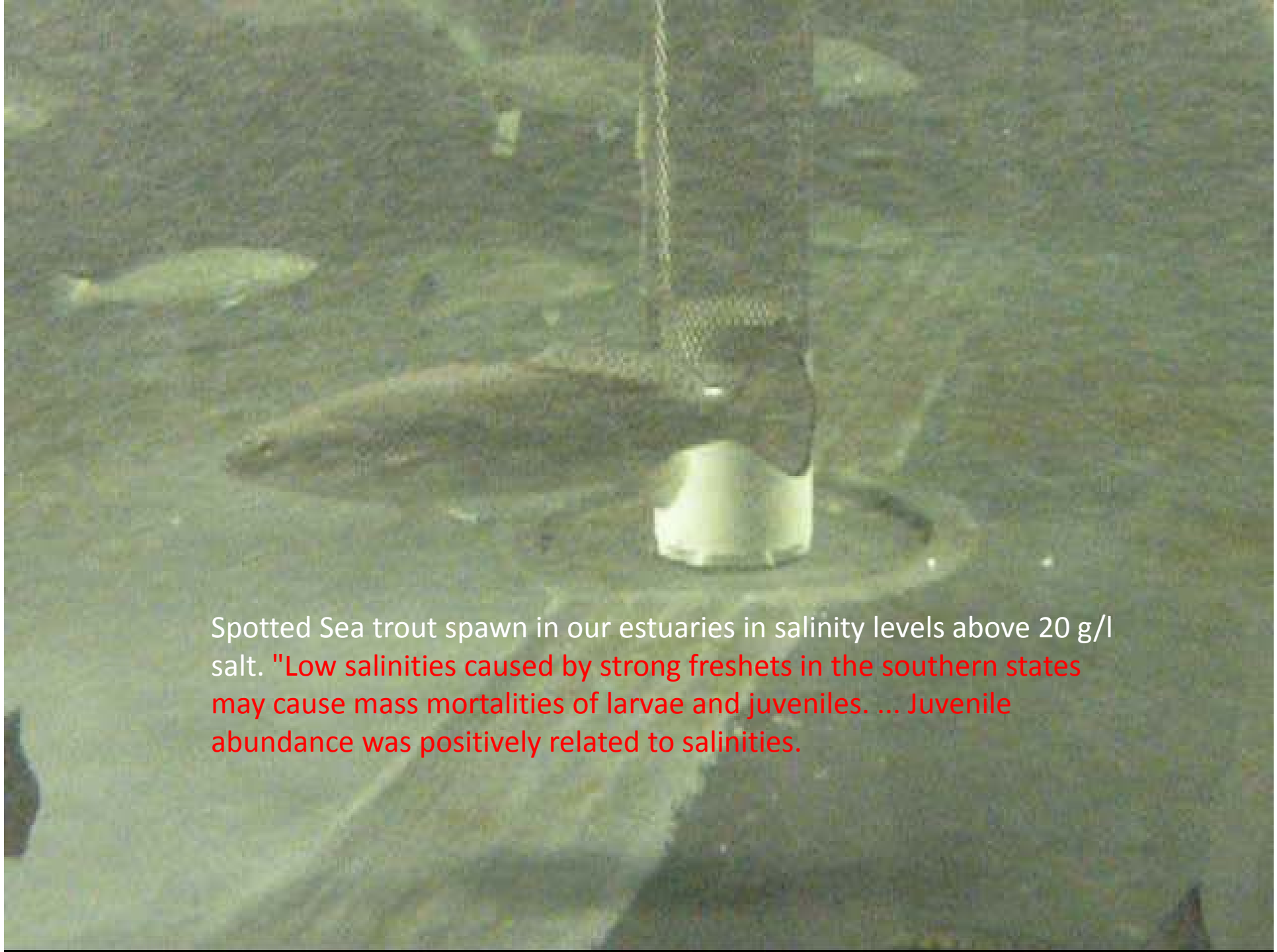
Marine zooplankton, like rotifers and copepods, are susceptible to stress when exposed to a rapid decrease in salinity.


Oysters have a higher tolerance of salinity change.
A minimum salinity level of 6 g/l salt required for larvae to settle and metamorphose into spat.
Optimum salinity is 10 – 28 g/l salt.

Salinity tolerance of some commercial and recreationally important estuarine species

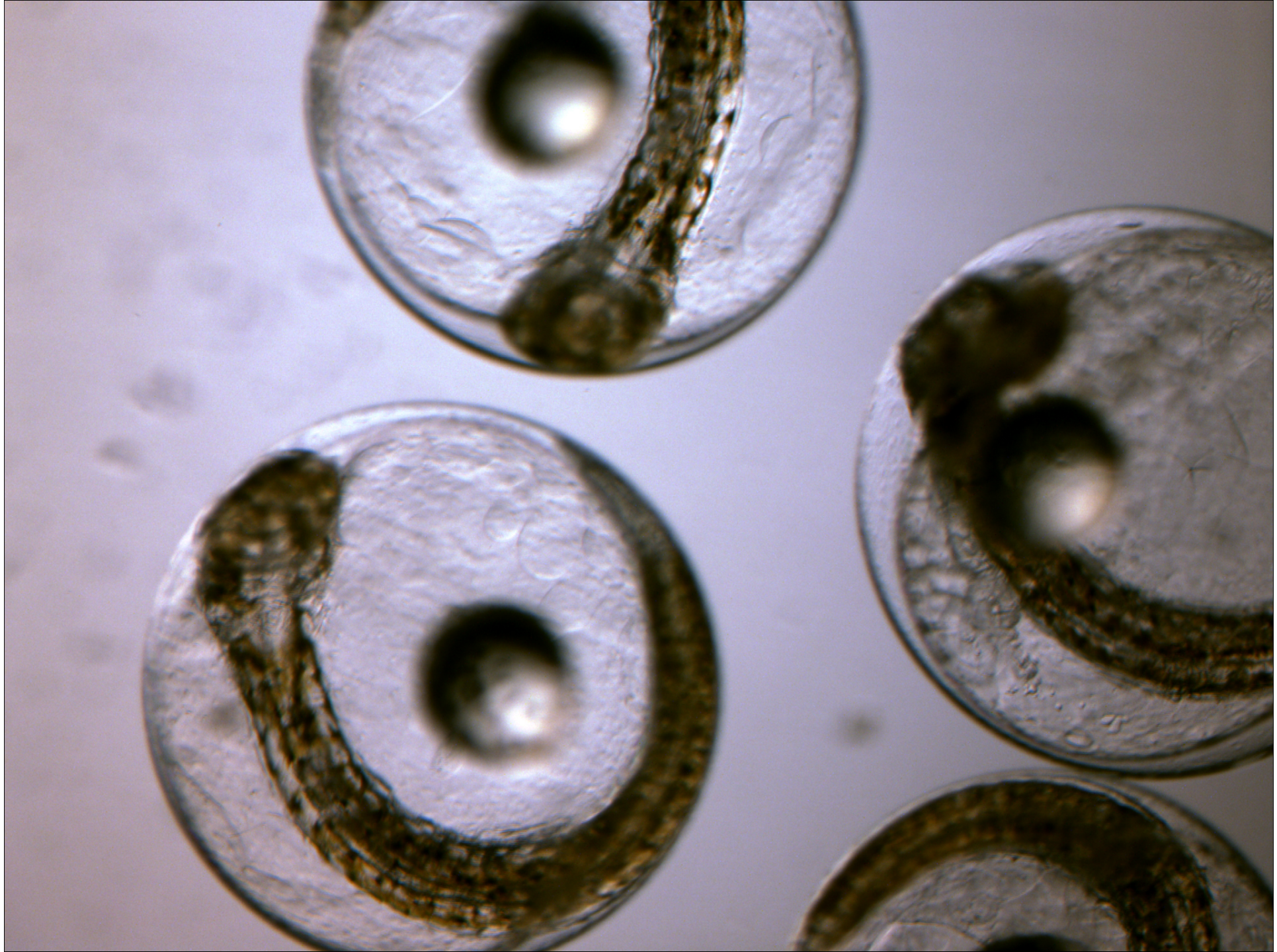
Clams require a minimum salinity level of 22 g/l salt

Blue Crab larvae have a minimum salinity requirement of 20 g/l salt. Salinity is not a limiting factor for adult crabs.



Spotted Sea trout spawn in our estuaries in salinity levels above 20 g/l salt. "Low salinities caused by strong freshets in the southern states may cause mass mortalities of larvae and juveniles. ... Juvenile abundance was positively related to salinities.

Shrimp post larvae, day 13 or younger, would have a better chance of survival by delaying entry into estuaries susceptible to rapid salinity declines. A salinity of >25 g/l salt is needed for metamorphosis.



Cobia spawn in salinity levels of 32 to 34 g/l salt. As cobia larvae become older, salinity becomes less of an issue pertaining to survival.

1 to 4 days
Control survival (approximately 32 g/l salt) was 12.5 %
20 g/l salt – 8.9% survival; 10 g/l salt 3.2% survival.


Older cobia, 13 days post hatch, may perform better in lower salinities of 15 g/l salt.

Red Drum spawn in high salinity waters of 35 g/l salt. Larvae perform best at 25 to 35 g/l salt.
Larvae have no tolerance of low salinity.

When the Water is Not So Wide (apologies to Pat Conroy): Effects of Sormwater Runoff on the Headwaters of a High Salinity Estuary

Stephen A. Borgianini, Rebekah Herty, Monica Labrador, Maria Bartholf, Jose Gonzalez


Legend
MAY RIVER
BROAD CREEK
May River Watershed
Figure 4-1
CDM Camp Dresser & McKee Inc.


bing
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The Tidal Creek Food Web


Bald Eagle


Osprey

Redfish


Sharks


Diving birds


Intermediate Predators


Cobia

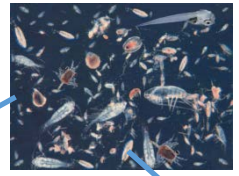
Marine mammals


Wading birds


Planktivorous fish

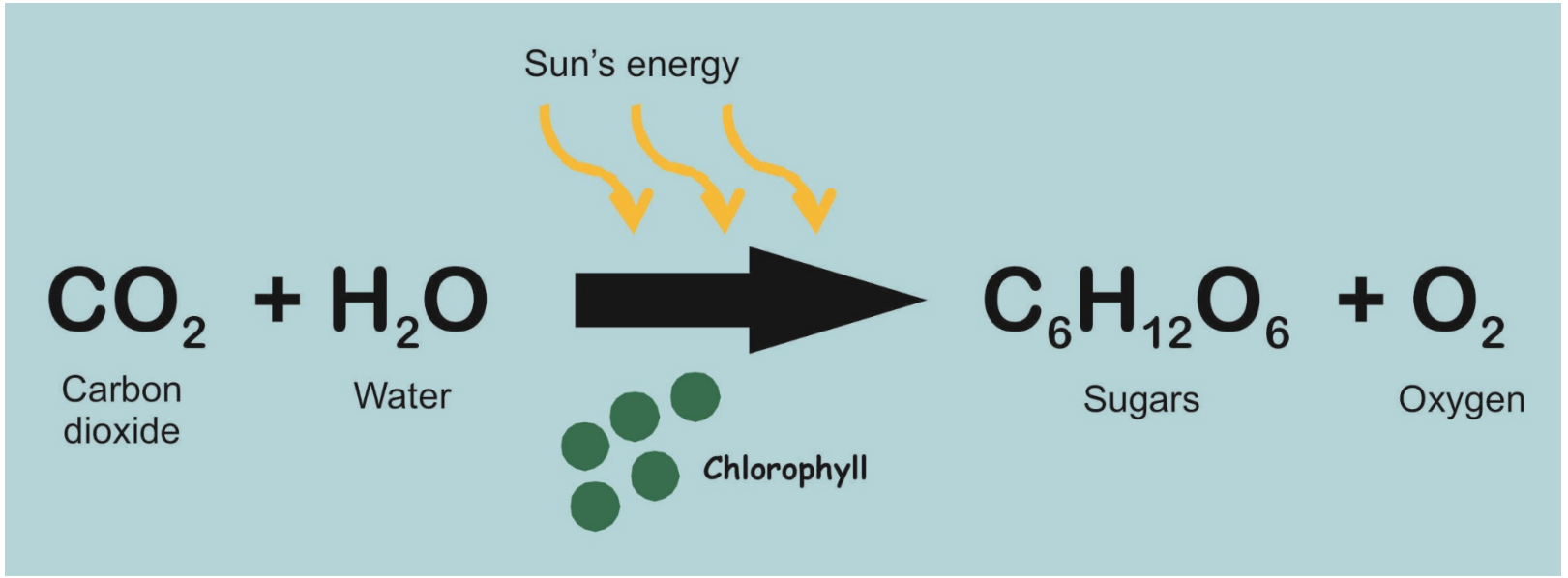

Carnivorous zooplankton

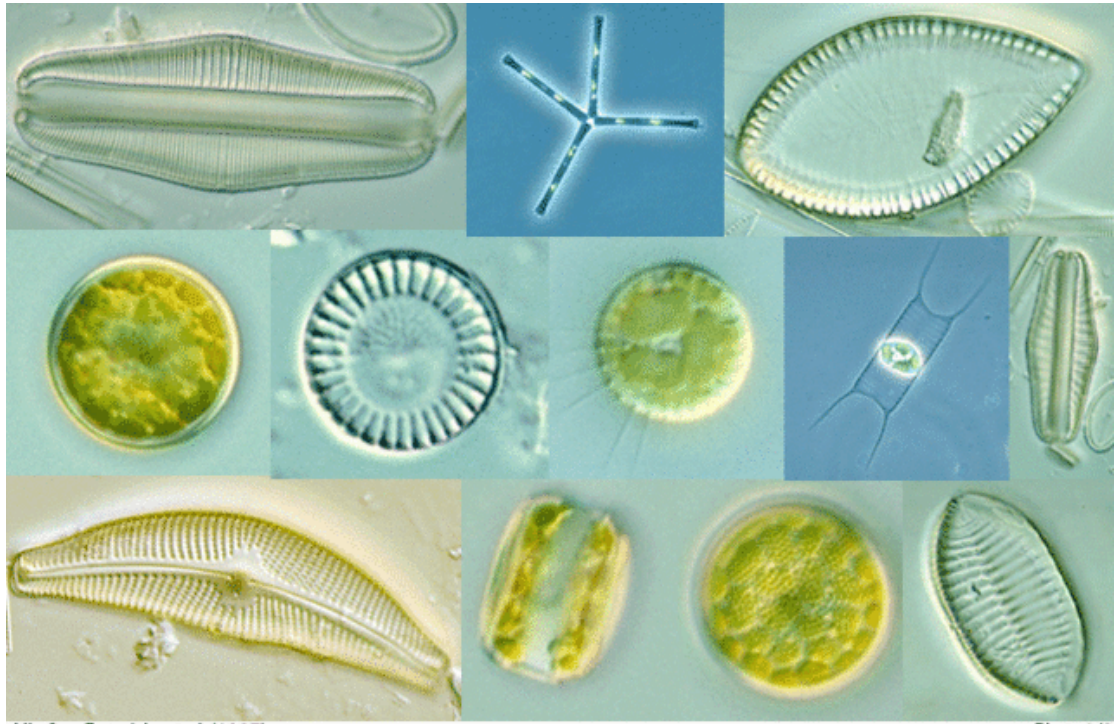

Terrapin


Herbivorous zooplankton


Phytoplankton

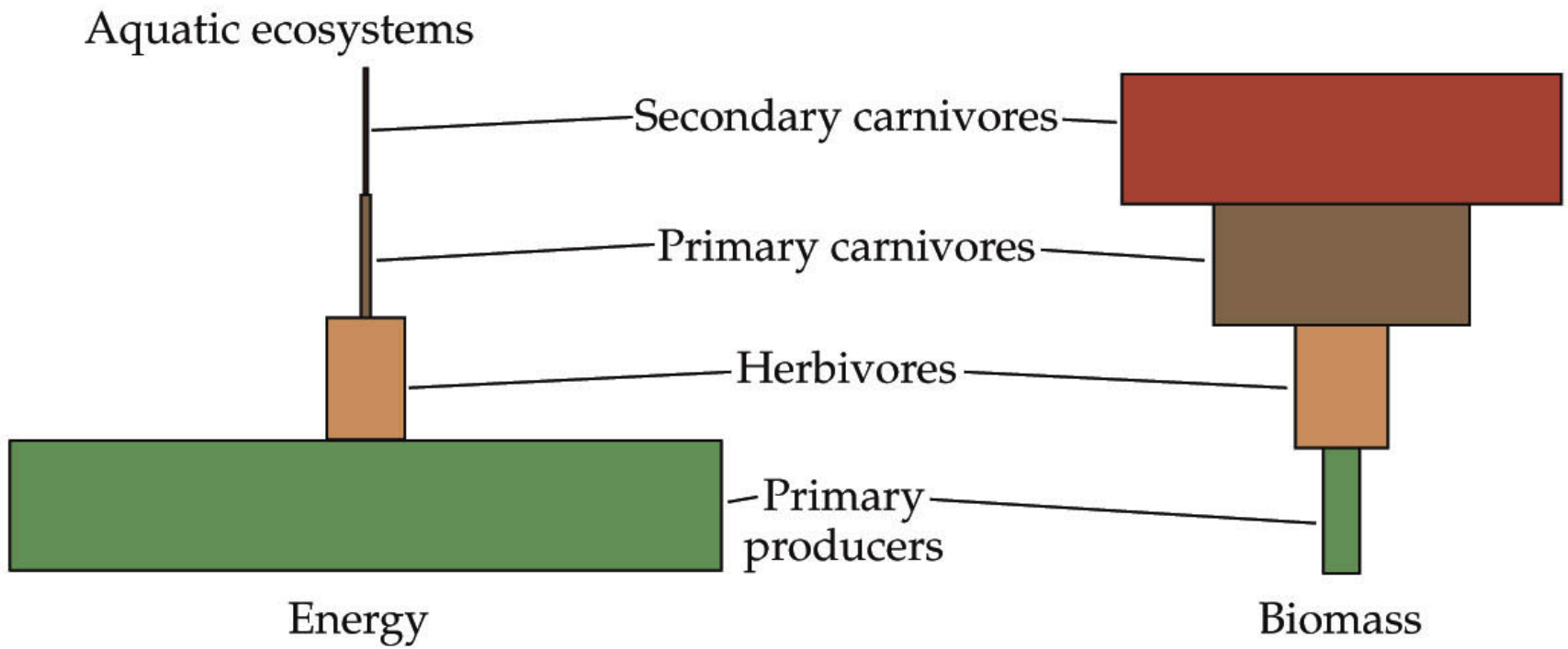

Cyanobacteria



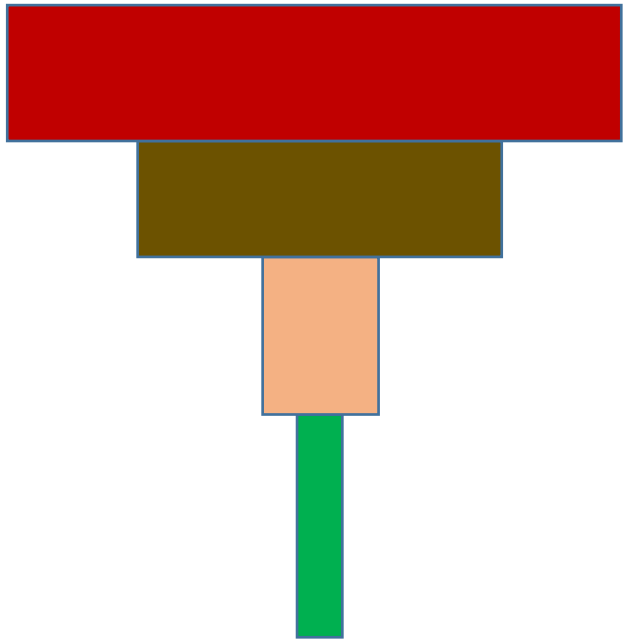


All after Entwisle et al. (1997)

Plate 1/2


Aquatic ecosystems
Secondary carnivores
Primary carnivores
Herbivores
Primary producers
Energy
Biomass

Any stressor that affects primary production can potentially destabilize the food web



Project Location

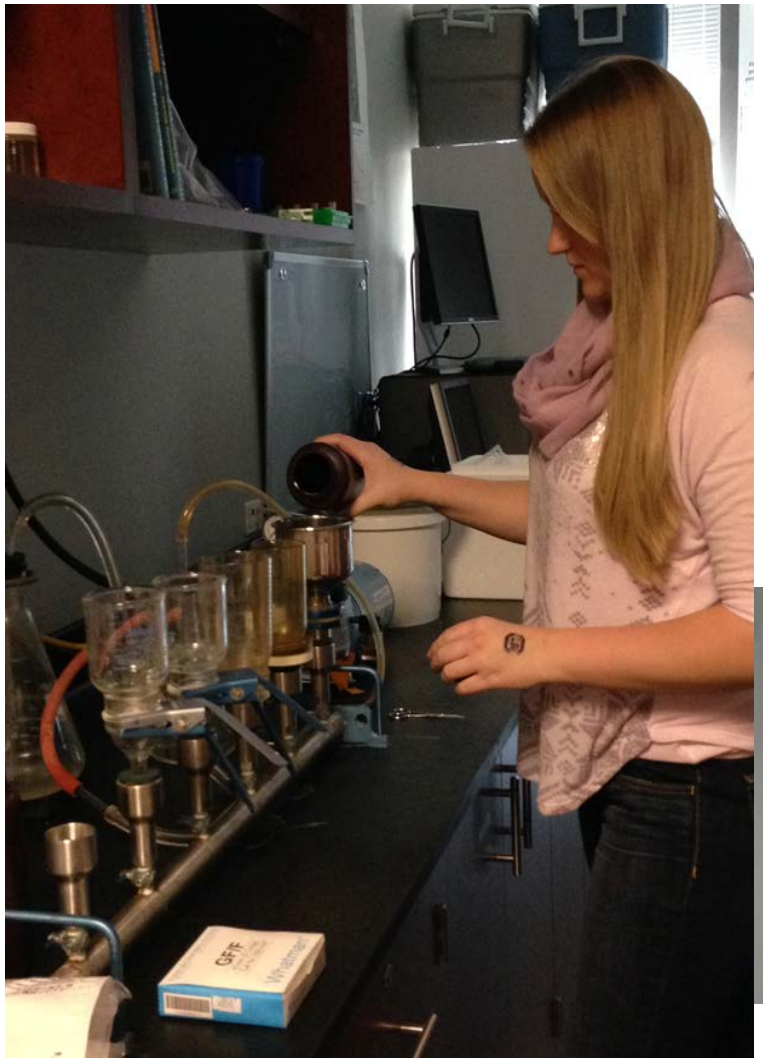
Sampling was conducted at two locations along the May River semiweekly from 2 May 2013 to 2 May 2014.

Measured Temperature, Salinity, Secchi Depth, tide stage and current direction, chlorophyll a (Chl a), Rainfall (Montie Lab) and identified phytoplankton to species (if possible)

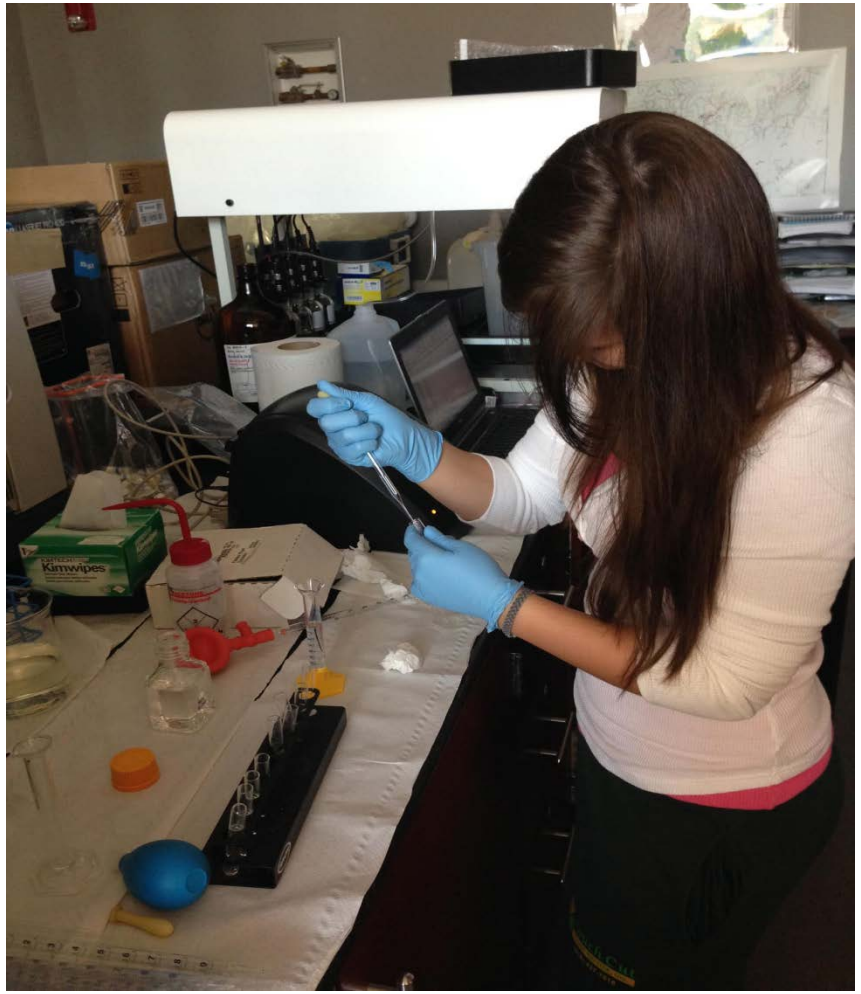
Rose Dhu Creek
Headwaters of the May River

Bluffton Town Dock; May River

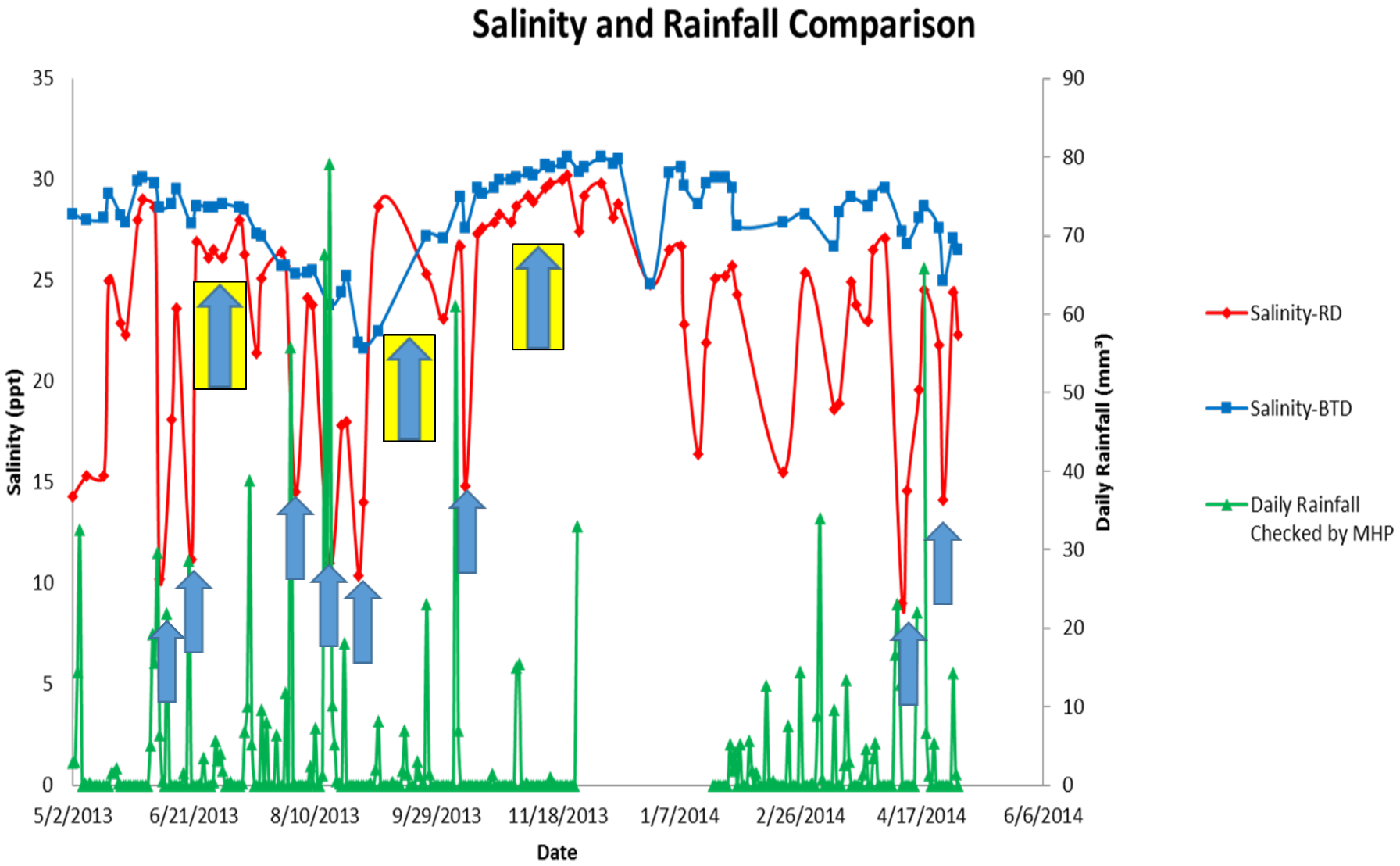
Filtering and Extracting Chlorophyll a



Analyzing for Chlorophyll a by Fluorometry



Algal pigments, particularly chlorophyll a, fluoresce in the red wavelengths after extraction in acetone when they are excited by blue wavelengths of light.



Low volume headwaters (Rose Dhu Creek) exhibited much greater variability in salinity than the deeper, broader downriver Bluffton Town Dock site.

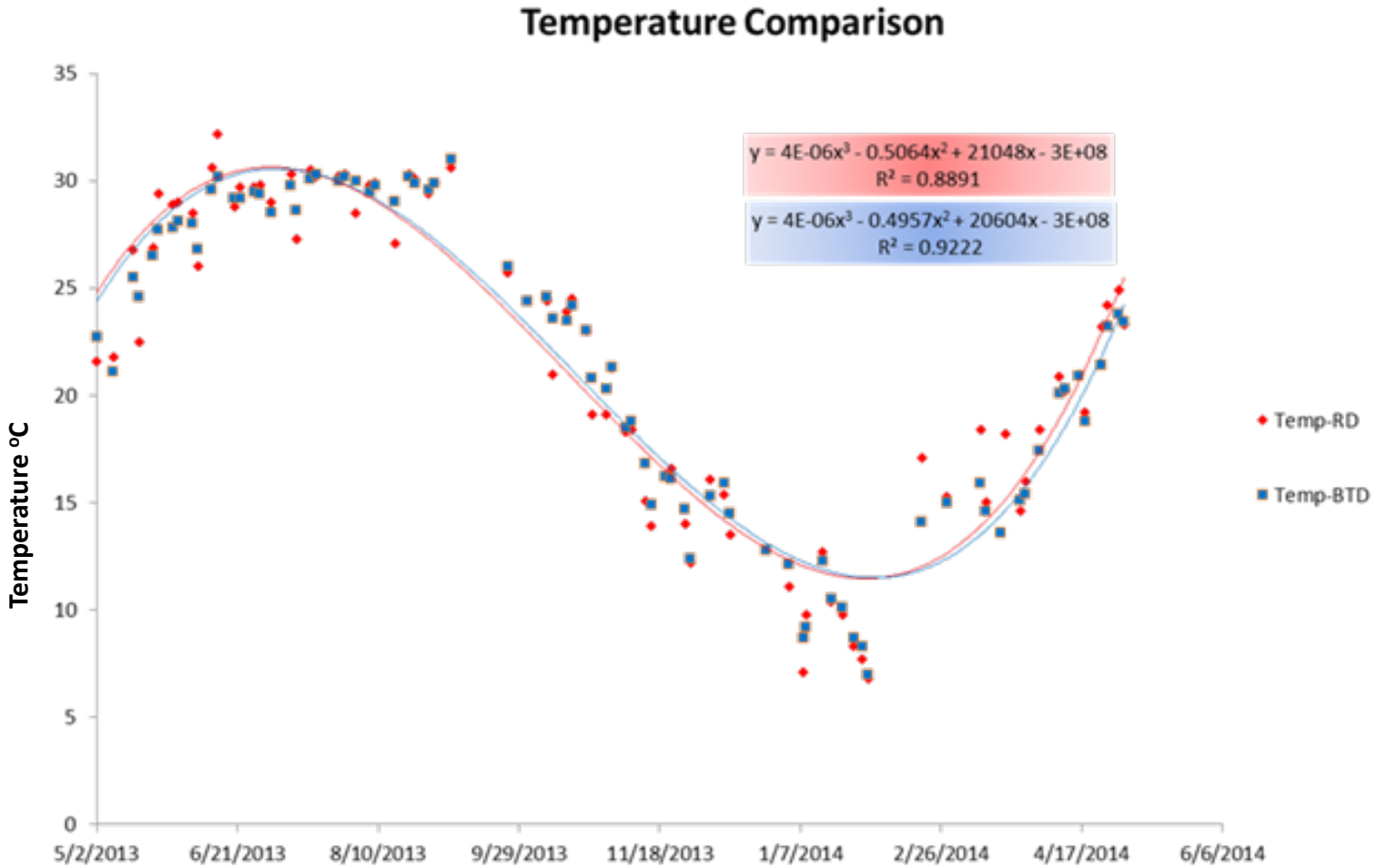
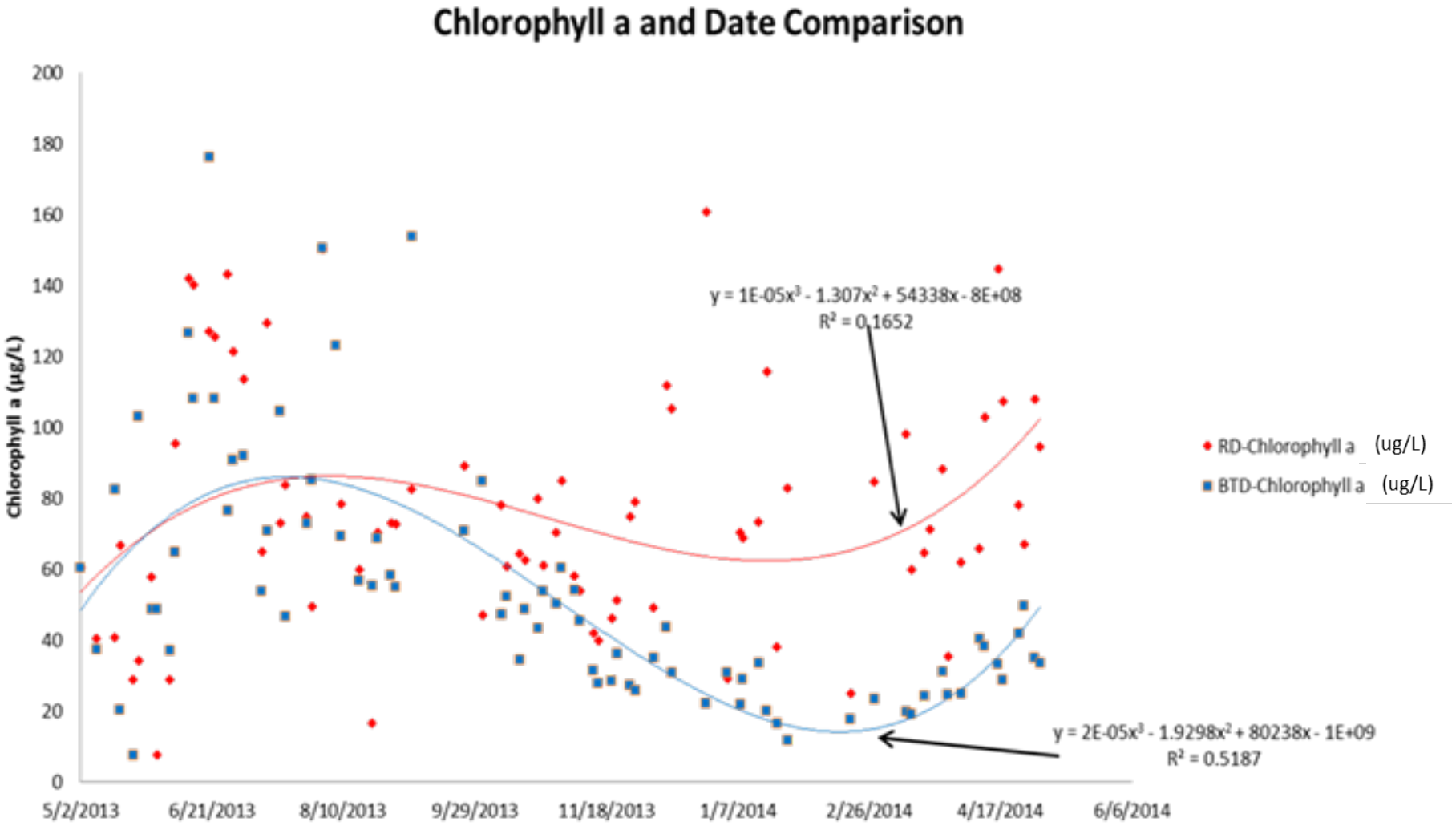


Figure 2: Both Rose Dhu and Bluffton Town Dock show a similar seasonal variation in Water Temperature.

No difference in water temperature between the two sites indicating an obvious and expected seasonal trend.



Headwaters exhibited a very weak seasonal trend in Chl-a (R^2 value = 0.1652) while the downriver site exhibited a strong seasonal trend in Chl-a (R^2 value = 0.5187)

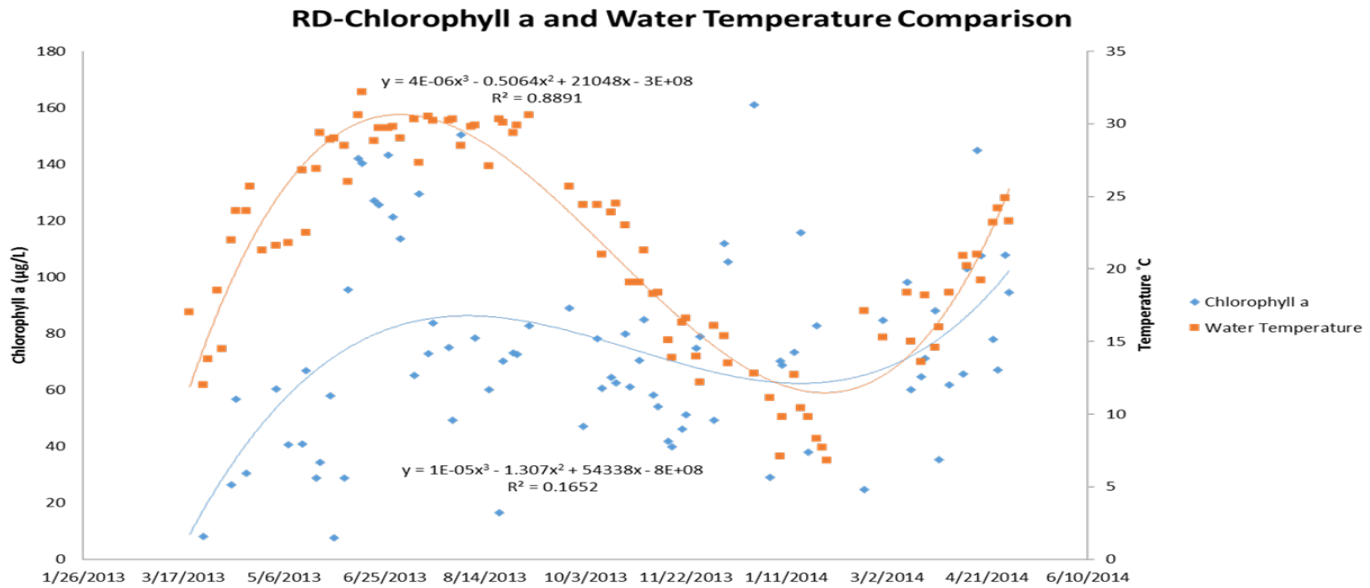
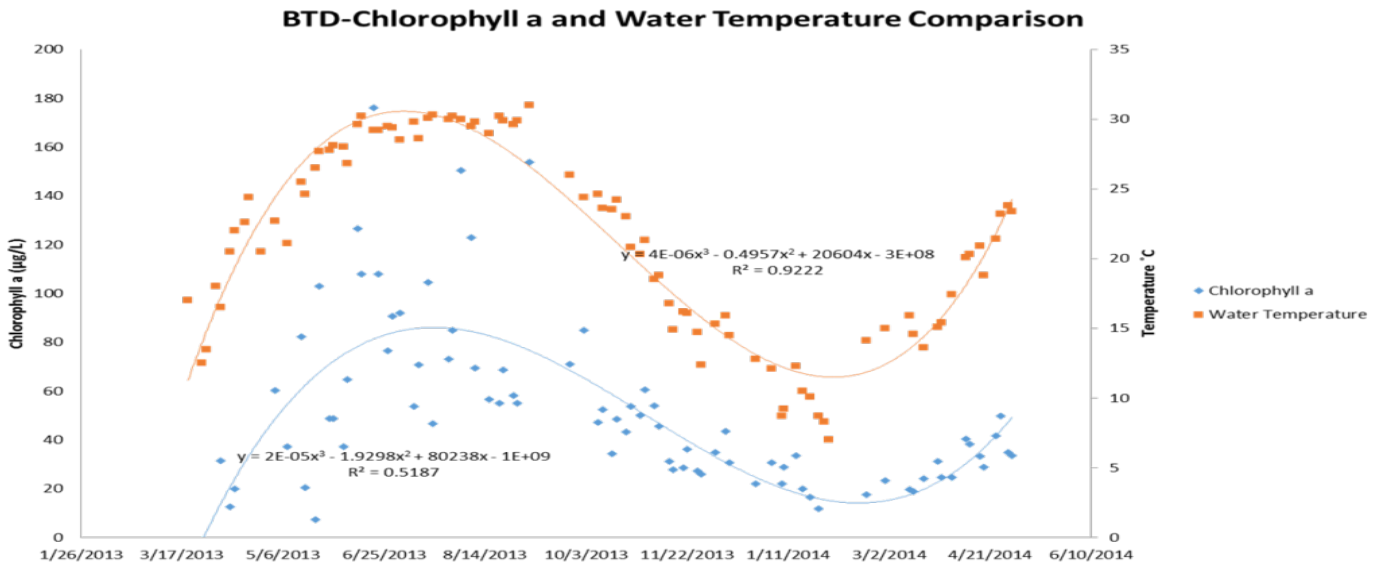


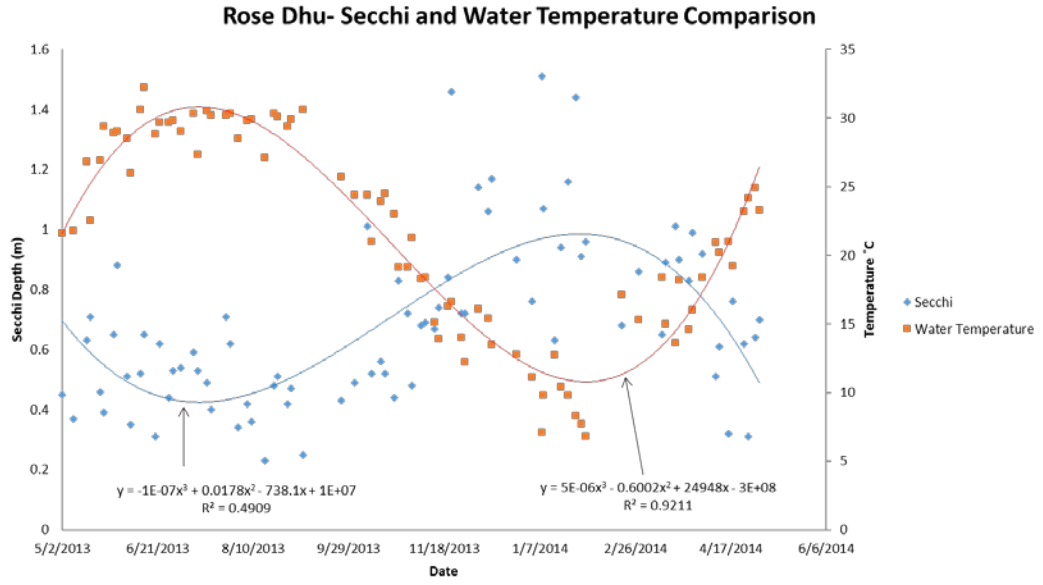
Figure 4 : The data show a weak seasonal trend in Chl-a production at the Rose Dhu site when compared to water temperature.



And as expected the same trend is obvious when you look at the relationship between Chl a and Water Temperature

Secchi Disk Depth

The Secchi disk is used to measure the transparency of the water. It can also be used as a estimate of the compensation point/depth.



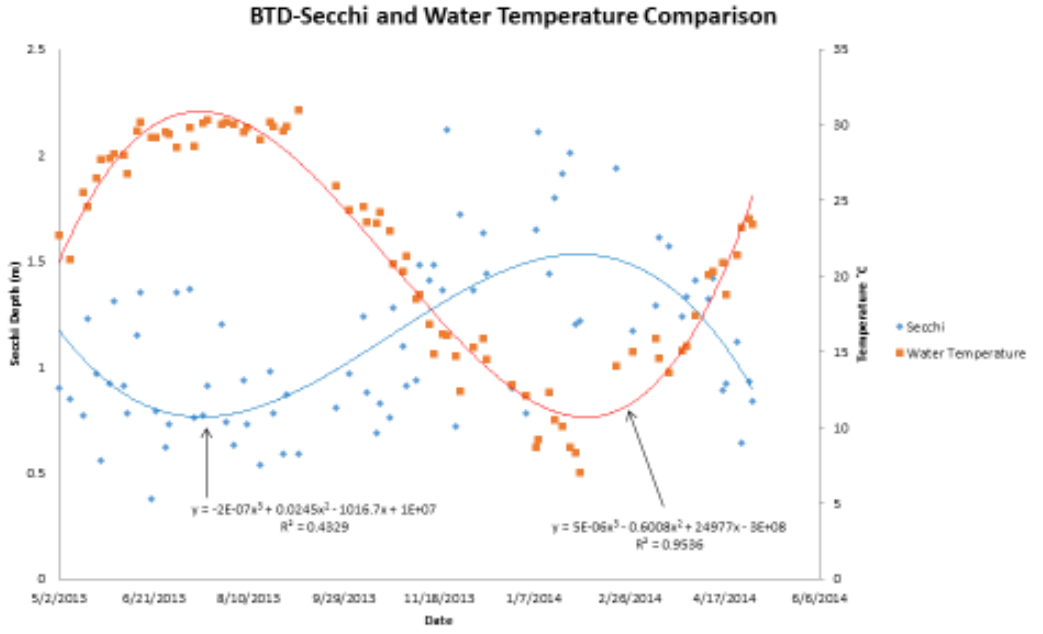
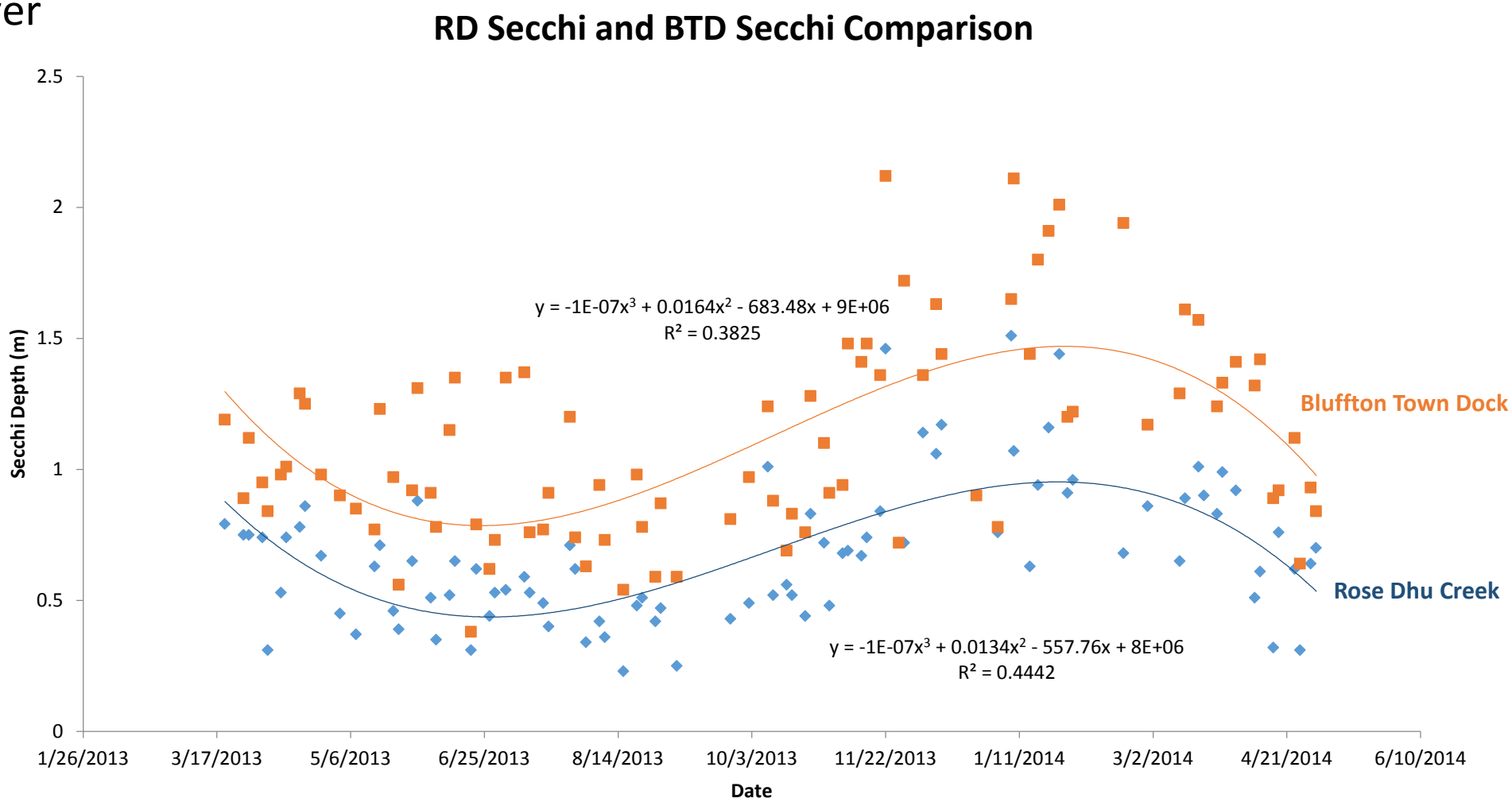


Figure 7 : : The data show strong seasonal, but inverted trends in Secchi Depth and Water Temperature similar to the trends observed at the Rose Dhu site

Both Headwater and Downriver Secchi Depth exhibited similar (but inverse) trends relative to Water Temperature, as we expected.

Secchi Depth was greater Downriver than at the headwaters site indicating greater turbidity upriver



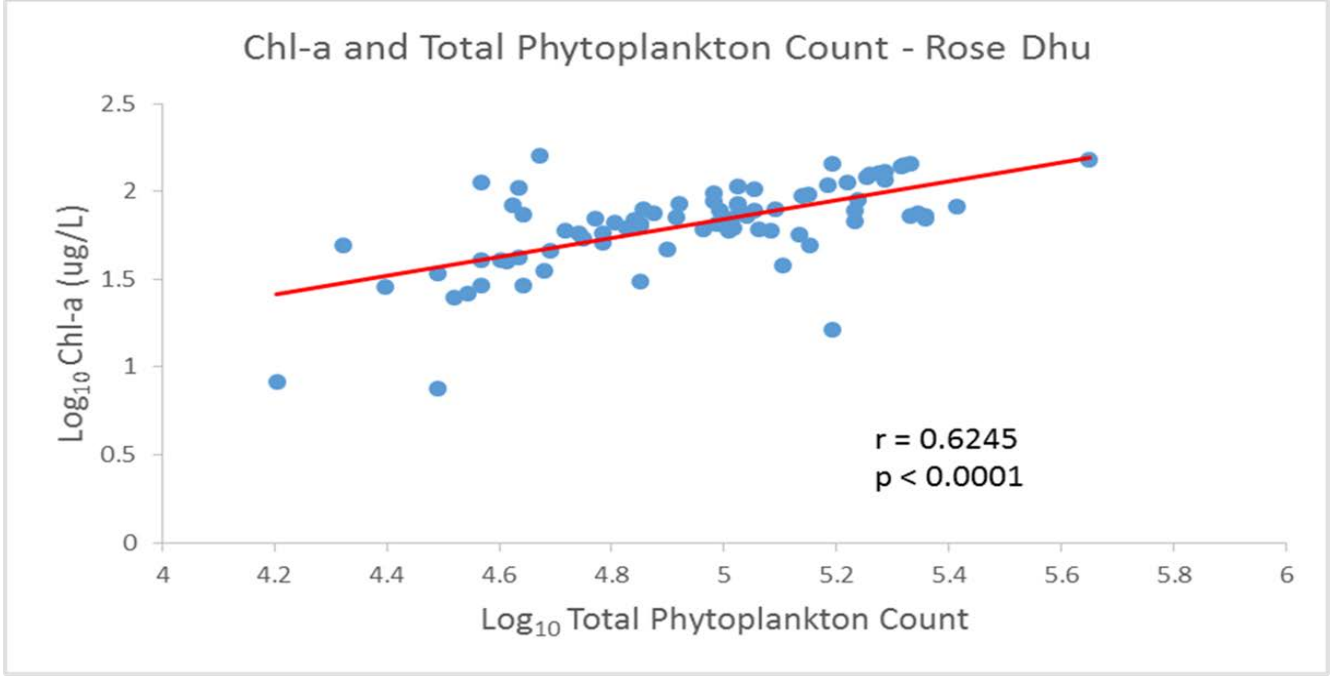


Figure 10 : Total Phytoplankton count is strongly positively correlated with Chl-a production at the Rose Dhu site

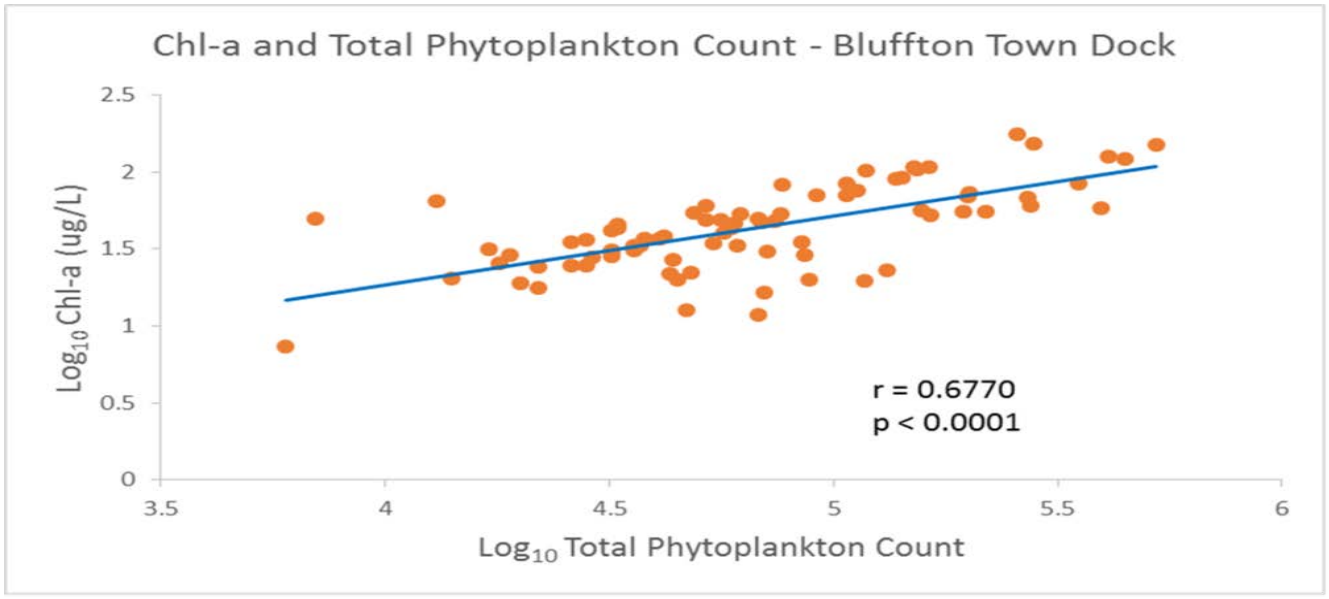


Figure 11 : Total Phytoplankton count is strongly positively correlated with Chl-a production at the Bluffton Town Dock site

Chl-a production at both sites correlated strongly with number phytoplankters in the water column as would be expected.

Rose Dhu Creek Anomalies

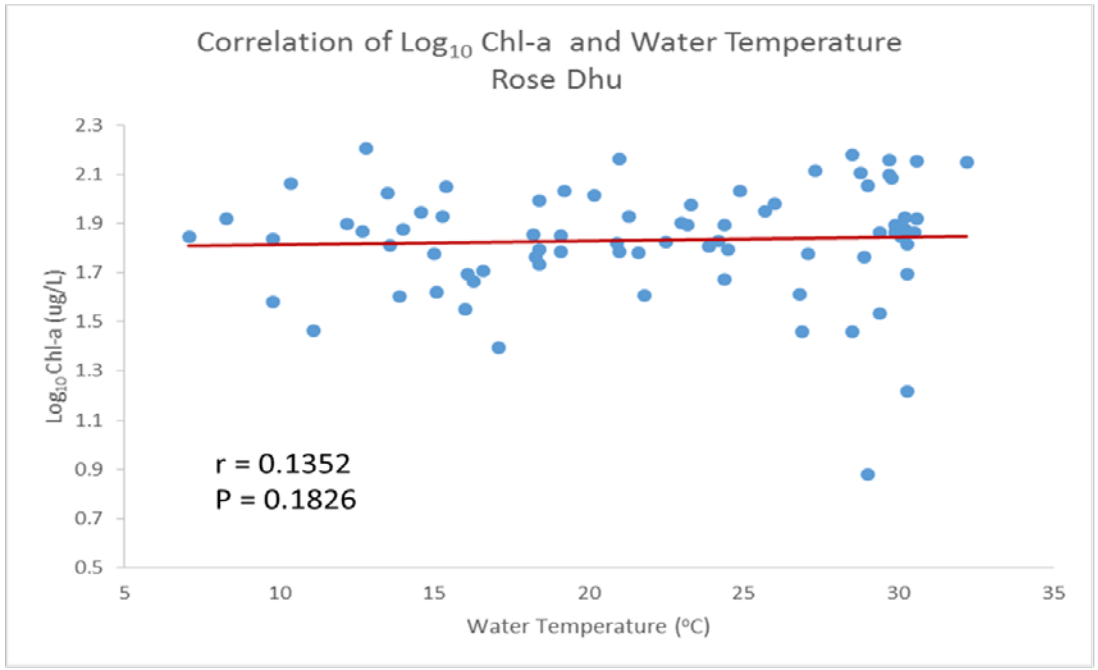


Figure 12 : Water Temperature is not well correlated with Chl-a production at the Rose Dhu site

Water Temperature is not a strong predictor of Chl-a production at Rose Dhu

Neither is Secchi Depth

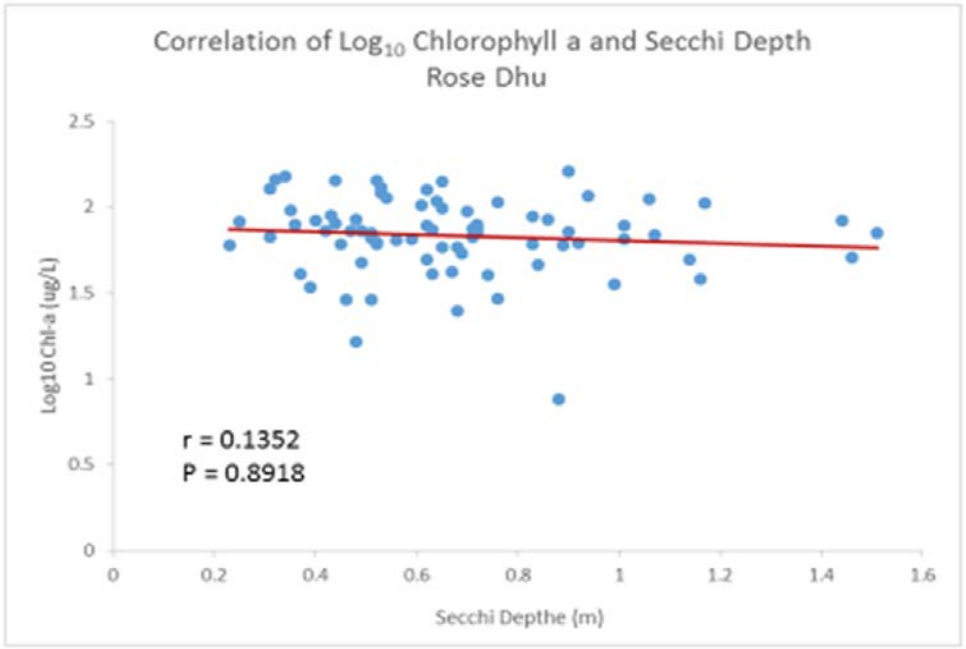
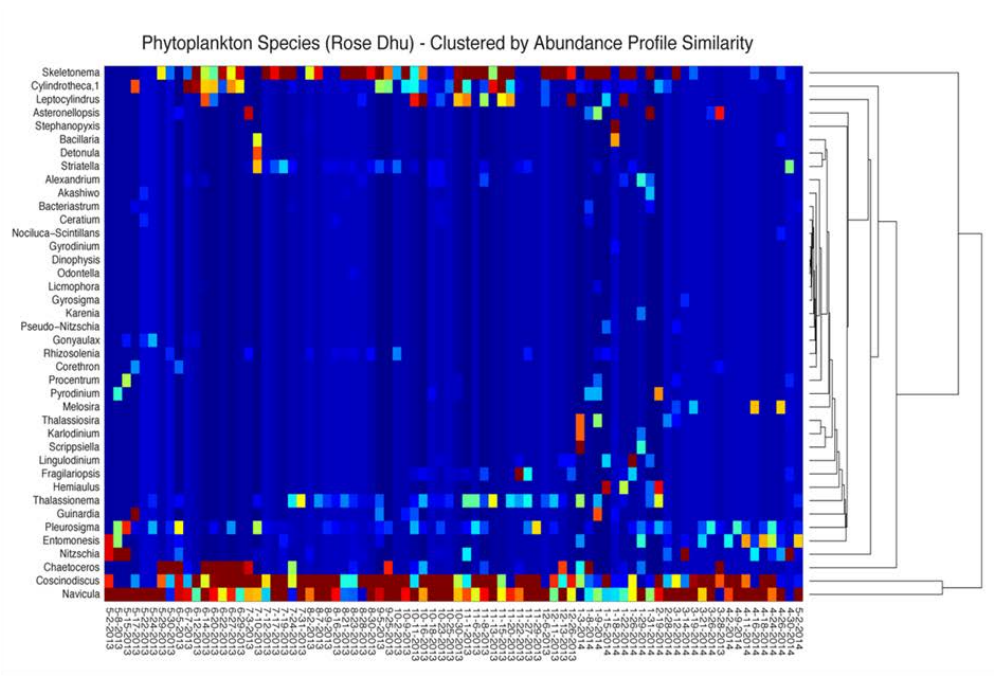


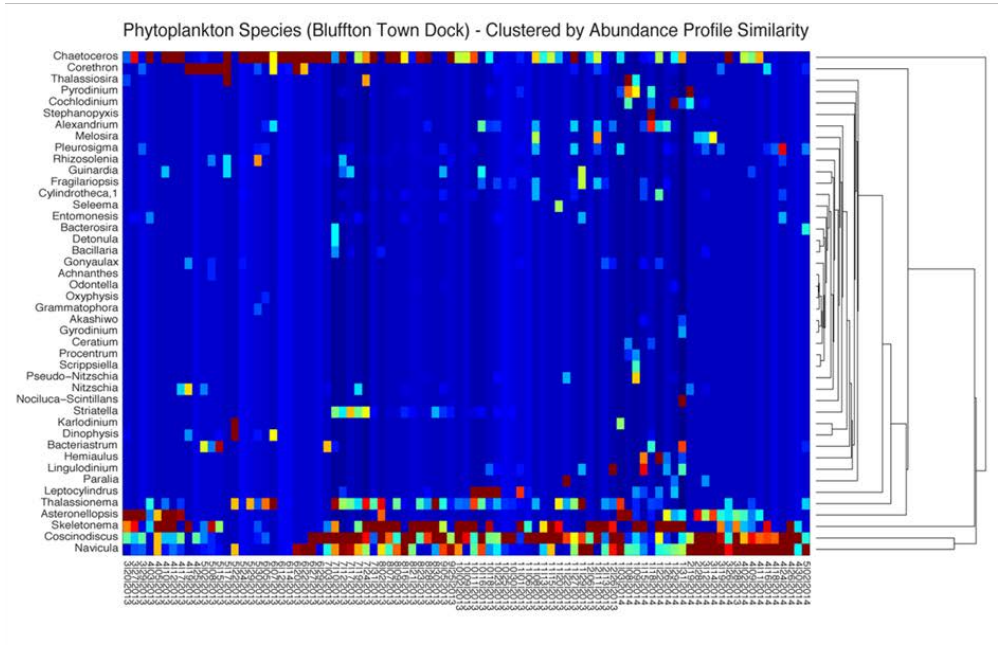
Figure 13 : Secchi Depth is not well correlated with Chl-a production at the Rose Dhu site

Between Site Comparisons (t-test)

		Interpretation
Phytoplankton Count	RD > BTD **P < 0.05**	**Rose Dhu Creek had greater concentration of Phytoplankton than Bluffton Town Dock over the study period**
Chlorophyll a	BTD > RD **P < 0.0001**	**Bluffton Town Dock had greater concentration of Chlorophyll a than Rose Dhu Creek over the study period**
Secchi Depth	BTD > RD **P < 0.0001**	**Bluffton Town Dock had greater Secchi Depth measurements than Rose Dhu Creek over the study period**
Water Temp.	RD = BTD	**Water Temperatures did not vary significantly between the two sites over the study period**

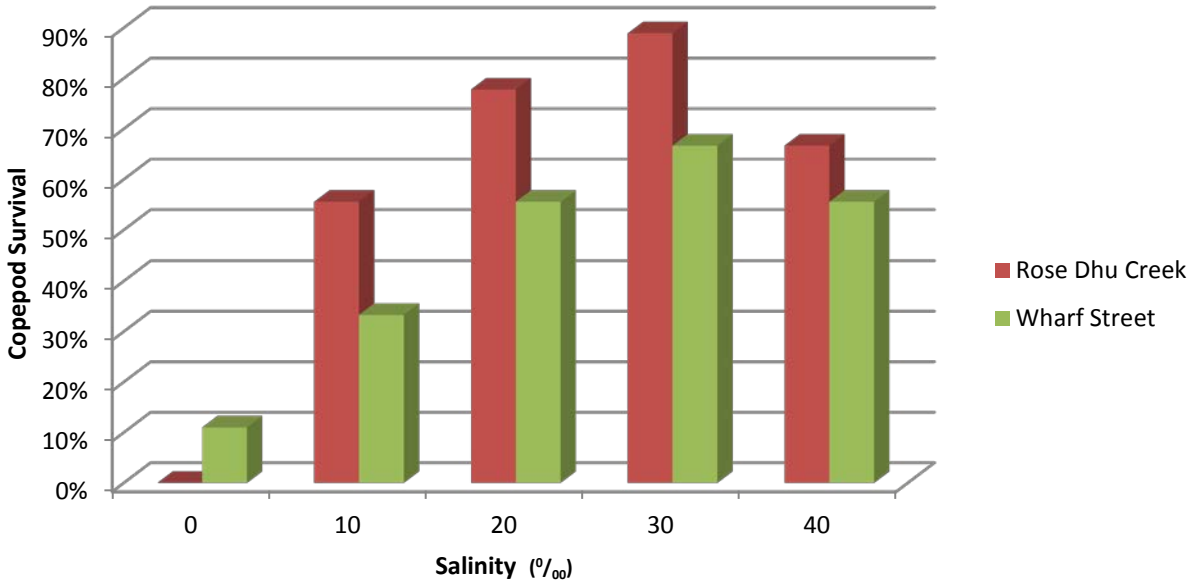
Phytoplankton Community Species Composition



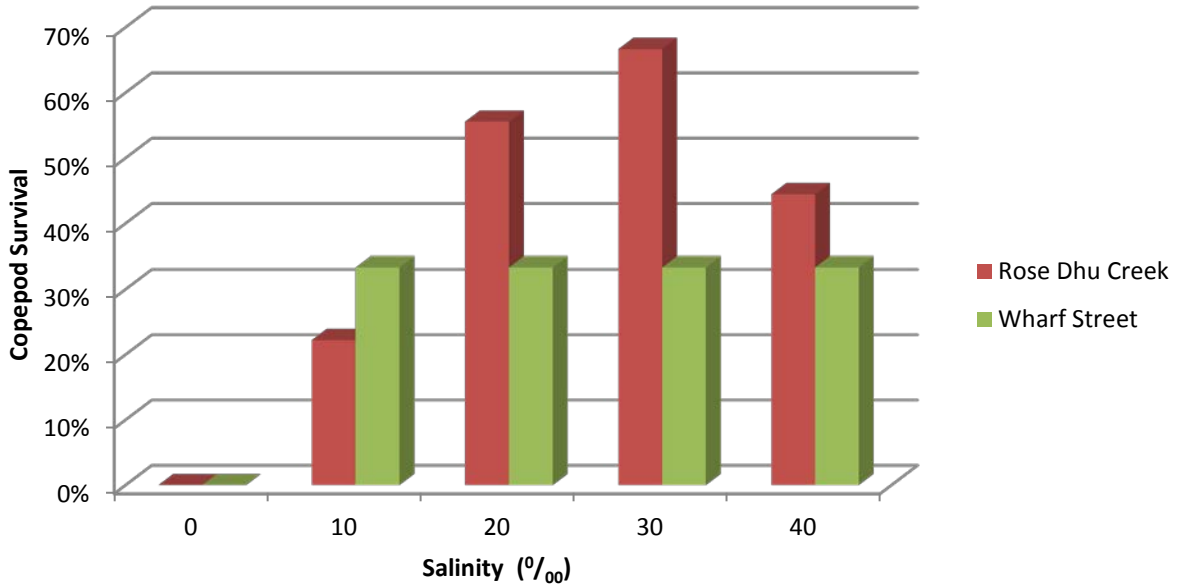


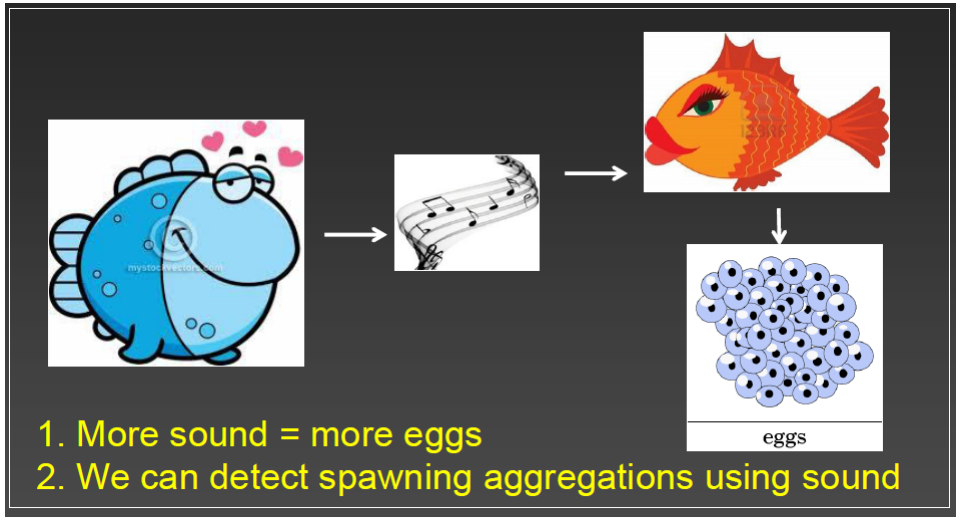
Copepods Exhibit Acute Toxicity to Freshwater

Average Copepod Survival 24 Hours



Average Copepod Survival 48 Hours





Listening Stations

- Twenty-seven stations
- 2 minute recordings
- Aug 2011 to Dec 2012

Spatial Patterns of Sound Production of Spotted Seatrout

- No chorusing aggregations detected in the headwaters of the May River.

- Less calling near the source of adjoining creeks (Savage, Bull, & Bass).

- Most likely no spawning at these locations.

Conclusions and Future Plans

While headwaters had a greater number of phytoplankters than downriver, Chl-a concentrations were much greater downriver indicating some drivers or stressors affecting Chl-a production in the headwaters.

Analysis of the taxonomic makeup of the phytoplankton community indicated strong spatiotemporal differences in the May River

The downriver Bluffton Town Dock site exhibited physiochemical and biological trends and correlations consistent with what one would expect based upon the scientific literature. This was not true in the headwaters. Variation in Chlorophyll-a concentrations cannot be easily explained by the data we collected.

Preliminary Copepod toxicity studies indicate acute negative effects of freshwater exposure on survivorship

Montie lab's studies have demonstrated reduction in courtship behavior in headwaters

We will continue to assess the effects of freshwater input on productivity in the headwaters through the development of a "tide/rainfall/salinity" model.

Acknowledgements

- USCB Water Quality Lab - Fluorometer
- Montie Lab Shared Data
- Dr. J. Staton - Statistical consultant
- Sarah Shay – summer intern

Funding

BEAUFORT COUNTY
STORMWATER MANAGEMENT UTILITY BOARD AGENDA
Wednesday, February 24, 2016
2:00 p.m.
Executive Conference Room 170, 100 Ribaut Road, Beaufort, SC
843.255.2805

In accordance with South Carolina Code of Laws, 1976, as amended, Section 30-4-80(d), all local media was duly notified of the time, date, place and agenda of this meeting.

1. CALL TO ORDER – 2:00 p.m.
   A. Approval of Agenda
   B. Approval of Minutes – January 27, 2016 (backup)
2. INTRODUCTIONS
3. PUBLIC COMMENT
4. REPORTS
   A. Utility Update – Eric Larson, P.E. (backup)
   B. Monitoring Update – Eric Larson, P.E. (backup)
   C. Stormwater Implementation Committee Report – Eric Larson, P.E. (backup)
   D. Stormwater Related Projects – Eric Larson, P.E. (backup)
   E. Upcoming Professional Contracts Report – Eric Larson, P.E. (backup)
   F. Regional Coordination – Eric Larson, P.E. (backup)
   G. MS4 Update – Rebecca Baker (backup)
   H. Maintenance Projects Report – David Wilhelm (backup)
   I. Financial Report (backup)
5. UNFINISHED BUSINESS
6. NEW BUSINESS (backup)
   A. Revised MOU with USCB Water Quality Lab.
7. PUBLIC COMMENT
8. NEXT MEETING AGENDA
   A. March 23, 2016 (backup)
9. ADJOURNMENT