BEAUFORT COUNTY
STORMWATER MANAGEMENT UTILITY BOARD AGENDA
Wednesday, April 11, 2018
2:00 p.m.
Executive Conference Room, Administration Building
Beaufort County Government Robert Smalls Complex
100 Ribaut Road, Beaufort, South Carolina
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 – March 14, 2018 (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. Municipal Reports – Eric Larson, P.E. (backup)
   H. MS4 Update – Eric Larson, P.E. (backup)
   I. Maintenance Projects Report – David Wilhelm, P.E. (backup)

5. UNFINISHED BUSINESS
   A. Stormwater Master Plan Update – Eric Larson (backup)

6. NEW BUSINESS
   A. USCB Grant Proposal Presentation – Dr. Eric Montie and Dr. Alan Warren, USCB (backup)
   B. Discussion Only – Restructuring of the Stormwater Management Utility Board

7. PUBLIC COMMENT

8. NEXT MEETING AGENDA
   A. May 9, 2018 (backup)

9. ADJOURNMENT

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

March 14, 2018 at 2:00 p.m. in Executive Conference Room, Administration Building, Beaufort County Government Robert Smalls Complex, 100 Ribaut Road, Beaufort, South Carolina

Draft Minutes 03/19/2018

Board Members

Present	**Absent**
Don Smith	Patrick Mitchell
Marc Feinberg	
Allyn Schneider	
Larry Meisner	
William Bruggeman	
James Fargher	

Ex-Officio Members

Present	**Absent**
Van Willis	Scott Liggett
Andy Kinghorn	Kim Jones

Beaufort County Staff
Eric Larson
David Wilhelm
Melissa Allen
Patty Wilson
Carolyn Wallace

Visitors
Alan Warren, USCB Lab
Alice Howard, County Council
Ellen Comeau, Clemson Extension
York Glover, County Council

1. Meeting called to order – Don Smith
Mr. Don Smith shared that Mr. Larry Meisner will be resigning from the Board, as he is leaving Beaufort. He thanked him for all he has done for the Board.

A. Agenda – Approved.
B. February 14, 2018 Minutes – Approved.

2. Introductions – Completed.

3. Public Comment(s) – None.

4. Reports – Mr. Eric Larson and Mr. David Wilhelm 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/2018/031418.pdf

Mr. Eric Larson congratulated Mr. Meisner on his next journey and thanked Council Members, Mr. Glover and Ms. Howard for being present.

A. Utility Update – Eric Larson

In reference to item #1, the committee is meeting next week to finalize a proposal to the SoLoCo. They are recommending the use of a consultant to help rewrite the codes for the applicable region. The meeting will be March 27th at 10:00 a.m. at Hardeeville City Hall.

The technical subcommittee on a regional authority has slowed down, as they felt it was more important to see how the SoLoCo reacts to the proposal about the regional technical standards first.

In response to a question from Mr. Andy Kinghorn about the committees, Mr. Larson explained that the technical subcommittee was tasked to write a goal/mission statement for the exploratory committee to use as the concept of a regional authority moved forward. The exploratory committee will likely be appointed by the politicians. The technical subcommittee is made up of staff that does stormwater at the municipalities and has been focused on the technical standards only. Mr. Kinghorn asked if the Town of Port Royal and City of Beaufort are represented. Mr. Larson expressed that his recommendation to the SoLoCo is to invite them for the discussion and that the intent is to appoint a committee that represents all of Beaufort County and Jasper County.

B. Monitoring Update – Eric Larson

In reference to item #2, Okatie West, the preconstruction monitoring work is complete and construction will begin on March 15th. The County will do the same sampling one year from now.

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

The SWIC has not met since the last board meeting.

D. Stormwater Related Projects – Eric Larson

Mr. Larson provided an update on item #1 (Okatie West); the County is working on a minor modification to the design due to a research opportunity with a product made by the company Bold and Gold. The product is a bio-filter made of a granular mixture of chemically reactive material that will clean water of bacteria, nitrogen and phosphorous. The only cost associated with the modification would be to hire a contractor to do the installation (infiltration/trench). The bid for the project came in under budget, so there is room for a change order. The University associated with the project will pay for an extensive monitoring program post construction for its effectiveness and is looking to partner with the USCB lab.

Mr. Meisner asked if there is a maintenance cost associated. Mr. Larson indicated that it is part of their research; they will pay for the materials and monitoring. He commented that they were just looking for an opportunity. The shelf life of the product is 10 years, so the project would either end or they would replace it. The bio-filter would be the 3rd BMP in series for this project. This would not reduce the effectiveness of the pond as currently designed.

Mr. William Bruggeman asked how the University knew the County was doing this project. Mr. Larson explained it was a result of networking at a conference; he met the engineering firm that is partnered with the research University. They asked about the County's projects, looked at design and indicated they could make it work.

Mr. Smith asked if the County will have enough data [to measure effectiveness]. Mr. Larson indicated a large number of samples were taken for bacteria and flow to have enough data to compare.

Dr. Alan Warren commented that every Monday, Wednesday, and Friday the lab collected samples for E.coli, fecal coliform and in-situ parameters and the County measured flow at the same time. They County and USBC lab has one-month worth of data collected on 12 different occasions. This will provide a good idea of the pond and its impact on bacteria, as post pond and post 3rd BMP monitoring will be done.

Mr. Smith asked if the bacteria baseline is good or bad. Dr. Warren explained data from GEL is available in addition to their data and the counts were surprisingly low compared to what is seen throughout the County. He explained that with bacteria counts being low, that flow data would be important.

In reference to item #2, Mr. Larson mentioned that easement work is ongoing and Council Members (Mr. Glover and Mr. Dawson) are both engaged to help come to a solution with property owners in their districts.

E. Professional Contracts Report – Eric Larson

The final draft for the implementation plan has been received. The SWIC is meeting next week to review the draft and make comments. Mr. Larson will present it to the Stormwater Utility Board and ATM will present to the Natural Resources Committee in April. This is an update to the previous master plan and the big changes will be highlighted. Some of the draft results have already been inputted into the County's proposed FY19 budget.

In reference to item #2, CIP projects, the meetings are happening tomorrow and next week.

In reference to item #3, Mr. Larson participated in selecting three engineering teams to provide full service engineering and architecture services (roofs, HVAC, roads, MS4, surveying). The hourly rates and scope of services have already been established, so only task orders would need to be issued. The current master service agreement with ATM will be allowed to expire at the end of August. In reference to a questions about the contracts, Mr. Larson responded that the firms are allowed $500,000 in design service fees. He indicated the County received ten proposals, interviewed five teams and selected three. He also explained the teams are not completely local, as some services the County needs are not provided locally.

F. Regional Coordination – Eric Larson

In reference to item #1, Academy Park, the project is going to construction soon, as it received final SRT approval.

In reference to item #5, The SESWA Conference will be held on Hilton Head in October. Town of Hilton Head staff is working to create a bus tour.

G. Municipal Reports – Eric Larson

In reference to the Mossy Oaks task force, Ms. Alice Howard shared that meeting scheduled next week is being rescheduled due to a scheduling conflict with Northern Regional Planning Committee. Mr. Larson mentioned that the County has made a committee

to help co-fund the project for preliminary design (Phase 1) and that the Town of Port Royal has committed as well.

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

Mr. Larson pointed out the increase in permit and inspection activity on the MS4 chart, which shows the need for the extra Stormwater Utility Inspector position that is listed in the FY19 proposed budget.

The annual report has been included in the packet and is also posted online. In reference to item #6, the statewide MS4 general permit expires at the end of the year. The County is starting their third year of the program, but the permit is at the end of its five-year cycle. By law, SC has to issue a new permit by that deadline. The County has to have a Notice of Intent submitted by June 30th, six months prior to the new permit. A NOI will have to be submitted prior to viewing a draft of the new permit. Mr. Larson commented that through experience this is when additions and changes are made.

In reference to a question about permitting, Mr. Larson said you can be covered by a general statewide permit, which is preferred, or you can have an individual permit that is customized and is usually harder than being covered by the general permit.

In reference to Mr. Meisner's question about a new MS4 Coordinator, Mr. Larson indicated that an offer has been made and accepted. He mentioned the County is advertising for a fourth inspector position. Mr. Bruggeman asked what the qualifications for an inspector are. Mr. Larson replied an associate's degree, bachelors preferred, in a related field and two years related experience.

I. Maintenance Projects Report – David Wilhelm

Mr. David Wilhelm shared that sweeper truck that was approved by County Council has been ordered. The logistics, such as staffing, an operating schedule, and where materials will be disposed of, still need to be worked out.

In reference to the Salem Drive East project, Mr. Wilhelm explained that the system was not well maintained which was causing major flooding on properties that are on septic systems. The biggest challenges were the depth, up to 15' deep in areas and there were a lot of structures on/near property lines so the crew had to work carefully. Drop inlets were installed at each property and riprap was placed at the outfall at each end of the system.

Mr. Wilhelm noted that the Port Royal bush hog project covered six months of work and came in on budget at 48¢ a foot, as the goal for this type of project is 50¢ a foot.

Upcoming major projects are planned to start soon for Wallace Road on Lady's Island, Horse Island on Saint Helena Island, and Oyster Street and Drayson Circle in Bluffton.

Ms. Alice Howard asked about the Community Bible sink hole. Mr. Wilhelm replied it was because the County installed the system (so the County was responsible for fixing).

5. Unfinished Business

Mr. Smith asked if Mr. Larson had a chance to look into the Super Fund Sites. Mr. Larson replied that he had not started on that project yet.

6. New Business –

A. *Proposed Budget for FY19* – Mr. Larson presented the unaudited FY17 actuals. He noted that the fees were down around $500,000 from the projected amount [unpaid fees]. The

permit fees (other income) will be reinvested into maintenance of the permitting software. The $5 million bond was received late and applied in FY18. In reference to Capital Improvement Fund, most of the differences were due to shifting priorities from Matthew and Irma. A lot of the capital projects didn't get started, but have started in FY18. In response to a question, Mr. Larson noted that since Stormwater is an enterprise fund, the money rolls over as a cash balance. Under capital assets new purchases, he explained that everything that was needed was purchased, but the department was able to obtain good deals through bidding processes and state contracts (approx. $200k savings).

Mr. Larson presented the proposed budget for FY19. The projected fees are based on the rate model, which adjusts for collection rate and projects growth. The collection rate is the total number of accounts paid. The $777K figure is the admin budget plus the cost shares. The administration (management fees) is lower due to efficiencies with how rates and billings are done. The Okatie West project will be complete, but there will be a carry over to account for Ward Edwards' final bill (i.e. grant paperwork). The CIP increases are the new phases being added in. Mr. Larson shared that the capital assets have a useful life and replacement plan.

Mr. Van Willis asked if the funds collected are rolled into this budget. Mr. Larson explained they show up in the Unincorp/CWI SWU Fees and tracked by the treasurer's office by parcel ID. He indicated there are not different expense codes for municipalities versus unincorporated; it becomes part of the operational program.

Mr. Larson pointed out that FY19 is the last of four years for the reserve fund ($250k); the reserve balance will be at $1 million or more.

Mr. Smith asked why radios cost so much. Mrs. Carolyn Wallace explained these are radios that are capable of being used with Emergency Management and are handheld with a built in charging system in the vehicle. She noted they have expensive software.

Mr. Feinberg asked about the wash facility noted on the budget. Mr. Larson explained that this is a current deficiency with MS4 compliance, so this will be a wash facility for all County vehicles and will be tied to sanitary or septic.

Mr. Smith asked about the land acquisition line item. Mr. Larson explained that is money set aside for condemnation and easement acquisition.

A motion was made to recommend approval to the Natural Resources Committee. Discussion took place on the SWIC reports.

Mr. Larson gave a brief overview of the reports that went to the SWIC. One report shows collection rates and actual fees paid versus projected. The City of Beaufort and Town of Port Royal each have a handful of accounts that have a large amount of IA that are not paying.

The second report is the proposed management fees. Collection rates, growth rates and distributions are used to calculate the fees. The three cost shares for FY19 are for public education, water quality monitoring (PR, City, County), and regional stormwater standards development. The committee proposed three methods (land mass, population, and even split) for the regional standards development cost share; the committee will be recommending to split by population.

Mr. Willis asked if land mass distribution would be by County. Mr. Larson said it would be square miles by jurisdiction. Mr. Willis commented that would be interesting for Town of Port Royal and City of Beaufort because two of the biggest non-payers are large land masses, so they are being charged for the land but don't receive the revenue.

Mr. Larson pointed out that the rate per account or SFU is shown with and without the regional standard cost share for easy comparison.

The motion to recommend approval of the budget to NRC was approved (6/0).

Mr. Smith asked if Mr. Larson has looked into the law that he shared with him [federal facilities paying fee]. Mr. Larson indicated that he has opened discussions with County attorneys. Brief discussion took place about the loss of revenue from the federal facilities not paying their fees.

B. *Special Presentation – Lowcountry Stormwater Partners* – Ms. Ellen Comeau with Clemson Extension shared Lowcountry Stormwater Partners (LSP) accomplishments and highlights of their program from 2017 and their plans for 2018. LSP's mission is to strive for fishable, swimmable, lowcountry waterways. They are made up of 31 partners to include Clemson Extension, local MS4s, municipalities, state agencies (i.e. DNR), and local organizations (i.e. Port Royal Sound Foundation).

LSP had 829,124 impacts for MCM1 Public Education in 2017, a 400% increase from the previous year and 134,124 impacts for MCM2 Public Involvement, a 30% increase from the prior year. These impacts are a total from all of the partners. In response to a question, Ms. Comeau explained that impacts are participants that sign in. She used the example of the Pond Conference having 98 participants, so that would equate to 98 impacts. They use impacts instead of individuals because someone could attend multiple events. LSP grew by four new partners over the past year, adding Together for Beaufort Water Quality Council, Beaufort County Human Services Alliance, McCormick Taylor, and Oldfield.

Highlights from 2017 included:

- 2017 Beaufort Area Stormwater Pond Conference – Presented two tracks: one for pond owners/property managers and one for pond management professionals and landscapers.
- 12th Annual SESWA Conference – A success from the conference, Mr. Larson and Dr. Scaroni (Clemson) have been invited to present the LSP concept at the Kentucky Stormwater Association Conference in June 2018.
- Spring Master Pond Manager – This focused on both stormwater and recreation ponds. There were 32 participants in the online course. There were also two field days in Beaufort County; the Stormwater Pond Field Day consisted of reading construction drawings and doing inspections and planting a 60-foot shoreline buffer and the Recreational Pond Field Day which was hosted on Spring Island, where participants discussed pond design and rookery management and practiced delineating wetlands.
- Cultivating a Carolina Yard Workshop – This taught homeowners how to create a low maintenance yard. The workshops were hosted at Daufuskie Island and Oldfield.
- Success with Stormwater Master Naturalist Training – Hands on workshop that was held at Crystal Lake. Ms. Comeau is scheduled to host this training again in April.
- Some plans for 2018 include increased BMP signage, starting a community grant program (i.e. - provide a BMP for HOA to install and maintain), septic system campaign (goal is to increase maintenance), and the "Silt Fence and Beyond Workshop" (target audience contractors and developers).

In response to a question about the high number of impacts, Ms. Comeau explained impacts are included from all of the partners, to include Clemson Extension which offers statewide efforts (billboards and commercials) and the courses they offer such as Master Pond and CEPSCI.

Mr. Smith commented that HOAs are a good venue, as many organizations can reach a lot of people and encouraged Ms. Comeau to keep contacting them. Ms. Comeau indicated when it comes to stormwater ponds, she prefers that the Board contacts her and invites her to present.

The Lowcountry Stormwater Partners presentation is attached.

B. *Litter Concerns* – Mr. Don Smith brought up the HWY278 litter issue that has drawn media attention, expressing it is also a stormwater concern. Mr. David Wilhelm shared that the County is aware of that and is working diligently to find a solution. They have approval to create a litter control team. The plan is to have a full time team of three people working eight hours a day, five days a week.

In response to comments and concern, Mr. Wilhelm explained that there are three parts to the litter problem; education and outreach, enforcement and litter control team. As a result of a suggestion by the Keep Beaufort County Beautiful board, they will be reaching out to all haulers to encourage them to join Adopt-A-Highway groups. He indicated there are currently 91 active groups, almost 3,000 volunteers. Mr. Wilhelm mentioned that HWY 278 is a SCDOT road and a lot of sections are being cleaning up by communities/businesses, but it a high visible area that needs a little more attention. They have not found anyone to adopt those sections yet.

Mr. Willis indicated that the Town of Port Royal is formalizing their agreement with the County and they will partner with DOT on some areas also.

Mr. Wilhelm mentioned that the County received a grant to buy tarps to give them out and show citizens how to use them. DOT was going to be providing half of the cost of the litter control team; however, last week the County was notified that they were withdrawing their support.

7. Public Comment(s) – None.

8. Next Meeting Agenda – Approved.

Additions to April 11, 2018 Agenda

- Unfinished Business –
  - Stormwater Master Plan Update (Eric Larson)
- New Business -
  - Special Presentation – Superfund Sites (Eric Larson)

9. Meeting Adjourned

CLEMSON
COOPERATIVE EXTENSION

LOWCOUNTRY STORMWATER PARTNERS

A Service of Clemson Extension

2016 – 2017 ANNUAL REPORT HIGHLIGHTS

The Lowcountry Stormwater Partners

- Striving for fishable, swimmable, Lowcountry waterways
- 31 partners
  - Clemson Extension
  - MS4s
  - Municipalities
  - State agencies
  - Local organizations

CLEMSON
COOPERATIVE EXTENSION

PORT ROYAL
EST. 1562
COOL. COASTAL. FAR FROM ORDINARY.

CLEMSON
COOPERATIVE EXTENSION

CLEMSON
COOPERATIVE EXTENSION

2016-2017 Highlights

MCM 1: Public Education

- 829, 124 impacts
- 400% increase from 2015-2016

MCM 2: Public Involvement

- 134,124 impacts
- 30% increase from 2015-2016

2016-2017 Highlights

- **4 new partners**
  - Together for Beaufort Water Quality Council
  - Beaufort County Human Services Alliance
  - McCormick Taylor
  - Oldfield

CLEMSON
COOPERATIVE EXTENSION

PROGRAM HIGHLIGHTS

CLEMSON
COOPERATIVE EXTENSION

2017 Beaufort Area Stormwater Pond Conference

CLEMSON
COOPERATIVE EXTENSION

12th Annual SESWA Conference

CLEMSON
COOPERATIVE EXTENSION

Hosting Master Pond Manager

CLEMSON
COOPERATIVE EXTENSION

"Cultivating a Carolina Yard" Workshop

CLEMSON
COOPERATIVE EXTENSION

"Success with Stormwater" Training

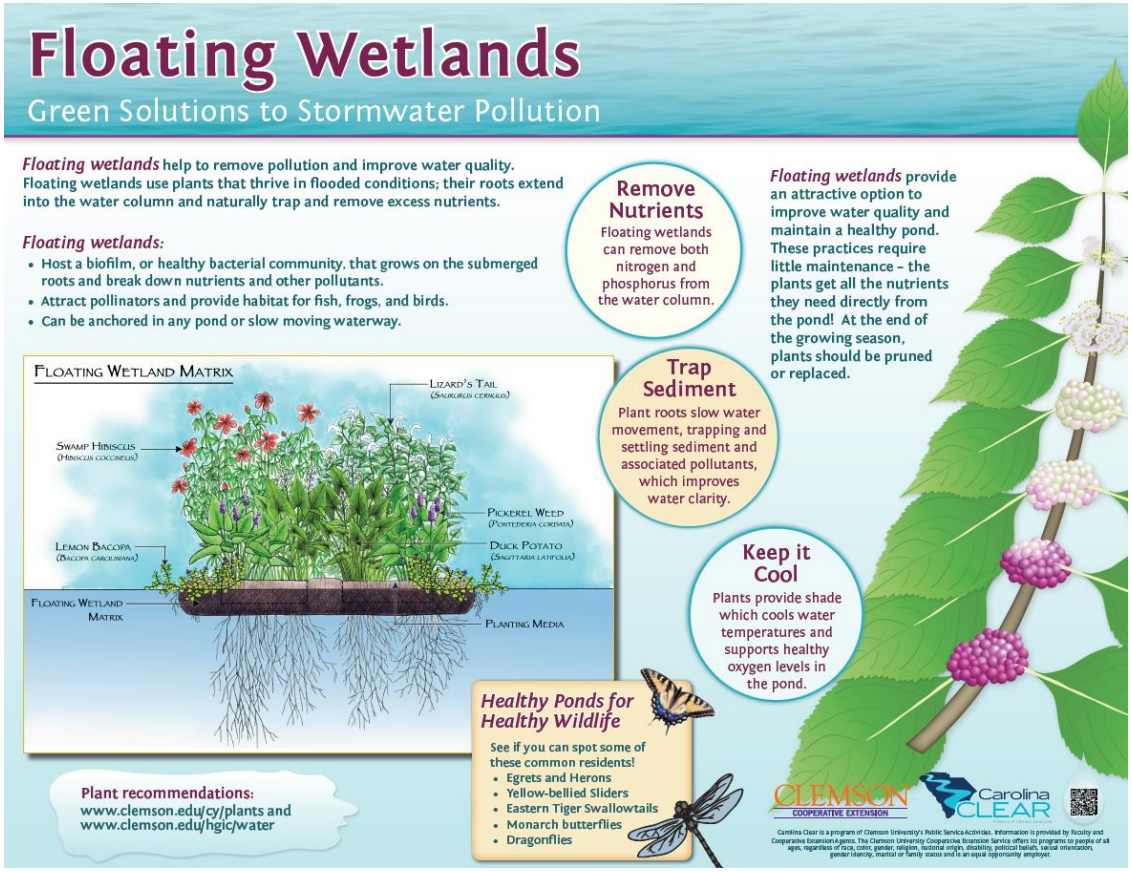
SOUTH CAROLINA
Master
Naturalist
LOWCOUNTRY MN PROGRAM

CLEMSON
COOPERATIVE EXTENSION

PLANS FOR 2018

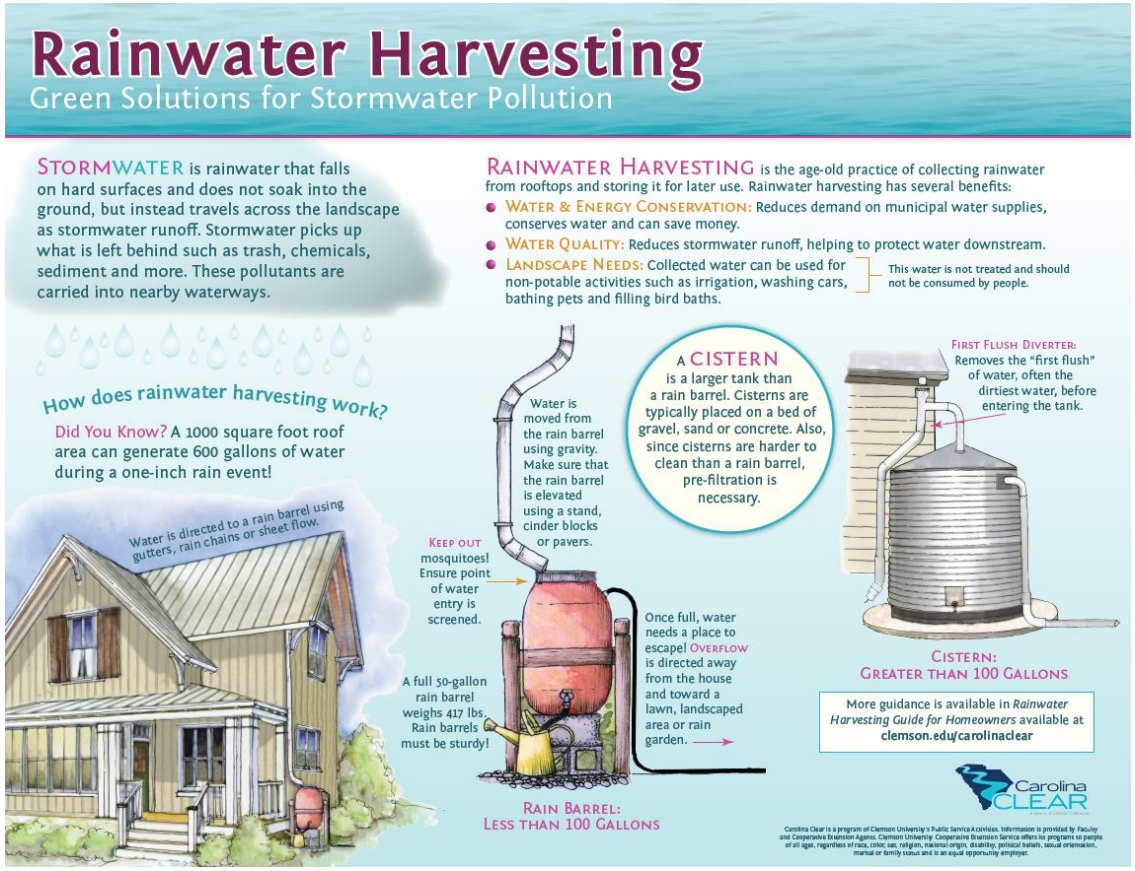
CLEMSON
COOPERATIVE EXTENSION

Increased BMP Signage



CLEMSON
COOPERATIVE EXTENSION

Lowcountry Stormwater Partners Community Grants Program



CLEMSON
COOPERATIVE EXTENSION

Septic System Campaign

CLEMSON
COOPERATIVE EXTENSION

"Silt Fence and Beyond" Workshop

CLEMSON
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Contact Info

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Lowcountry Stormwater Partners

www.facebook.com/LowcountryStormwaterPartners

www.clemson.edu/extension/carolinaclear/regional-consortiums/lsp/index.html

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Voice (843) 255-2805 Facsimile (843) 255-9436

April 11, 2018

Stormwater Manager's Report for the Stormwater Utility Board Meeting

Utility Update

1. Southern Lowcountry Regional Board (SoLoCo) – The technical subcommittee presented a recommendation to the SoLoCo on March 27. The recommendation was two-fold: 1) adopt a vision statement for a regional Stormwater technical standard, and 2) hire a consultant in FY 19 to guide and advise the region on the stormwater standard development. The SoLoCo Board accepted the recommendation and agreed to forward it onto each jurisdiction's council for action. They self-imposed a 3-month deadline to come back to the SoLoCo group (in June).
   a) After the March 27th meeting, discussions with ToHHI and Town of Ridgeland staff promoted the technical subcommittee to reconsider the process to procure services for the consultant. The original recommendation to negotiate a scope of services with the consultant the Town of Bluffton had selected earlier last fall for a similar effort, the committee elected to issue a new RFQ. The plan is to advertise and issue the RFQ, interview, and select a consultant within the 3-month timeframe.
   b) Staff updated the Northern Regional Plan Implementation Committee on March 23rd.
   c) The City of Beaufort and Town of Port Royal have invited staff to speak on the topic at a joint workshop in June.

2. Regionalization – See SoLoCo update.

3. FY 19 Budget – Approval of the management fee for TY 18 by the municipalities is pending. The deadline was April 1. County Council will have a budget adoption ordinance in May and June.

4. Promotions and new staff – Mrs. Katie Herrera has been hired as the MS4 Coordinator.

5. Special projects – Staff has begun research on the various topics provided by the Board for future meetings:
   a) Superfunds sites – This was scheduled for April but staff was unable to reach DHEC staff in a timely manner and ask for their assistance in a presentation.
   b) DHEC Shellfish monitoring results for 2017 – In progress. Staff is reviewing.
   c) SWU Fees and federal properties – County Legal is willing to come to a SWUB and present at a future date.
   d) County Convenience Center (Drop off Center, or DOC) Facility Plan – staff is still preparing the document.

Monitoring Update

1. Lab Update (From Dr. Alan Warren and Lab Manager Danielle Mickel)
   a) Beaufort County
      i. Dr. Warren met with BC and Engineers to discuss sampling for upcoming projects.
      ii. Second quarter of second year for MS4 has started.
   b) Town of Bluffton:
      i. Continue with weekly sample analysis.
      ii. 2nd Qtr MS4 has started.
   c) Palmetto Bluff:
      i. Revision for new MOU to continue monthly sampling and analyses for wet and dry events.
      ii. Data reduction/reporting.
   d) GEL-HHI:
      i. Analysis for Hilton Head Island E.coli samples 4x/Qtr, including data reduction/reporting, and invoicing.
   e) USCB Lab:
      i. Annual proficiency testing is complete with passing of all analytes.
      ii. Monthly (and as needed) calibration of equipment and instruments.
      iii. Certification Upkeep-including review of QA/QC, logbooks, COC's.
      iv. On-going efforts to obtain additional certification; no new certs obtained during this Qtr.
      v. Monthly sterility checks on Lab water for TOC, TRC, HPC, Conductivity, metals.
      vi. Learning new software for laboratory management systems.
      vii. Account tracking for all accounts-expenditures, deposits, ledgers, PO's
      viii. Logistics, planning, scheduling of all activities.
      ix. Procurement of all required materials, supplies and equipment

2. DHEC data mining grant proposal from USCB to Town of Bluffton and Beaufort County – Dr. Alan Warren and Dr. Eric Montie will be presenting under New Business on a research project to study all available data from DHEC and other sources to benchmark the health of our streams. Presentation attached.

Stormwater Implementation Committee (SWIC) Report

1. The SWIC committee met March 21, 2018 to review the final draft of the Stormwater Management Plan update. No other business was discussed.

Stormwater Related Projects

1. Okatie West / SC 170 Widening Retrofit (Construction = $993,048, CO#1 Design

$8,000) Construction has begun. The project is on schedule for a July 31, 2018 completion. The design modification to add the Bold and Gold water quality pre-treatment product is being developed for change order request from the Contractor.

2. Whitehall Boat Landing – The County is upgrading the boat landing off of Sea Island Parkway near the Woods Memorial Bridge as a CIP. Staff met with the design/build team to discuss the Stormwater design.

3. Easements – Staff is working on numerous easement requests and meets monthly to review status. County Council members are working with staff in an attempt to resolve unwilling easement acquisition prior to recommending condemnation to the Board. There are no projects ready for that recommendation at this time.

Professional Contracts Report

1. Stormwater Management Plan (Master Plan) Update – ($475,000 Budget; $239,542 County portion) – ATM delivered the final updated plan to the SWIC. This link http://www.bcgov.net/departments/Engineering-and-Infrastructure/stormwater-management/Whats-New.php will direct you to the full management plan update. The executive summary is included in the packet. A brief presentation of the report will be made under Unfinished Business.

2. CIP FY 18 Grouping Stormwater Projects – (Design - Ward Edwards $202,000, Andrews Engineering $560,490, Const. est. $5,512,900) – All projects are in early design phase. Project meetings resulted in changing the monitoring plan for each project. Only Sawmill project will have pre-construction monitoring. Shanklin and Salt Creek will have post-construction monitoring at the inlet and outlet of the ponds. Brewer will have post-construction monitoring before and after numerous BMPs. Clemson is providing conceptual designs and construction oversight for an expanded plan to include 10 BMPs.

Regional Coordination

1. Factory Creek Watershed Regional Detention Basin "Phase I" & Academy Park Subdivision (Design Cost $49,873, Tree Mitigation Cost $18,200 & $18,200, Construction Cost by the Developer) – Project is approved for construction. Ground breaking is pending.

2. Factory Creek Watershed Regional Detention Basin "Phase II" (Design Cost = $63,390, Tree Mitigation Cost is pending, Construction Cost by the Developer) – Final stage is under construction. No new updates.

3. Municipal "County" Infrastructure – A joint meeting of County Council and Town of Bluffton Council is pending. The main subject is Stormwater Regionalization. However, this topic may be included as the two are related. No date has been set at this time.

4. Mossy Oaks Task Force – See Municipal Reports.

5. Graves Property / Pepper Hall – County Council consideration of a public / private partnership – Council has formed a subcommittee to open negotiations with the developer on a P3 for the development of the Okatie Park purchased by the County several years ago through the Rural and Critical Lands Program. A key issue with the site is offsite runoff coming through the Graves tract. The Developer would like to design Stormwater management in coordination with the County to meet both objectives of management of existing and proposed future runoff. Staff is participating and will provide more details as they become available.

6. SESWA Fall Conference – October 3-5, 2018 at the Marriott Convention Center, Palmetto Dunes, Hilton Head Island, SC. This conference is not limited to SESWA members. Any Board member or member of the development community that wants to attend should go to www.seswa.org and watch for registration information.

Municipal Reports

1. Town of Hilton Head Island (From Jeff Netzinger, Stormwater Manager and Brian Eber, MS4 Coordinator)
   i. No information was available at the time of this report.

2. Town of Bluffton (From Kim Jones, Watershed Management Division Director)
   i. See attached report.

3. City of Beaufort (From Neil Desai, Asst. Public Works Director)
   i. Mossy Oaks Task Force – The last scheduled meeting of the task force was postponed. The next meeting was scheduled for April 6th. Results will be presented during the Board meeting.
   ii. No additional information was available at the time of this report.

4. Town of Port Royal (From Van Willis, Town Manager and Tony Maglione, consultant)
   i. No information was available at the time of this report.

MS4 Report

1. Plan Review – See the attached chart for Beaufort County Stormwater staff plan review workload for the past 12 months.

2. Stormwater Permits – See the attached chart for Beaufort County Stormwater permits issued for the past 12 months.

3. Monthly Inspection summary - See the attached chart for Beaufort County Stormwater staff inspection, complaint, IDDE, and violations summary for the past 12 months.

4. Public Education – Lowcountry Stormwater Partners (LSP), via Carolina Clear, continues to work on several initiatives towards public education and outreach.

   Over the past month:
   - Presented at the Hilton Head Home Builders show on 3/16/18 to about 50 people.
   - Created and sent an informational presentation and resource packet about stormwater pond maintenance to the Rose Hill board as Ellen was unable to attend their meeting in person.
   - Toured Harbor Island with concerned citizens and discussed rookery/pond maintenance on 3/30/18.

   Scheduled:
   - Give a rain garden presentation to the Lowcountry Master Gardener Association April 3rd.
   - Present to the Beaufort County Senior Leadership class on April 4th.
   - Tour the Mossy Oaks neighborhood April 9th as LSP is now working in conjunction with the Mossy Oaks Task force to educate homeowners about residential infiltration practices. Workshops to be set up soon.
   - Man an LSP/Clemson Extension table at Port Royal's Soft Shell Crab Festival on April 21st.
   - Man an LSP table and provide enviroscape demonstrations at the May River Clean Up on April 28th.
   - Pitch the idea of holding the "Cultivating a Carolina Yard" workshop to the Hampton Lake POA board on July 19th.

   Other projects include:
   - Finding an HOA within the Bluffton area to mark storm drains during the May River Cleanup.
   - Getting quotes for LSP merchandise.
   - Working to contact the Callawassie Ecology Club to discuss hosting the "Cultivating a Carolina Yard" workshop.
   - Researching successful septic campaigns.

5. Construction permitting – Back in July 2017, the County became a permitting authority for Stormwater as part of the "ramp up" of the MS4 permit program. Despite a thorough education campaign and series of public meetings, the word did not get out as well as we'd hoped. A comprehensive press release went out in February explaining the new process and set an April 1st date to begin with firm implementation of the new permit requirements. This time the development community took notice. County staff and DHEC permitting staff in Charleston are now working to set up training for home builders, designers, etc. to again explain the permit requirements and process. No date has been set. Staff has met with HHI Home Builders Association staff to educate them on the new process and to coordinate the proposed training.

6. MS4 Coordinator – Mrs. Herrera has been rapidly getting up to speed on our program by reviewing the annual report, the revised SWMP, and the BMP Manual. She has met with key staff and consultant for a briefing on activity.

7. MCM6 – Facility plan for Drop Off Centers – Consultant Beth McLaughlin is working on a proposed upgrade plan for the county DOC to make them compliant with pollution prevention as defined in our BMP Manual. This is a MS4 permit requirement.

8. Monitoring plan update – Consultant Beth McLaughlin is also working on an expansion of our monitoring plan to incorporate TMDLs in the Chechessee River and Beaufort River. These TMDLs were added to our MS4 compliance as a result of becoming "permit by rule" in 2017.

9. MS4 Statewide General permit – No update at this time.

10. Statewide General permit for Construction – This permit expired in December. DHEC is actively seeking comments on the old permit to aid in shaping the proposed changes to the new permit. Beaufort County and the Town of Bluffton both submitted comments. SCASM submitted comments on behalf of its members.

11. E-permitting – DHEC will be rolling out e-permitting with the NOI for the MS4 permit in May. Staff will be trained on the software and will be required to submit the new MS4 permit through the system later this year.

SCOPE OF SERVICES FISCAL YEAR (July 2018 to June 2019)

"Historical Analysis of Water Quality and Climate Change Endpoints and Monitoring of Natural Resources in the May River – A Pilot Study for Other Watersheds in Beaufort County"

The Scope of Services in this MOU Addendum between the Town of Bluffton and USCB (specifically the Marine Sensory and Neurobiology Lab or USCB-MSNL and the USCB Water Quality Lab or USCB-WQL) includes those activities specified in sections A-E below.

Note: The May River has been chosen for this pilot study because Dr. Montie has been working in this watershed since 2011. The goal will be to focus data mining, statistical analysis, and natural resource monitoring in the May River during the 2018-2019 funding cycle with historical comparisons of water temperature, fecal coliform, and salinity levels to the Okatie River, Broad Creek, and Battery Creek. This focused approach will allow us to formalize our data mining approach and statistical methodology that can then be applied to all watersheds in Beaufort County as future work.

A. Historical Analysis of SCDHEC Shellfish Monitoring Data

1. For each SCDHEC Shellfish Monitoring station in the May River, a historical evaluation will be completed of existing parameters (**i.e., water temperature, fecal coliform, and salinity levels**) from 1999 to 2016. Statistical analysis (i.e., regression analysis) will be performed for each parameter at all monitoring stations.
2. From these data, USCB will determine how these parameters changed over the years and what monitoring stations have undergone the most degradation.

B. Understanding Factors that Influence Fecal Coliform Levels

1. USCB will determine what factors have influenced fecal coliform levels in the May River. Initial factors will include temporal parameters (e.g., year, season, month, lunar phase, tidal phase), geographical parameters (e.g., sampling station, distance from the mouth of the May River, width of river, depth), and environmental data (e.g., water temperature, rainfall, salinity levels, dissolved oxygen, pH). This will be accomplished using specific statistical methods (i.e. General Linear Models).
2. USCB may also explore how changes in human activities have affected fecal coliform levels in the May River by incorporating growth parameters (e.g., population, the amount of impervious surface, forested land).
3. This type of data analysis may help explain why sudden changes in fecal coliform levels appear at certain monitoring stations and could provide some insight into developing more effective best management practices (BMPs).

C. Mining of Other Historical Chemical, Physical, and Biological Data

1. USCB will use the Water Quality Portal to **explore** data sets (NWIS, BioData, Stewards, STORET) for other chemical, physical, and biological parameters in the May River other than fecal coliform. A historical evaluation of some these existing parameters (**e.g., DO and pH**) will be completed if they exist.
2. This type of data analysis may help identify other problematic water quality issues beyond fecal coliform that may affect human health and our natural resources including oysters, shrimp, blue crabs, fish, and bottlenose dolphins.

D. Comparing Historical Data of the May River to Other Watersheds

1. USCB will perform a historical evaluation of **water temperature, fecal coliform, and salinity levels** in the Okatie River, Broad Creek, and Battery Creek, and these changes will be compared to the May River.
2. We understand the importance of performing this work for **all watersheds in Beaufort County** as well as performing comparative analysis to identify what water quality parameters and what watersheds have undergone the most drastic change. However, this detailed analysis is outside the scope of the 2018-2019 work outline. Future work would focus on comparative and statistical analysis of water quality parameters (i.e., fecal coliform, salinity, water temperature, DO, and pH for all watersheds in Beaufort County (i.e., if they exist).

E. Novel Techniques to Monitor Our Natural Resources in the May River

1. *Monitoring Environmental Data.* Since 2013, USCB-MSNL has been monitoring water temperature and depth continuously using HOBO loggers at three stations. Since 2015, USCB-MSNL has been monitoring salinity, pH, and dissolved oxygen bi-monthly at six stations. USCB will continue these measurements.
2. *Monitoring Fish Spawning.* Since 2013, USCB-MSNL has been acoustically monitoring fish spawning aggregations of silver perch, black drum, spotted seatrout, and red drum in the May River. USCB-MSNL will continue to monitor these spawning aggregations and will document any changes in these aggregations.
3. *Monitoring Juvenile Invertebrates and Fish.* In 2016, USCB-MSNL initiated a seining program of tidal pools, creeks, and shorelines in the May River to determine the diversity, yearly abundance, and growth patterns of fish species. USCB-MSNL will continue this seining program and will document any changes in abundance and growth patterns.
4. *Monitoring Bottlenose Dolphins.* In 2015, USCB-MSNL initiated a bottlenose dolphin monitoring program to document changes in seasonal and yearly abundance, distribution, residency, and health of these apex predators in the May River. USCB-MSNL will continue this program and document any changes.

Table 1. Sampling strategy for environmental parameters, invertebrates, fish, and bottlenose dolphin monitoring in the May River, SC.

	No. of Stations	Sampling Frequency	Laboratory Personal
Water temperature and depth	3	Every 20 min	0
Salinity, pH, DO	6	Bimonthly	2
Acoustic sampling	3	Every 20 min	0
Seining	6	Monthly	4
Bottlenose dolphin surveys	NA	Bimonthly	2

Budget

The budget for the 2018-2019 funding cycle is $30,000 which covers supplies and salary for employees.

Laboratory Contacts:

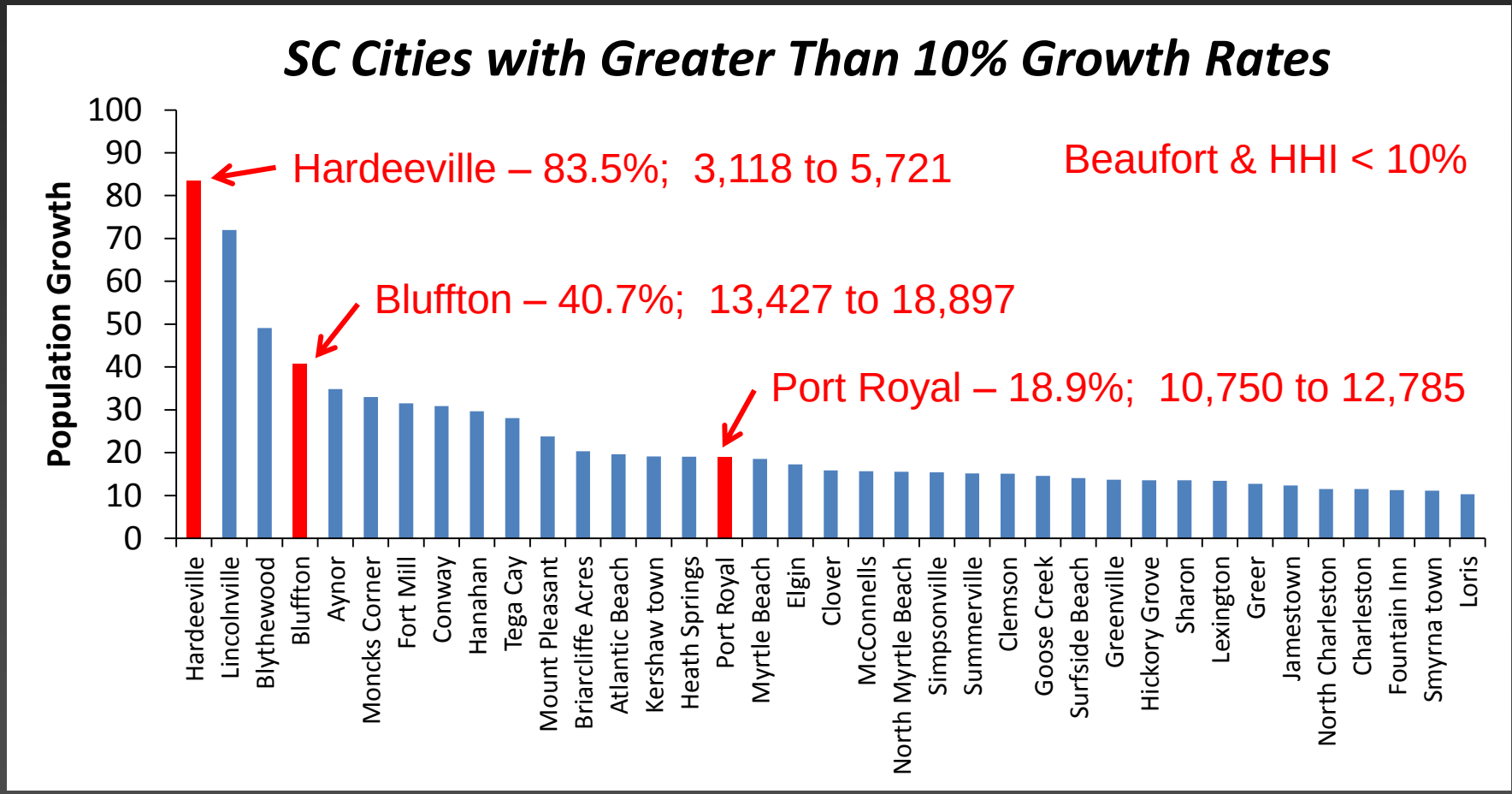
Title	Name	Contact
Laboratory Director of USCB-MSNL	Dr. Eric Montie	Office: 843-208-8107
Laboratory Director of USCB-WQL	Dr. Alan Warren	Office: 843-208-8338
Laboratory Manager of USCB-MSNL	Agnieszka Monczak	Office: 843-208-8192
Field Manager of USCB-MSNL	Bradshaw McKinney	Office: 843-208-8192
Laboratory Manager of USCB-WQL	Danielle Mickel	Office: 843-208-8193
Water Quality Analyst of USCB-WQL	Michael Monday	Office: 843-208-8193

Historical Analysis of Water Quality and Climate Change Endpoints and Monitoring of Natural Resources in the May River – A Pilot Study for Other Watersheds in Beaufort County



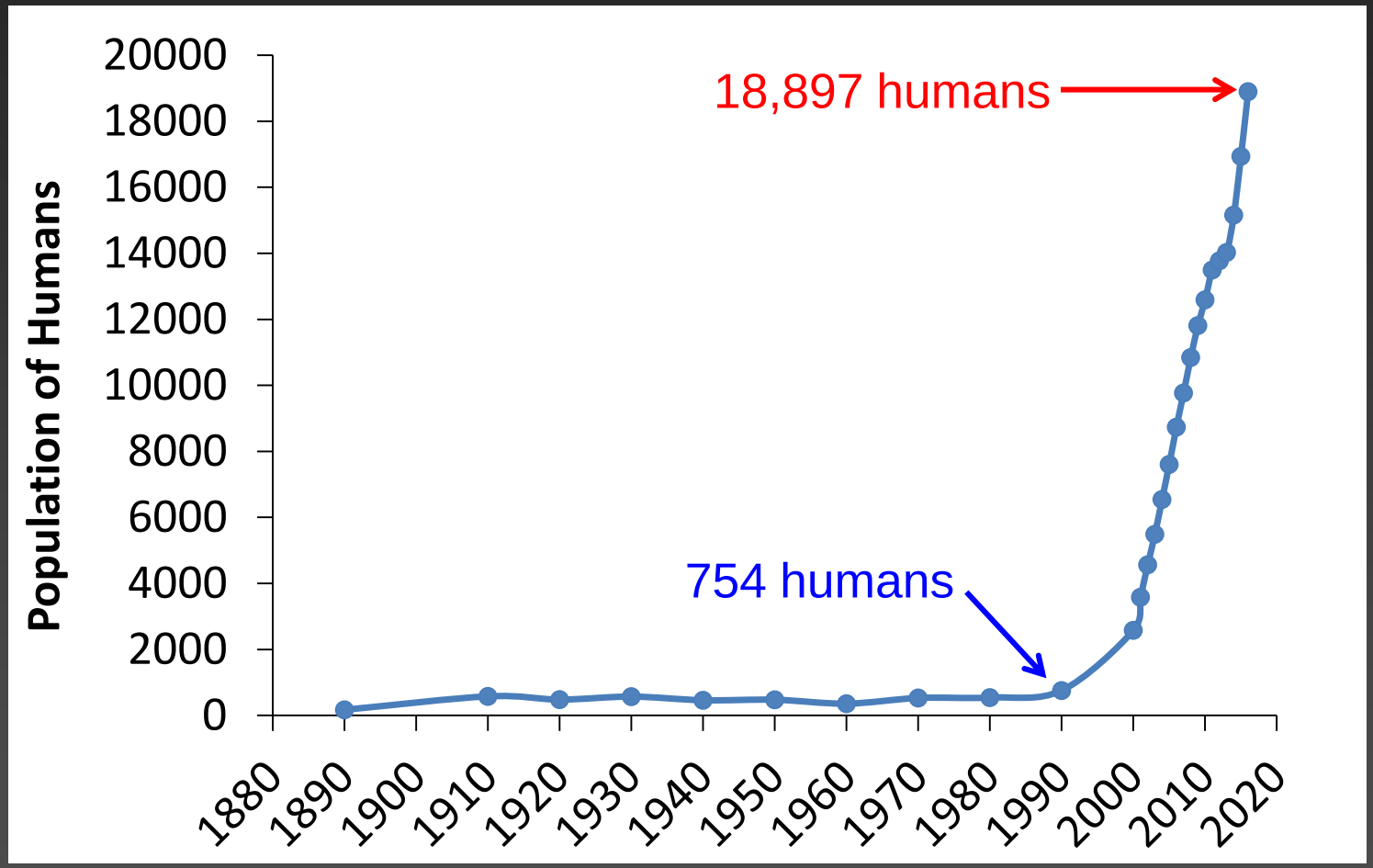

Eric W. Montie, M.S., Ph.D., and Alan Warren, M.P.H., Ph.D.
Departments of Natural Sciences and Health Promotion
USCB Marine Sensory and Neurobiology Lab
USCB Water Quality Lab
University of South Carolina Beaufort

Hardeeville and Bluffton – Fastest Growing Cities in SC from 2010 to 2016



United States Census Bureau
https://www.census.gov/programs-surveys/popest/data/data-sets.html

Exponential Growth of Bluffton



United States Census Bureau
https://www.census.gov/programs-surveys/popest/data/data-sets.html

Development of May River and Okatie River Watersheds from 1990 to 2016

With Population Growth and Development Comes Increased Stress to the May River

Habitat loss

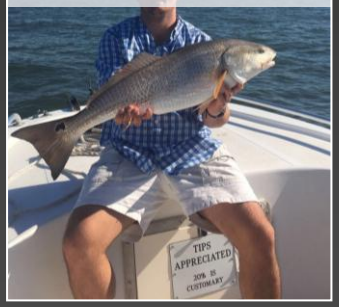
Fecal coliform pollution

Noise Pollution

Stormwater runoff

Alteration to shoreline habitat

Fishing



Microplastics

Boat interactions

Pharmaceuticals

Need for Historical Analysis and Long-term Monitoring of Water Quality, Climate Change Endpoints, and Our Natural Resources

Where are we and where are we going?

REVISED MAY RIVER WATERSHED ACTION PLAN:

4. Establish new partnerships (e.g., USCB, USGS) to perform in situ long-term monitoring of climate change endpoints such as depth (sea level rise), rainfall, temperature, salinity, conductivity, dissolved oxygen, pH, and possibly chlorophyll and dissolved organic matter.

    a. Time-series analysis of Fecal Coliform “hot spot” data and Microbial Source Tracking within the May River Watershed.

5. Establish new partnerships (e.g., USCB) to perform long-term monitoring of natural resources in the May River.

Proposed Scope of Work

A. Historical Analysis of SCDHEC Shellfish Monitoring Data

B. Understanding Factors that Influence Fecal Coliform Levels

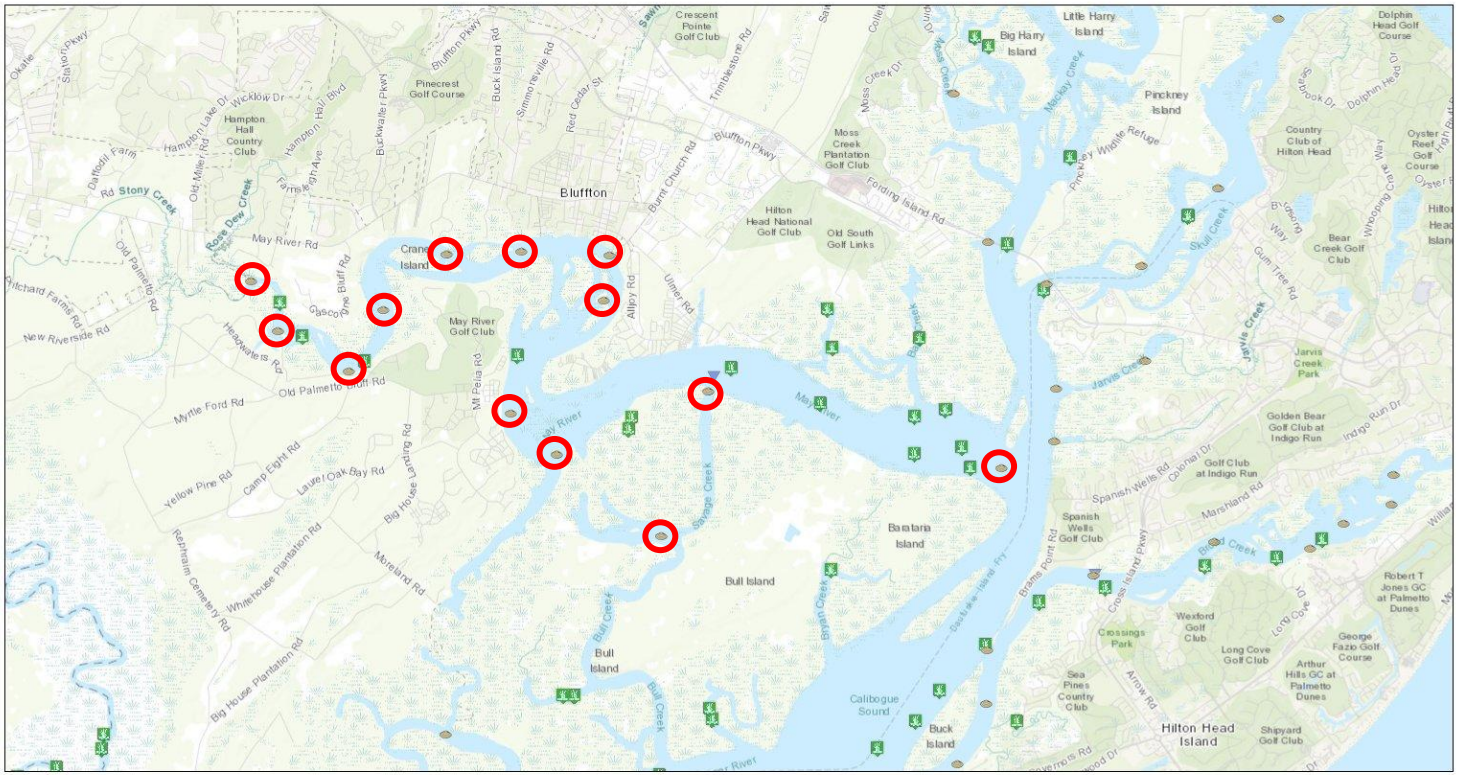
C. Mining of Other Historical Chemical, Physical, and Biological Data

D. Comparing Historical Data of the May River to Other Watersheds

E. Novel Techniques to Monitor Our Natural Resources in the May River

A. Historical Analysis of SCDHEC Shellfish Monitoring Data

SCDHEC Monitoring Stations in the May River

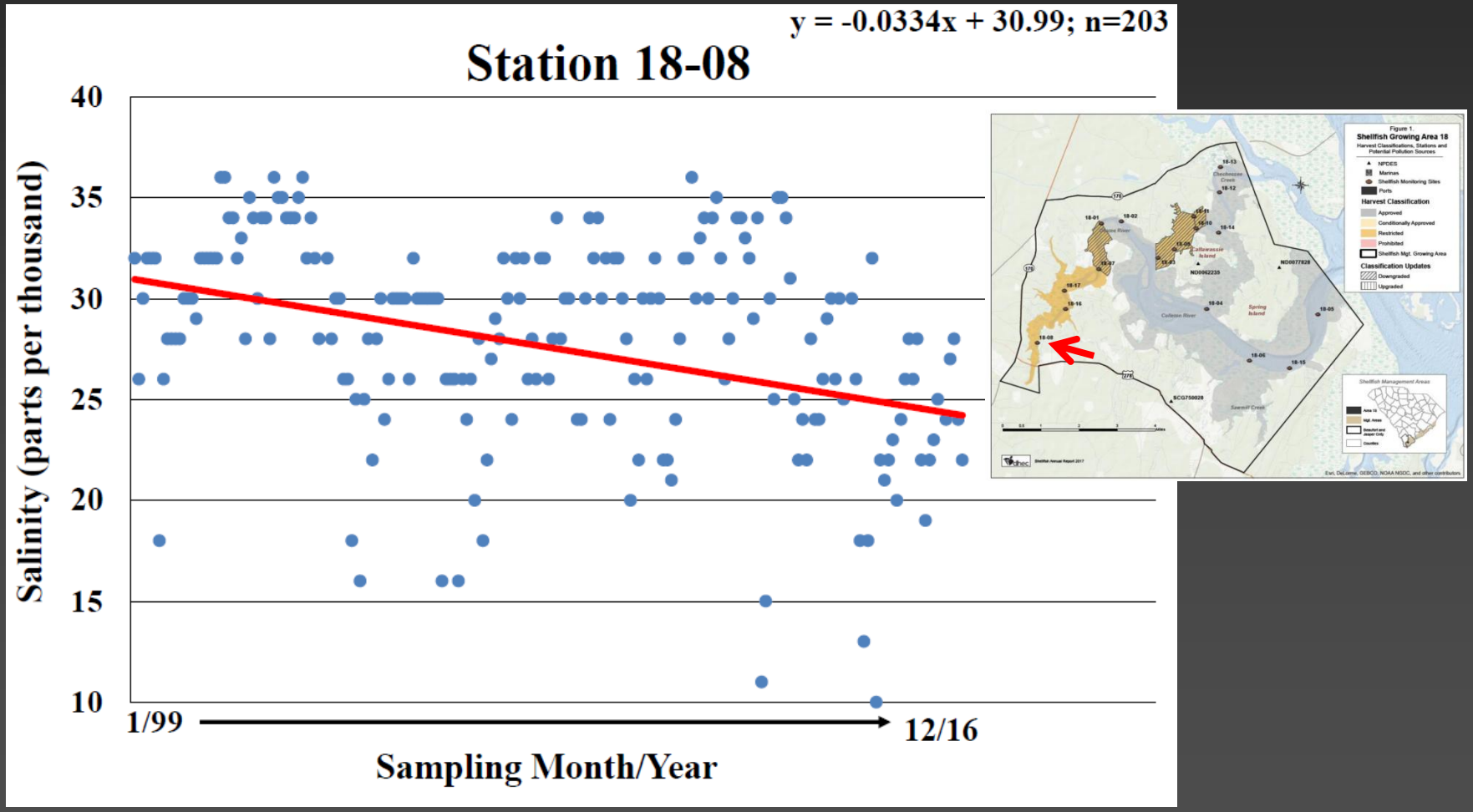


Perform Time Series Analysis from 1999 – 2017:

1. Water temperature
2. Salinity
3. Fecal coliform

A. Historical Analysis of SCDHEC Shellfish Monitoring Data – Okatie River Example

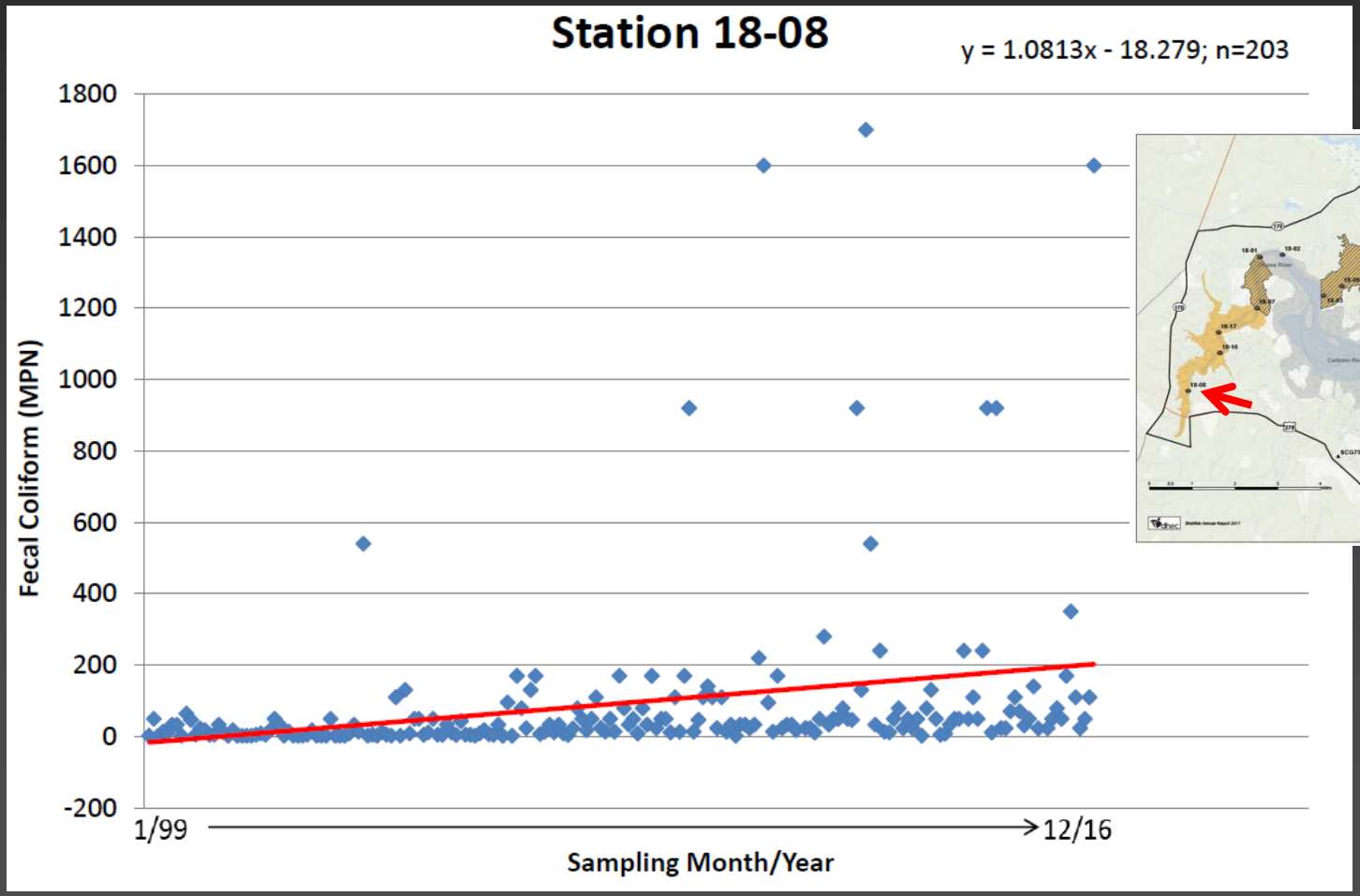
Historical Salinity Data

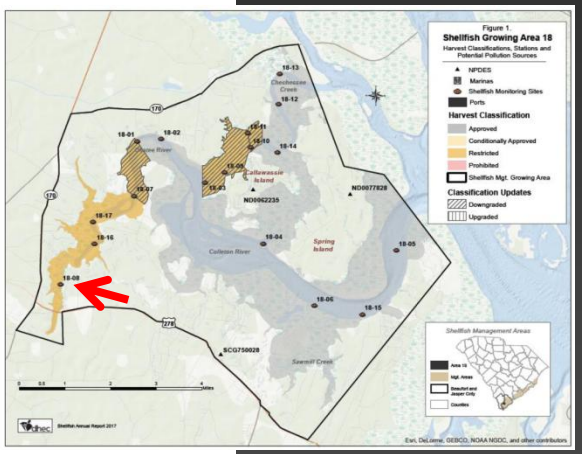


**Prepared by Alan Warren using SCDHEC Shellfish Monitoring Data.*

A. Historical Analysis of SCDHEC Shellfish Monitoring Data – Okatie River Example

Historical Fecal Coliform Data





**Prepared by Alan Warren using SCDHEC Shellfish Monitoring Data.*

B. Understanding Factors that Influence Fecal Coliform Levels in the May River

Temporal Parameters
- Year
- Season
- Month
- Lunar phase
- Tidal phase

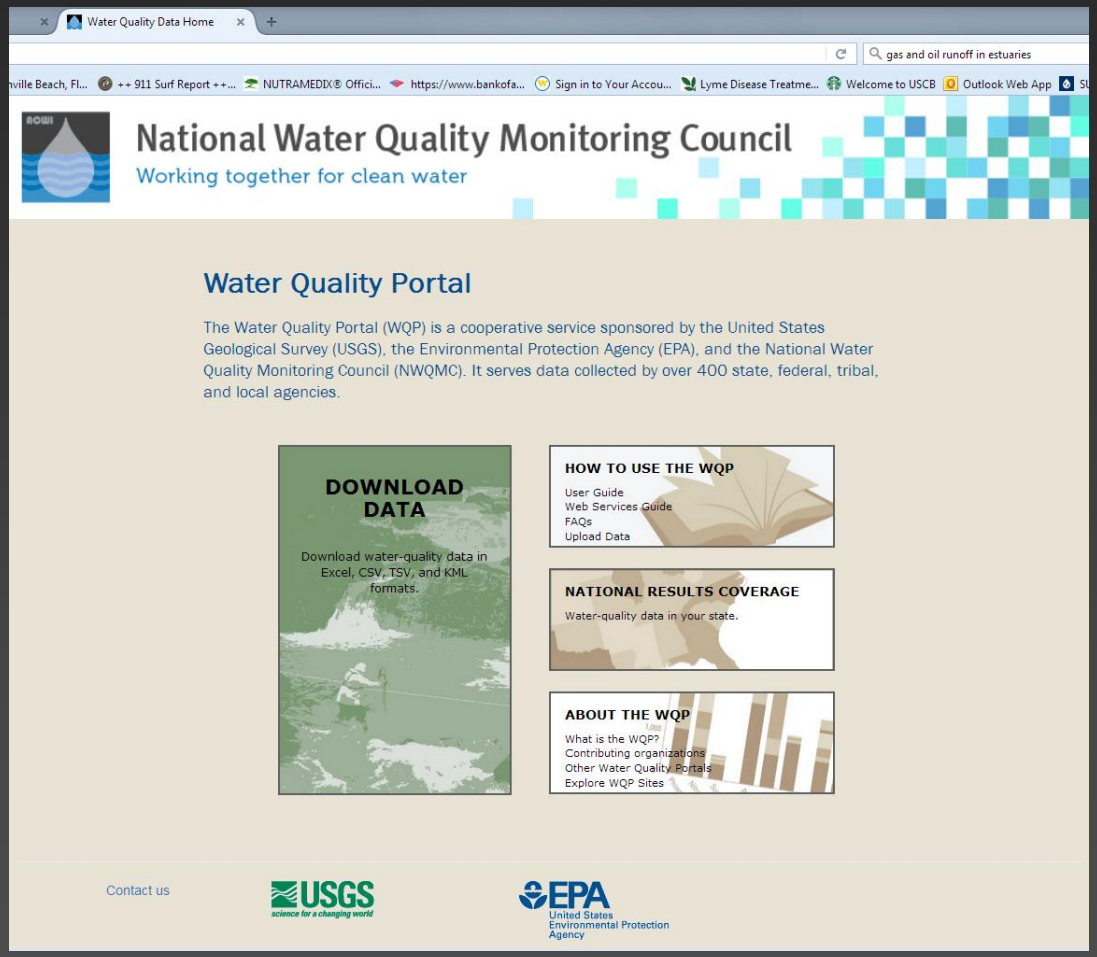
Geographical Parameters
- Sampling station
- Distance from mouth
- Width of river
- Depth

Environmental Parameters
- Water temperature
- Rainfall
- Salinity
- Dissolved oxygen
- pH

Human Parameters
- Population
- Impervious surface
- Forested land
- BMP installments

*Use publicly available data from STORET, NWIS, STEWARDS

C. Mining of Other Historical, Chemical, and Biological Data from the May River

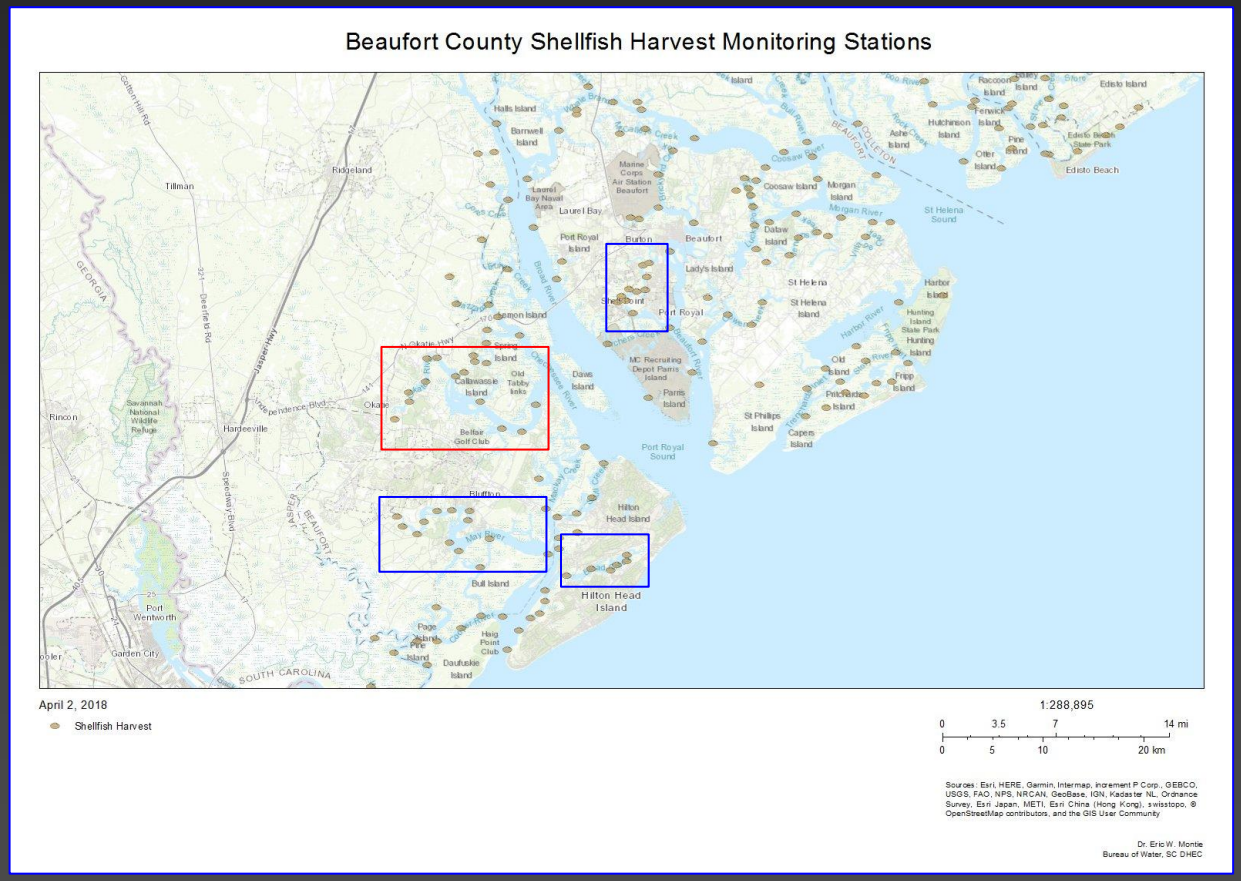


This type of data analysis may help identify other problematic water quality issues beyond fecal coliform that may affect human health and our natural resources including oysters, shrimp, blue crabs, fish, and bottlenose dolphins.

*Use publicly available data from STORET, NWIS, STEWARDS
https://www.waterqualitydata.us/

D. Pilot Study - Comparing Historical Data of the May River to Other Watersheds

1. We will perform a historical evaluation of water temperature, fecal coliform, and salinity levels for the Okatie River, Broad Creek, and Battery Creek and compare to the May River.
2. Future work – Analysis of all watersheds in Beaufort County.



*Map created using SC Watershed Atlas https://gis.dhec.sc.gov/watersheds/

*Use publicly available data from STORET, NWIS, STEWARDS https://www.waterqualitydata.us/

E. Novel Techniques to Monitor Our Natural Resources in the May River

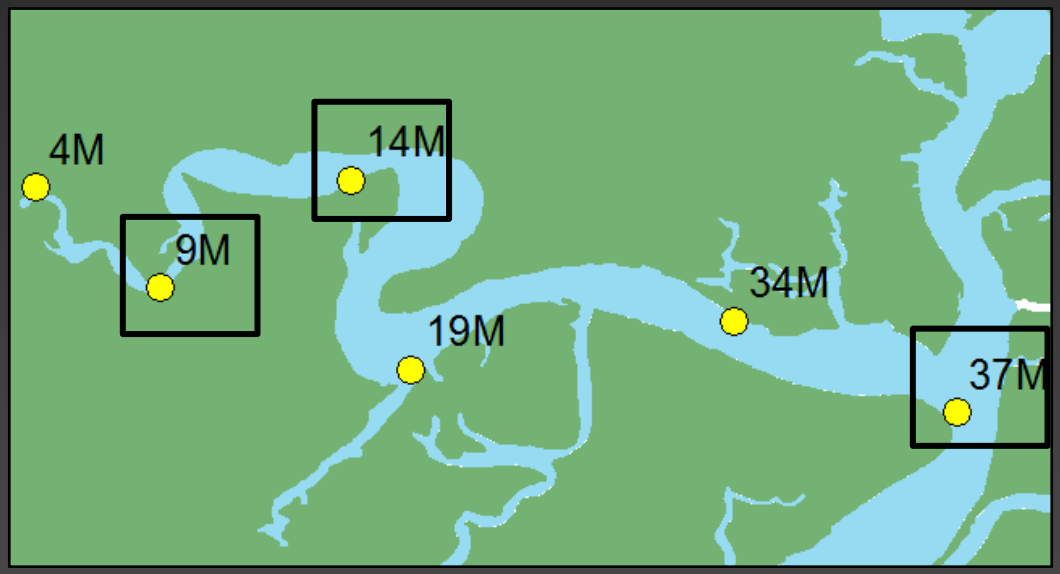
1. *Monitoring Fish Spawning*
   - *Seasonal timelines of spawning each year*
   - *Total hours of chorusing/yr*

2. *Monitoring Invertebrates and Fish*
   - *Diversity*
   - *Appearance in the estuary*
   - *Abundance*
   - *Lengths and seasonal growth curves*

3. *Monitoring Bottlenose Dolphins*
   - *Total abundance*
   - *Mother/calf pairs*
   - *Distribution*
   - *Residents vs. migrants*
   - *Health*

E. Novel Techniques to Monitor Our Natural Resources in the May River

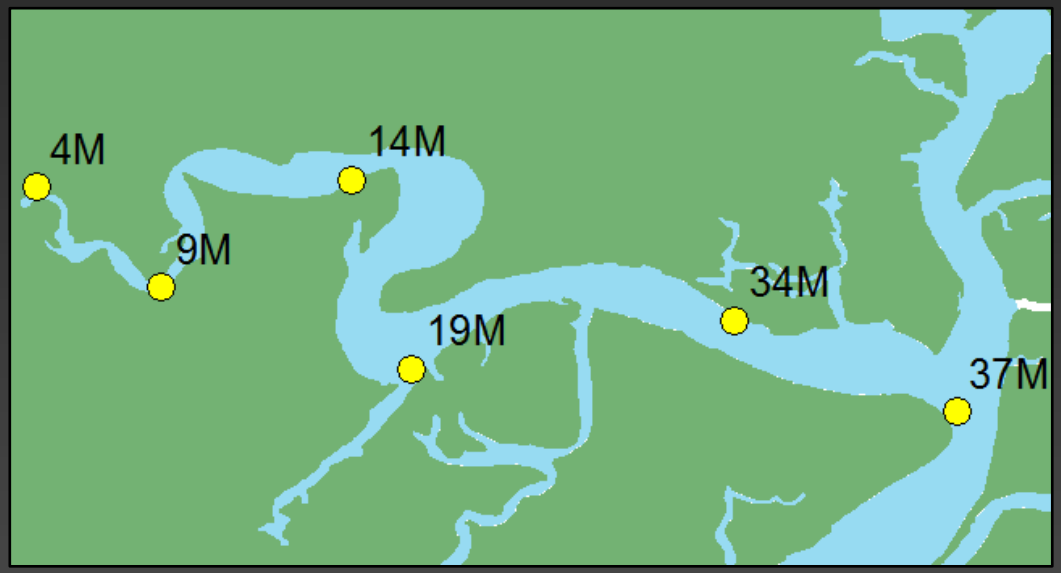
1. Monitoring Fish Spawning – Deployment of Acoustic Recorders



Yellow = bimonthly water quality; black = current acoustic stations

E. Novel Techniques to Monitor Our Natural Resources in the May River

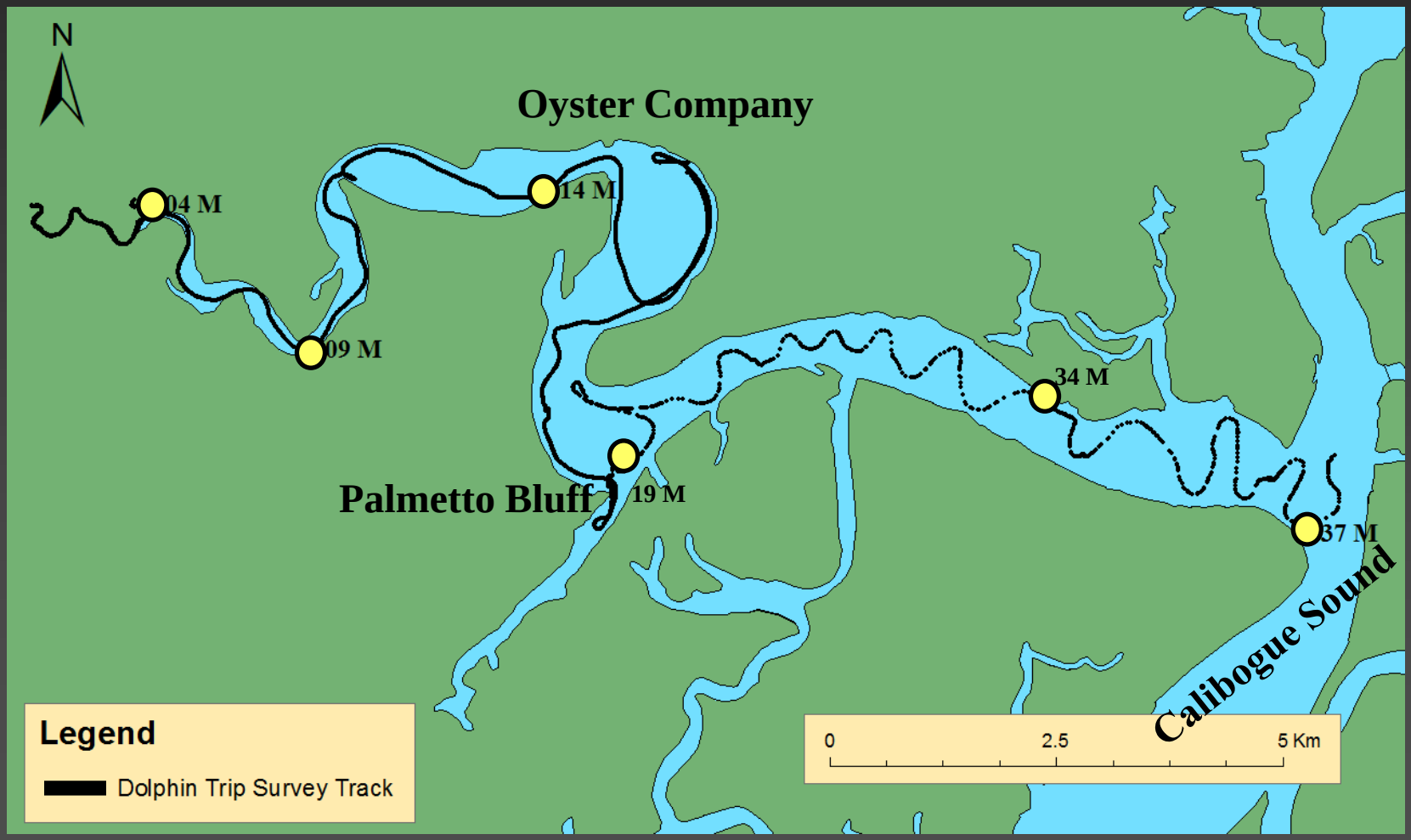
2. Monitoring Invertebrates and Fish – Monthly Seining Surveys



Red drum

E. Novel Techniques to Monitor Our Natural Resources in the May River

3. Monitoring Bottlenose Dolphin – Bimonthly Boat Surveys



USCB Marine Sensory and Neurobiology Lab

Lab Manager
(Agnieszka Monczak)

Field Manager
(Bradshaw McKinney)

Graduate Students
(Alyssa Marian)

Interns
(Jamileh Soueidan, Eva May)

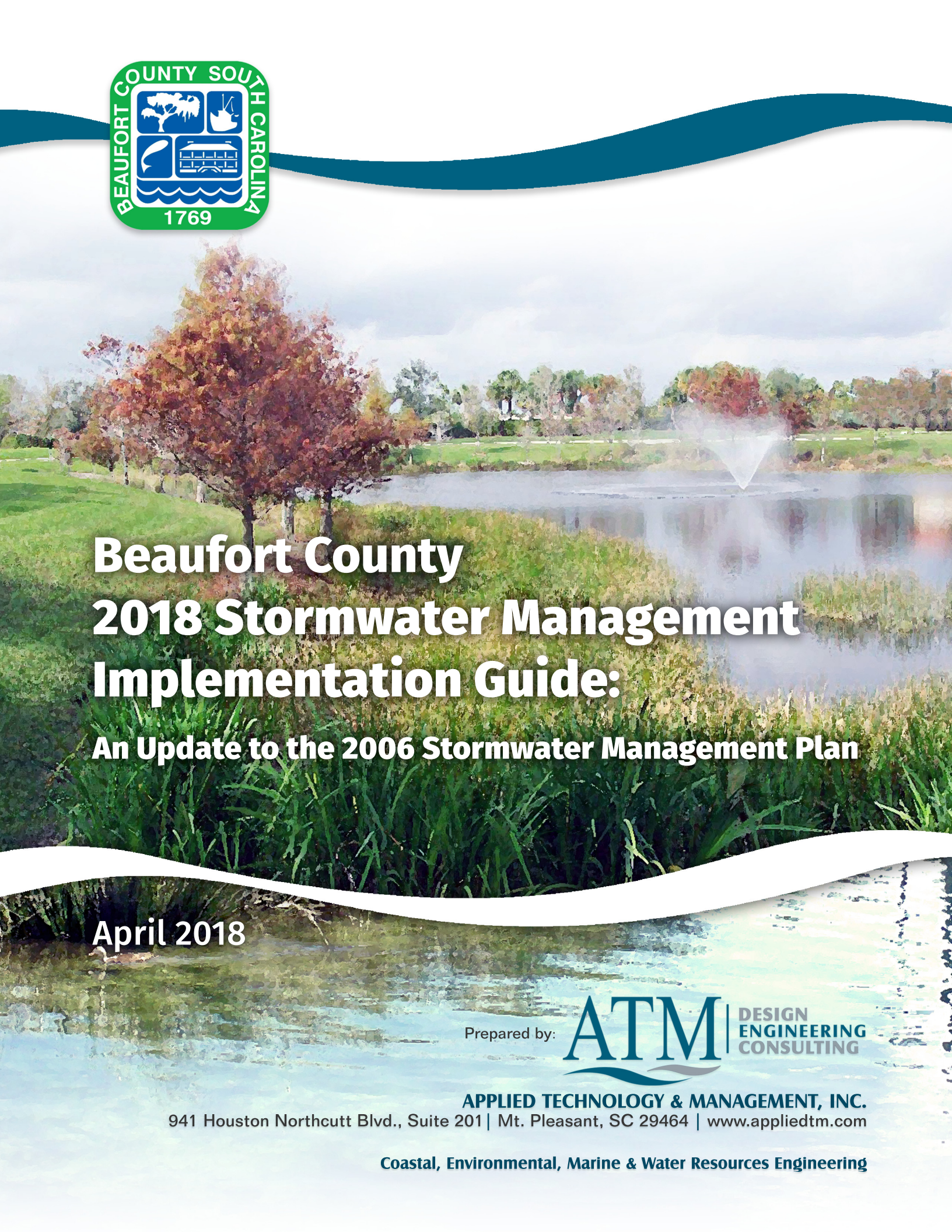
USCB Students
(Ashlee Seder, Jake Morgenstern, Shaneel Bivek, Austin Roller, Caleb Shedd)

Funding Request for 2018-2019

Budget

USCB-MSNL supplies and salaries for employees $30,000

- No funding request for USCB-WQL.
- No funding request for Montie salary.



Beaufort County 2018 Stormwater Management Implementation Guide:

An Update to the 2006 Stormwater Management Plan

April 2018

Prepared by:

ATM DESIGN ENGINEERING CONSULTING

APPLIED TECHNOLOGY & MANAGEMENT, INC.

941 Houston Northcutt Blvd., Suite 201 | Mt. Pleasant, SC 29464 | www.appliedtm.com

Coastal, Environmental, Marine & Water Resources Engineering

Contents

2018 Stormwater Management Implementation Guide Executive Summary

Introduction

This update to the 2006 stormwater master plan (SWMP) for Beaufort County, South Carolina presents the results of a limited update to certain watersheds and datasets used in the development of the original SWMP. The report summarizes the work performed, findings, and recommendations developed by Applied Technology & Management, Inc. (ATM) as part of this update.

This updated Executive Summary is immediately followed by the original Executive Summary from the 2006 SWMP. While portions of the SWMP were updated in this revision, some of the original information in areas outside of the revised sections remains the same as published in 2006. For clarity of previous assumptions and methodology, the original sections of the 2006 SWMP are reproduced herein to provide one location for all current information in the SWMP.

2018 Updated Background and Purpose

In 2015, Beaufort County and its partnering municipalities engaged Applied Technology & Management, Inc. (ATM) to update portions of this report and to revise certain portions of the models to reflect changes since the implementation of the 2006 SWMP. This implementation guide provides actions for watersheds throughout the County.

Until 2006, stormwater management was flood prevention management and focused primarily on moving stormwater away from roads and developments as rapidly as possible, with minimal concerns for the impacts the rapid movement of stormwater had on the unique and sensitive estuarine environment that exists throughout Beaufort County.

Since the implementation of this SWMP in 2006, considerable additional advances have been occurring in the understanding of stormwater management. Additional monitoring data and locations are now available, and the County and partnering municipalities have adopted a new rate structure to continue the implementation and operation of the stormwater utility. This update was undertaken to identify the seven watersheds that have changed the most since the previous data was gathered and to update the models and information to deliver a dynamic document that will provide updated information for implementation of improvements based on more current data.

Since completion of the 2006 SWMP, the County has accomplished the following:

- Established the level of service (LOS) and extent of service (EOS) for the County Stormwater Utility
- Developed a Capital Improvements Plan (CIP) and updated it in 2015

- Created an in-depth and detailed stormwater best management practice (BMP) manual and revised and updated the manual in 2015
  - Completed some key stormwater retrofit projects and begun new projects to implement the CIP
  - Implemented ordinances with the County Zoning and Development Standards Ordinance (ZDSO) that require stormwater treatment and discharge systems to meet certain requirements
  - Implemented a new stormwater ordinance in 2015
  - Continued to build its inventory of existing stormwater conveyance systems and update the County's GIS database
  - Implemented an updated stormwater utility rate structure in corporation with the municipalities in 2016

In addition, the municipalities have implemented many of their own stormwater conveyance systems and water quality BMPs.

- Town of Bluffton accomplishments include:
  - 2007 Adoption of a Stormwater Ordinance and BMP Manual.
  - 2009 Established USCB Water Quality Laboratory.
  - 2010 Revision of Stormwater Ordinance & BMP Manual to include stormwater volume control for water quality.
  - 2011 Adoption of the May River Watershed Action Plan with policies, programs and projects aimed at reducing fecal coliform in the May River.
  - 2013 Completion of New Riverside Pond for water quality improvement.
  - 2016 Completion of the Pine Ridge Irrigation Re-use project for stormwater volume reduction.
  - Continuing to build its stormwater infrastructure GIS database.
- The Town of Hilton Head has implemented new stormwater control systems with associated BMPs and is in the first phases of dredging and cleaning the many aged stormwater ponds within the community.
- The City of Beaufort has developed its stormwater ordinance and incorporated stormwater quality BMPs into its planning documents. The City is in the process of identifying aged stormwater infrastructure for capital planning purposes.
- The Town of Port Royal has constructed the first regional stormwater management system and continues to expand the scope of the stormwater management system service areas. The Town is in the process of inventorying its piped drainage systems and continues its street sweeping program.

Since the 2006 SWMP was implemented, the County has experienced continued growth in critical areas of the estuary and continued closure of Shellfish Harvesting Areas. To address these issues, as well as new federally mandated regulations, the County has:

- Voluntarily developed and implemented new strict stormwater volume control regulations

- Been designated by South Carolina Department of Health and Environmental Control (SCDHEC) as a Phase II small municipal separate storm sewer system (MS4) community
- Had a total maximum daily load (TMDL) adopted for the Okatie River, Chechessee River, and Beaufort River

All these major changes, as well as new and changing growth patterns related to development, have resulted in the need to update the 2006 SWMP.

A summary of the actions accomplished as part of this 2018 Implementation Guide Update is as follows:

- Performed an in-depth review of the 2006 SWMP to identify areas needing updating.
- Updated growth area mapping throughout the County and municipalities to determine growth and infill areas since 2006 utilizing a new 2016 high-resolution aerial photo and 2013 light detection and ranging (LiDAR) data.
- Reviewed hydraulic and water quality modeling performed in 2006 and updated models in the following seven priority watersheds chosen by the County and municipalities, focusing on watersheds with significant development and/or growth since 2006:
    - Beaufort River
    - Calibogue Sound
    - Colleton River
    - Coosaw River
    - May River
    - Morgan River
    - New River
- Investigated documented customer complaints to identify areas of concern through a series of public meetings held in the summer of 2016.
- Compared current findings against 2006 SWMP findings.
- Developed a revised CIP list based on updated models
- Developed a recommended inventory list

Figure ES-1 has not been updated because the overall watershed boundaries remain the same. This figure is a location map showing Beaufort County boundaries, major water bodies, tidal wetlands, upland areas, roads, and watershed boundaries.

Figure ES-2U is an update to Figure ES-2 and shows the areas of Beaufort County that the Stormwater Implementation Committee (SWIC), which is comprised of staff from each jurisdiction, selected for updated hydrologic and hydraulic modeling.

Figure ES-3U is an update to Figure ES-3 and shows the areas the SWIC selected for updated water quality modeling. Average annual pollution loads from the highlighted areas were calculated based on the updated land use information for the watersheds. In addition, bacteria concentrations were recalculated in many of the major tidal rivers and creeks, based on bacteria loadings from the load model, and calibrated tidal mixing and bacteria loss rate coefficients.

2018 Updated Hydrologic and Hydraulic Analysis Results

Locations of road overtopping problems identified by the 2006 SWMP were reviewed for the updated watersheds. Where changes occurred, locations were removed or added, as indicated by the updated hydrologic and hydraulic models. As in the previous version of this report, solutions for these problem areas in updated watersheds focused on upgrading culverts at the flooding road crossings or raising roadway elevations above flood levels.

As in the 2006 SWMP, the updated watershed analyses focused on the primary stormwater management system (PSMS) and does not address the potential for flooding of the secondary drainage system.

Locations of road overtopping problems identified by the hydrologic and hydraulic analysis are presented in Figure ES-4U.

2018 Updated Water Quality Analysis Results

Table ES-4U summarizes the classification of the water quality segments in Beaufort County water bodies based on the evaluation of the bacteria data from 1999 through 2016 for the selected watersheds. This analysis included data from additional stations that came into service post-2000 that had not been previously included. For each watershed, the tables show the number of water segments receiving “A”, “B”, “C” and “D” classifications, plus the number of segments of unknown quality (because there are no sampling stations). The table indicates that 71 percent of the water quality segments that are monitored have an “A” or “B” LOS, which means that bacteria standards are expected to be met in the long term. The remaining 29 percent of monitored water quality segments are at a “C” or “D” level, which means that bacteria standards are not expected to be met in the long term.

The table also indicates that many of the water quality segments are still not monitored by SCDHEC. Forty-seven percent of the modeled water quality segments were not monitored for the entire 17-year period. Some segments are in small tidal creeks and the headwaters of tidal rivers that perhaps would not be expected to meet the standards even under undeveloped conditions because the discharges of watershed runoff flows and loads are not subject to sufficient tidal mixing. Conversely, some segments may not be monitored because they are not affected by urban development.

Results for existing land use conditions are presented in Table ES-5U. Table ES-5U shows that 73 percent of the modeled water quality segments have an “A” or “B” LOS, and the remaining 27 percent have a “C” or “D” LOS.

The results of the analysis were used to make recommendations for water quality controls and water quality monitoring.

2018 Updated Master Plan Components

2018 Update to PSMS Enhancements

The hydrologic and hydraulic analysis identified additional locations in the updated watersheds on the PSMS that are not expected to meet the County-defined LOS for road overtopping, in addition to removing some previously modeled as a problem. Problem solutions were identified by evaluating culvert upgrades to increase the flow conveyance capacity of the PSMS and detention storage to reduce peak flows. It is recommended that these areas be reviewed in conjunction with overall water quality BMPs recommended as part of the 2018 CIP to determine if flow controls can be incorporated into the regional BMPs to help address PSMS overtopping.

Table ES-6U is an update to Table ES-6 and summarizes the costs of updated PSMS projects in the seven watersheds.

2018 Updated Water Quality Controls for Existing Development

The water quality analysis identified a number of water quality segments that are not currently meeting the fecal coliform bacteria water quality standard (based on monitoring data) and/or are not predicted to currently meet the bacteria water quality standard (based on model results for unmonitored segments). Some of these segments that are not in compliance with the bacteria standards would not achieve compliance even with treatment of all urban runoff by BMPs because tidal mixing and water body bacteria loss rates are insufficient relative to stormwater runoff bacteria loads from urban and non-urban areas.

The results of the analysis led to an assessment of potential water quality BMPs that could potentially improve water quality conditions. The analysis identified eight water quality segments that could potentially show an improvement in water quality LOS. An evaluation of potential regional BMP sites identified eight sites (Figure ES-5U) that had high potential as BMP locations as they had relatively limited potential for wetland impacts and relatively low costs of land acquisition and construction relative to the pollution load reductions that the BMP is expected to provide. Table ES-7U summarizes the costs of the recommended regional water quality projects in the seven watersheds. These projects will be added to the current CIP project list.

2018 Updated Water Quality Monitoring

An updated water quality monitoring program is recommended for Beaufort County only. The goals of the program include the following:

- Characterize baseline water quality via ambient (grab) sampling
- Identify seasonal trends and overall trends over time using long-term ambient sampling data

- Evaluate dry weather (ambient) and wet weather (automatic sampling) water quality in selected areas for comparison to pollutant concentration values used in the watershed water quality modeling effort
- Evaluate sources of bacteria (human, bird, pets, wildlife) in locations where measured bacteria levels are substantially higher than expected, based on the watershed and receiving water quality modeling

It is recommended that Beaufort County staff be responsible for monitoring on the tributaries to the major open water tidal river segments and BMP monitoring. Where coordination with other municipalities is occurring, this should be continued. This monitoring will be done in conjunction with SCDHEC's existing monitoring programs.

Water quality data from Beaufort County, the Town of Bluffton and Hilton Head Island were collected and analyzed for standard statistical parameters and for trends. The identification of appropriate sampling sites for grab sampling and automatic storm event sampling was based on the water quality statistical analysis, the current LOS for water quality segments, and the existing land use distribution. In all, four sites were selected for automatic sampling, and 52 sites were selected for grab sampling. These sites are provided on Figure ES-6U.

Sampling would be conducted on a monthly basis. Sampling events will note weather conditions, flow conditions, and tidal condition (ebb and flood). Field parameters monitored during each sampling event include temperature, dissolved oxygen (DO), conductivity/salinity, pH and turbidity. Samples will be collected and analyzed for the following parameter list:

- *Enterococci* (saltwater)
- *Escherichia coli* (*E. coli*) (freshwater)
- Fecal coliform bacteria
- Total suspended solids (TSS)
- Biochemical oxygen demand (BOD)
- Ammonia nitrogen
- Nitrite and nitrate nitrogen
- Total Kjeldahl nitrogen (TKN)
- Total phosphorus
- Chlorophyll-a
- Total organic carbon (TOC) quarterly
- Metals (cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc) quarterly
- Hardness, quarterly

Samples collected will be characterized as either "dry" or "wet" samples, based on the amount of precipitation received over the 72 hours preceding sample collection. If less than 0.1 inch of rain fell in the 72 hours before the time of sampling, the samples will be classified as dry weather samples. If 0.1 inch of rain or more fell during the previous 72-hour period, the sample will be categorized as a wet weather sample. By identifying

the weather conditions preceding each sampling event, it is hoped that contaminant concentrations can be linked to base- or low-flow conditions, or high-flow associated with stormwater runoff, thus providing valuable diagnostic information regarding potential source(s) of pollution.

Results from the laboratory analysis and field-collected parameters will be compared to the applicable water quality standards and criteria contained in SCDHEC Rule R.61-68, Water Classifications and Standards. Modifications to the plan, including stations to be sampled and observed concentrations, will occur based on the results obtained. Recommended statistical evaluations include standard descriptive statistics including data distribution, trend analysis (Kendall-Tau) and inter-station comparison (Mann Whitney, Wilcoxon).

Four stations would also include automatic sampling stations, so that sampling will be activated during storm events and stormwater runoff sampling can be reliably conducted. The four sites will be selected to represent runoff quality from different urban land use types (e.g., industrial, residential/golf course) and observed receiving water quality. In general, the same parameters will be sampled. Measurements of rainfall, stage, velocity and flow rate will also be made at the automatic sampling stations. The purpose of this sampling is to provide additional information to better define relationships be runoff event mean concentrations (EMCs) and receiving water quality. Preliminary pollutant loading modeling has revealed locations where resultant fecal coliform loads from the model were not excessive as compared to other areas but associated receiving waters were known “hot spots” based on evaluation of water quality data (i.e., tidal creek areas of May River and Okatie River). Other factors such as salinity regime changes, flushing, etc., also have an effect on observed fecal coliform levels in receiving waters. In addition to providing local EMC data to support future modeling efforts, this also provides insights to the importance of the various factors that affect receiving quality. It is anticipated that 12 or more storm event samples will need to be collected at each location to estimate EMCs with a reasonable confidence (95%). The actual number will depend on the variability of the data record at each location.

SCDHEC stations, classified as “shellfish” stations, will be evaluated concurrently for bacteria and salinity data. The objective is to use the collected data for comparison to the water quality model results and to determine if the model parameters provided a reasonable simulation of bacteria conditions or whether the model should be refined with adjusted mixing and first-order loss parameter values.

In general, there was good agreement between the measured values and the model results. However, some of the reaches did not have good agreement. This is likely due to how the hydrodynamics of the systems are being modeled. The approach that has been used to date is based on the net flow advection of the various reaches and is a quasi-steady-state approach. This is an acceptable approach in most cases. However, given the tide range that exists in the county’s receiving waters and the dynamic salinity regimes present, a detailed 3-dimensional hydrodynamic model, such as the Environmental Fluid Dynamics Code (EFDC), is required to adequately simulate the tidal fluctuations and salinity-density gradients that exist in the receiving waters.

Development of a 3-D hydrodynamic model would be a significant effort but would provide the proper hydrodynamic foundation for improved water quality predictions.

2006 Executive Summary

Introduction

This report presents and recommends a stormwater master plan (SWMP) for Beaufort County, South Carolina, based on a study conducted by Thomas & Hutton Engineering Co. (T&H) and Camp Dresser & McKee Inc. (CDM) for the Beaufort County Stormwater Management Utility. The report summarizes the work performed, findings, and recommendations for managing the quantity and quality of stormwater in the County.

Figure ES-1 presents a location map showing Beaufort County boundaries, major water bodies, tidal wetlands, upland areas, and roads. The figure also shows watershed boundaries. In all, 12 watersheds were defined.

Background and Study Purpose

Stormwater management methods have evolved significantly since the 1970s. Before then, stormwater management focused primarily on moving stormwater away from a developed area as rapidly as possible, with little or no consideration of receiving water impacts. Then, stormwater management methods began to require the detention of stormwater to reduce the peak flows from developments for purposes of flood control and streambank erosion control. Most recently, the retention and detention of stormwater has been designed to reduce stormwater pollution loads as well as reducing flooding and erosion impacts.

Focus on the protection of Beaufort County's water bodies was advanced in the mid-1990s with the formation of the Clean Water Task Force. This task force, a volunteer citizens group, worked with local and state scientists and public officials to identify potential pollution sources and to develop a set of recommendations for action. General categories of pollution sources included stormwater, central wastewater treatment, onsite disposal systems (septic tanks), boating impacts, and monitoring and enforcement.

Beaufort County acted in accordance with one of the Task Force's recommendations by enacting a stormwater utility in 2001. The stormwater utility assesses a stormwater fee to residential, commercial and industrial property owners, and the fees collected are dedicated to stormwater-related activities. These may include operation and maintenance of stormwater systems, implementation of improvements to reduce stormwater-related problems such as flooding and stormwater runoff pollution, and related studies.

This SWMP and report were funded through the fees collected by the stormwater utility. The study was designed to identify problem areas related to stormwater, and to

recommend a plan to solve problems and better control the impacts of stormwater on receiving waters in Beaufort County.

A parallel study evaluated the rate structure that is used to determine the stormwater utility fees. Together, the two studies provide the County with the information necessary to implement an updated fee structure designed to finance the recommended activities of the plan.

Study Elements

The elements of the master plan study included the following:

- Approach development. This included the establishment of Level of Service (LOS) for both water quantity (e.g., flood protection) and water quality (e.g., compliance with water quality standards), selection of computer modeling tools for the evaluation of watershed conditions and solutions for problem areas, and identification of potential management measures that would be evaluated in the study.
- Watershed data collection. This included the acquisition and review of water quality data, acquisition of pertinent physical data (e.g., land use, soil types), acquisition and review of local rainfall data, identification of areas with features such as septic tanks and existing stormwater controls, and mapping of known flooding areas based on discussion with County and municipal staffs.
- Stormwater management system inventory. This included the definition of the PSMS, which is essentially the primary system of storage, channels and culverts that carry flows from the land to the receiving water bodies; characterization of the existing system (e.g., culvert size and shape, condition, degree of siltation); and entry of appropriate PSMS data into a database for use in stormwater modeling.
- Hydrologic and hydraulic model development and application. This included the development of computer simulation models to represent watershed physical characteristics (e.g., channel cross-sections, culvert size, roadway elevations); calculation of stormwater runoff hydrographs (time series of runoff flows) for selected design storm events; routing of the runoff flows through the PSMS; identification of problem areas such as locations with road overtopping; and evaluations of alternatives to reduce or mitigate the identified problems.
- Water quality modeling. This included the development of computer simulation models to calculate the pollution loads from the watersheds to the County receiving waters, plus computer simulation models to evaluate bacteria concentrations in many of the receiving waters; comparison of receiving water bacteria concentrations to water quality standards; and evaluation of how management measures such as best management practices (BMPs) are expected to influence the compliance with water quality standards.
- Stormwater master plan development. This included the preparation of this report; a recommendation of appropriate management measures based on the

evaluations from previous study elements; estimation of costs associated with the recommended measures; and discussion of the implementation of plan elements relative to anticipated revenues from the stormwater utility.

County Watershed Characteristics

Figure ES-2 presents the areas of Beaufort County that were analyzed for detailed hydrologic and hydraulic modeling. The PSMS in Beaufort County (including the Town of Hilton Head Island) includes 164 square miles of land area. Design storm runoff flows from the PSMS area were routed through the PSMS hydraulic network, which included 168 miles of open channels and more than 300 stream crossings.

The LOS established for the design storms, developed in conjunction with County staff, is as follows:

- Evacuation routes: Road is passable for the 100-year design storm.
- Other roads: Road is passable for the 25-year design storm.
- Buildings: Flood stages will be managed below finished first-floor elevations. Modeled 100-year design storm flood elevations were compared with geographic information system (GIS) coverages of buildings, Federal Emergency Management Agency (FEMA) 100-year base flood elevations (BFEs), and light detection and ranging (LiDAR) ground elevations near those buildings to identify potential building flooding. Unfortunately, the County GIS and database do not have complete records of structure locations and finished first-floor elevations, so the study could not conclude whether or not structures in inundated areas were actually subject to flood damages. However, the analysis did indicate that the modeled 100-year peak water elevations were consistently lower than the BFEs identified by FEMA, which means that structures built in accordance with the FEMA BFEs should not be flooded because the stormwater system is inadequate. (The FEMA BFEs reflect storm surge conditions.).

The 25-year design storm and 100-year design storm include total rainfall depths of 8 inches and 10 inches, respectively, over a 24-hour period, with roughly 89 percent of the total rainfall occurring in the middle 2 hours of the event [using the Soil Conservation Service (SCS) Type III distribution].

The design storm evaluations also considered the water surface elevation at the downstream end of the PSMS, because downstream (tailwater) water elevations can affect the flow capacity of the PSMS. For the Town of Hilton Head Island, the mean high tide was used, for consistency with previous studies. For the rest of the County, a more conservative value (the mean annual high tide) was used. These water elevations were applied as a constant value over the course of the design storm so that the modeling reflected the maximum impact of downstream water elevations.

Figure ES-3 presents the areas of Beaufort County that were analyzed for water quality modeling. The total analyzed area is 725 square miles. Average annual pollution loads from the highlighted areas were calculated. In addition, bacteria concentrations were calculated in many of the major tidal rivers and creeks, based on bacteria loadings from the load model, and calibrated tidal mixing and bacteria loss rate coefficients.

The LOS for water quality focused on the concentrations of bacteria in County water bodies. Using historical fecal coliform bacteria data collected in the 1990s, long-term geometric mean bacteria concentrations at various sampling locations were calculated and then evaluated with respect to the short-term and long-term compliance with the bacteria standards at those locations.

Table ES-1 summarizes the various LOS categories that were established, indicating the relationship between each level and the short-term and long-term compliance with bacteria water quality standards. At the "A" level, both standards are expected to be achieved during any short-term (36-sample) period. At the "B" level, it is expected that the 90th percentile standard may not be achieved in all short-term periods but will be met in the long term. At the "C" level, the 90th percentile standard is not expected to be met in the long term. At the "D" level, neither standard is expected to be met in all short-term periods, and it is possible that both standards will not be met in the long term.

For this study, a "non-degradation" LOS was used as the basis for evaluating the impacts of new development and benefits of management measures. In other words, the focus was to determine whether the receiving waters are expected to maintain their current classification (A, B, C or D) in the future. The study also investigated the potential for improving the LOS of segments with an existing "C" or "D" LOS.

Table ES-2 summarizes the extent of development that was used in the analysis of existing and future land use conditions. Existing land use reflects existing County land use maps, aerial photographs and local knowledge. Future land use is based on a "buildout" condition developed by Beaufort County staff.

For each watershed, Table ES-2 lists the overall percent of urban imperviousness, as well as the range in urban impervious cover in basins within the watershed, and the basin(s) with the greatest impervious cover. Overall, the percent urban imperviousness increases from 7 percent (existing) to 9 percent (future). Watersheds having the greatest impervious cover now include Calibogue Sound (including the Town of Hilton Head Island), Colleton River, and Beaufort River. Watersheds that will see the greatest increases due to future development include May River, Colleton River, New River and Beaufort River.

Hydrologic and Hydraulic Analysis Results

Locations of road overtopping problems identified by the hydrologic and hydraulic analysis are presented in Figure ES-4. A total of 119 locations were identified as having road overtopping for the appropriate LOS design storm (100-year for evacuation routes,

25-year for other roads). In general, solutions for these problem areas focused on upgrading culverts at the flooding road crossings. Detention to reduce flooding was evaluated along the primary stormwater system but was found to be unsuitable. Most of the best regional storage locations had substantial existing wetlands, so the detention facilities would need to be "off-line" facilities constructed on higher ground adjacent to the existing wetlands. The expense associated with the significant excavation that would be required and land acquisition costs were very high relative to cost savings that would be achieved by reducing or eliminating the required downstream culvert upgrades.

Table ES-3 summarizes the number of problem areas by watershed and provides the anticipated costs associated with the solution of the problems. These planning level costs were developed for each project based on an estimated construction cost, plus a percentage to account for contingencies and engineering costs. The conceptual probable capital cost of the improvements is $22.9 million (based on December 2004 dollars).

The identified problem areas were classified as either "public" or "private" projects. Public projects are those that are located on public lands. In contrast, private projects are located in private subdivisions, military facilities, and other non-public areas. Of the $22.9 million in improvements, $15.3 million are considered public projects. It is anticipated that the utility will focus on the public projects.

The Town of Hilton Head Island, which is relatively fully developed, was studied previously in 1995, when a detailed storm drainage study was conducted. The purpose of the drainage study was to prepare an island-wide drainage inventory, identify flood prone areas, and present corrective actions to eliminate the flooding for a 25-year storm. Since 1995, the Town of Hilton Head Island and many of the plantations have embarked on a massive capital improvement program to upgrade their storm drainage system to accommodate the 25-year storm. The Town of Hilton Head Island's CIP budget for the improvements was $17 million. Approximately $12 million has already been spent, $3 million additional is under contract, and an estimated $1.5 million will be bid in the year 2005. In addition to the Town's $17 million drainage capital improvement program, both Sea Pines Plantation and Hilton Head Plantation have each constructed more than $1.9 million of drainage improvements in the past 10 years. Through these improvements, Hilton Head Island has eliminated the majority of the flooding problems for the 25-year, 24-hour storm.

The differences between the 1995 study and this study are itemized in the report. However, in summary, the 2004 study assumes all areas will be fully developed according to the zoning map and some of the watersheds have changed due to the much more accurate LIDAR topography. Through these refinements, other improvements have been identified and are recommended in this report. The conceptual probable capital cost for the recommended improvements for Hilton Head Island is $1.8 million (based on December 2004 dollars). Of that total, $1.2 million is allocated to public projects.

This analysis focused on the PSMS and does not address the potential for flooding of the secondary drainage system. The secondary drainage system may include tributary

area and conveyance systems leading to evacuation routes. In general, these secondary systems can be evaluated using less sophisticated engineering analysis than was conducted for the PSMS. County staff should review the secondary drainage system, particularly as it applies to the evacuation routes identified in the study.

Water Quality Analysis Results

Table ES-4 summarizes the classification of the water quality segments in Beaufort County water bodies based on the evaluation of the 1990s bacteria data. For each watershed, the tables show the number of water segments receiving "A', "B", "C" and "D" classifications, plus the number of segments of unknown quality (because there are no sampling stations). The table indicates that 78 percent of the water quality segments that are monitored have an "A" or "B" LOS, which means that bacteria standards are expected to be met in the long term. The remaining 22 percent of monitored water quality segments are at a "C" or "D" level, which means that bacteria standards are not expected to be met in the long term.

Table ES-4 also indicates that the South Carolina Department of Health and Environmental Control (SCDHEC) did not monitor many of the water quality segments during the 1990s. More than half of the modeled water quality segments were not monitored for the entire 10-year period. In some cases, stations were added toward the end of the 1990s, and did not provide a complete long-term data set. Other segments are in small tidal creeks and the headwaters of tidal rivers that perhaps would not be expected to meet the standards even under undeveloped conditions, because the discharges of watershed runoff flows and loads are not subject to sufficient tidal mixing. Conversely, some segments may not be monitored because they are not affected by urban development.

Results for existing and future land use conditions are presented in Table ES-5. In general, the table shows that the existing LOS is maintained under future conditions, which were evaluated based on the implementation of wet detention pond BMPs for new development. This assumption was made because new development is required to have BMPs, and wet detention ponds are the dominant BMP type applied in Beaufort County. In addition, Table ES-5 shows that 71 percent of the modeled water quality segments have an "A" or "B" LOS, and the remaining 29 percent have a "C" or "D" LOS.

Additional analysis was conducted to evaluate "best case" and "worst case" scenarios. The "best case" scenario was conducted for existing land use with 100 percent treatment of urban runoff with wet detention pond BMPs. Although this is not possible because existing development limits the land available and suitable for BMPs, the results show which water quality segments would benefit from BMP implementation, as opposed to segments that are affected primarily by natural bacterial loads and limited tidal mixing and/or limited bacterial loss rate in the water. The "worst case" scenario was conducted for future buildout land use with no BMPs (i.e., all BMPs fail to provide any benefit). The results show which water quality segments will be most sensitive to the effectiveness of the existing BMPs and BMPs on future development. The results of

the analysis were used to make recommendations for water quality controls and water quality monitoring.

Master Plan Components

Stormwater Control Regulations

Based on the findings of this study, existing stormwater controls Beaufort County that are currently applies appear to be appropriate for water quantity and water quality control, although there are some potential refinements (e.g., peak flow control for 100-year design storm).

For water quantity, new development is required to reduce the post-development peak runoff rate to pre-development peak runoff rate for design storms with return periods of 25 years or less. This requirement is more restrictive than the State standards, which require matching the peak runoff flow rate for design storm return periods of 10 years or less.

For water quality, new development is required to provide BMPs that control runoff pollution loads to an "anti-degradation" level. When future conditions were evaluated with BMPs on all new development, the results indicated that virtually all of the water quality segments maintained the same bacteria LOS that they had for existing conditions.

PSMS Enhancements

The hydrologic and hydraulic analysis identified 130 locations on the PSMS that are not expected to meet the County LOS for road overtopping. Problem solutions were identified by evaluating culvert upgrades to increase the flow conveyance capacity of the PSMS and detention storage to reduce peak flows. The evaluation of regional sites, which are typically in areas of existing wetlands, would be expensive to construct relative to cost savings achieved by reducing the magnitude of downstream improvements. Thus, the recommended solutions focus on increasing the conveyance capacity of the PSMS.

The recommended projects were assigned priority levels. The following five priority levels were established.

- Priority 1 – Road overtopping of 0.1 foot or more on evacuation routes (100-year design storm).
- Priority 2 – Road overtopping of 0.1 foot or more on non-evacuation routes (25-year storm) for major roads with no convenient alternative route.
- Priority 3 - Road overtopping of 0.1 foot or more on non-evacuation routes (25-year storm) for major roads with a convenient alternative route or a major neighborhood road with no alternative route.

- Priority 4 - Road overtopping of 0.1 foot or more on non-evacuation routes (25-year storm) for neighborhood roads with a convenient alternative route or minor neighborhood roads, with 100-year flooding greater than 0.5 foot OR 100-year road overflow velocity greater than 1 foot per second.
- Priority 5 - Road overtopping of 0.1 foot or more on non-evacuation routes (25-year storm) for neighborhood roads with a convenient alternative route or minor neighborhood roads (same as Priority 4), with 100-year flooding less than 0.5 foot AND 100-year road overflow velocity less than 1 foot per second.

In addition, each project was assigned a flood depth category. These are as follows:

- Flood level A: Greater than 9 inches of flood depth
- Flood level B: Flood depth of 6 to 9 inches
- Flood level C: Flood depth of 3 to 6 inches
- Flood level D: Flood depth of less than 3 inches

Table ES-6 summarizes the total cost of PSMS projects by priority and flood level.

Water Quality Controls for Existing Development

The water quality analysis identified a number of water quality segments that are not currently meeting the fecal coliform bacteria water quality standard (based on monitoring data) and/or are not predicted to currently meet the bacteria water quality standard (based on model results for unmonitored segments). Sensitivity analysis indicated that many of these segments that are not in compliance with the bacteria standards would not achieve compliance even with treatment of all urban runoff by BMPs, because tidal mixing and water body bacteria loss rates are insufficient relative to stormwater runoff bacteria loads from urban and non-urban areas.

The analysis did, however, identify 12 water quality segments that could potentially show an improvement in LOS from a “C” or “D” level to an “A” or “B” level. For segments with known problems achieving the standards, areas recommended for potential BMP implementation to treat stormwater from existing development. These areas are shaded in Figure ES-5.

An evaluation of potential regional BMP sites identified eight sites (Figure ES-5). These selected areas had relatively limited potential for wetland impacts, and relatively low costs of land acquisition and construction relative to the pollution load reductions that the BMP is expected to provide.

Water Quality Monitoring

A water quality monitoring program is recommended for Beaufort County. The goals of the program would include the following:

- Establish baseline water quality via ambient (grab) sampling
- Identify seasonal trends and overall trends over time using long-term ambient sampling data
- Evaluate dry weather (ambient) and wet weather (automatic sampling) water quality in selected areas for comparison to pollutant concentration values used in the watershed water quality modeling effort
- Evaluate quality of inflow to and outflow from selected BMPs (automatic sampling) for comparison to efficiency values used in this study and in the BMP Manual
- Evaluate sources of bacteria (human, bird, pets, wildlife) in locations where measured bacteria levels are substantially higher than expected based on the watershed and receiving water quality modeling

It is recommended that Beaufort County staff be responsible for monitoring on the tributaries to the major open water tidal river segments and BMP monitoring. For open water segments that are of interest, it is recommended that SCDHEC conduct the monitoring, as an extension of its existing monitoring programs.

The identification of appropriate sampling sites for grab sampling and automatic storm event sampling was based on the water quality sensitivity analysis, the current LOS for water quality segments, and the existing and future land use distribution. In all, four sites were selected for automatic sampling, and 14 sites were selected for grab sampling. These sites are provided on Figure ES-5.

For automatic sampling, four sites were selected that, in general, have the following characteristics: tributary to water quality segments that are not meeting water quality standards, dominated by a single land use type (e.g., industrial, residential), essentially fully developed, and located in a water quality basin designated for exploration of BMP retrofit opportunities. Data collected from these stations should be compared to the concentrations assigned in the watershed water quality model.

For grab sampling, 14 sites were selected that, in general, have the following characteristics: tributary to water quality segments that are expected to drop in LOS if BMPs are not effective, and a tributary area that will undergo extensive urban development in the future. The data from these stations will provide a basis for evaluating whether the water quality in the tributary is degrading as a result of new development.

The recommendations also include the evaluation of several wet detention pond BMPs, which are the dominant BMP type in Beaufort County. In particular, the efficiency of bacteria removal in wet ponds is critical in the evaluation of the protection that BMPs will provide to County receiving waters. No specific locations are recommended. However, the pond(s) should have well-defined inflow and outflow locations for sampling.

The study recommends coordination with SCDHEC to determine if SCDHEC would consider adding additional shellfish program stations (bacteria sampling) and ambient sampling (nutrients, metals) in 12 open water sites. These open water segments include locations that are considered sensitive based on the water quality modeling, plus some segments where the model predicts standards will not be met, but there are no data to validate the model. These sites are shown in Figure ES-5.

An independent peer review concluded that Beaufort County may wish to conduct additional sampling beyond the base recommended program to assess impacts on habitat in the tidal tributaries. Additional study is recommended to clearly define the objectives of this monitoring and develop program details (e.g., station selection and prioritization, frequency and duration of sampling, sample parameters).

Operations and Maintenance

For this study, the consideration of operation and maintenance has focused on the PSMS. Specific activities would include the maintenance of the bridge and culvert locations along the PSMS and the maintenance of the open channels in the PSMS. Routine maintenance of the stream crossings would include clearing of the headwater structures of obstruction and removal of silt from culverts. Maintenance of the open channels would primarily include clearing of obstructions.

Maintenance costs for the secondary stormwater management system were evaluated by the County staff and Town of Hilton Head Island staff, based on previous years' experience.

Inventory of Secondary Stormwater Management System

The master plan study developed an inventory of the PSMS, so future inventory efforts should focus on data collection for the secondary stormwater management system. Particularly in the City of Beaufort and the Town of Port Royal, maps showing the system often have outdated, incomplete or incorrect information. A complete inventory would be useful in assessing the capacity of the system and evaluating the extent of required maintenance in those areas.

Additional and On-going Study and Analysis

One recommendation is the development of flood inundation mapping and a current structure database that includes finished first-floor elevation, to evaluate potential for structural flood damage. This would help the jurisdictions identify structural flooding areas and give flood control projects in those areas a higher priority.

It should be noted that study analysis indicated that, in almost every case, the 100-year water elevations predicted by the model were lower than the 100-year BFE on maps FEMA developed. Consequently, homes built after the implementation of the FEMA

flood mapping should not have finished first-floor elevations that would result in structural flood damage.

Other potential on-going activities would include periodic updates of the water quality models as land use, PSMS conduit sizes, and other physical data change.

An independent peer review suggested additional water quality model applications to (1) evaluate the model performance against a second set of independent data, and (2) conduct sensitivity analysis and uncertainty analysis to show how changes in model input values affect the results of the modeling. Further study has been recommended in the plan in accordance with the peer review findings.

Public Information

Public information should be included in any stormwater master plan. Advantages of an effective public information program include the following:

- Improve public awareness of how individual activities can affect water quality, and encourage activities (e.g., recycling) that control pollution sources
- Increase public awareness of success stories (i.e., show benefits of specific projects or activities funded by the utility)
- Enhance public involvement in protection of water quality on a watershed or basin basis (e.g., septic tank maintenance, fertilizer application)

Numerous methods can be implemented, such as creating/distributing water quality literature and media campaigns.

No specific methods are recommended for Beaufort County, although an annual budget is recommended based on experience with other jurisdictions and costs of other plan elements.

Planning Level Costs for Plan Components

Table ES-7 summarizes the costs of the various elements of the recommended stormwater master plan. In some cases, these are annual costs (e.g., maintenance), while others are one-time costs for specific projects (e.g., PSMS improvement design and construction).

The total cost for annual (ongoing) activities is $5.4 million, and the total cost of specific projects and studies is $33.2 million, based on December 2004 dollars (Table ES-7). These cost estimates are based on previous experience, utilizing unit costs such as cost of culverts in terms of dollars per foot of pipe or inventory costs in terms of dollars per acre of study area.

Implementation of the Plan Components

The implementation of the master plan will depend upon the costs required to implement the recommendations, as compared to the revenue being generated by the stormwater utility. Based on the proposed new rate structure for the utility and a base annual cost of $40 per year per billing unit, the utility is expected to generate $4.8 million per year in revenue (April 2005 estimate). By comparison, the annual costs listed in Table ES-7 already exceed the expected annual revenue, even before specific projects are considered.

This report provides several examples of potential expenditures for a 10-year planning horizon. Ultimately, the stakeholders (e.g., jurisdiction staff, citizens, regulatory agencies) will determine the appropriate level of revenue and expenditure for an effective program.

Local jurisdictions have approved increases above the $40 base rate and, therefore, the annual revenue will likely be greater than that shown in Section 16 of the report.

TABLE ES-1

LEVEL OF SERVICE CATEGORIES FOR WATER QUALITY

LEVEL OF SERVICE CLASSIFICATION	LONG-TERM FECAL COLIFORM GEOMEAN CONCENTRATION (#/100 ML)	ANTICIPATED EXCEEDANCE OF BACTERIA WATER QUALITY STANDARDS	
		GEOMEAN OF 14/100 ML	NO MORE THAN 10% OF SAMPLES EXCEEDING 43/100 ML
A	less than or equal to 7	No 36-sample period	No 36-sample period
B	greater than 7 and less than or equal to 8.7	No 36-sample period	Some 36-sample periods but not long-term
C	greater than 8.7 and less than or equal to 10	No 36-sample period	Long-term
D	greater than 10	Some 36-sample periods, perhaps long-term	Long-term

TABLE ES-2

WATER QUALITY BASIN URBAN IMPERVIOUSNESS

WATERSHED	URBAN IMPERVIOUSNESS (%)				BASIN WITH GREATEST IMPERVIOUSNESS
	RANGE BY BASIN		TOTAL WATERSHED		
	EXISTING	FUTURE	EXISTING	FUTURE	
Calibogue Sound	0 - 31	0 - 32	11	12	Broad Creek 4
May River	0 - 10	0 - 18	5	11	May River 3, May River 4
Colleton River	4 - 26	4 - 30	10	14	Sawmill Creek 2
Chechessee River	0 - 8	0 - 15	2	3	Skull Creek North 1, Ballenger Neck
New River	0 - 14	4 - 21	5	10	New River 1
Beaufort River	1 - 47	2 - 53	15	19	Battery Creek 4
Coosaw River	0 - 21	0 - 25	5	7	Brickyard Creek, McCalleys Creek 1
Whale Branch West	1 - 12	3 - 17	6	8	Middle Creek 2
Morgan River	0 - 15	0 - 21	5	7	Rock Springs Creek 1, Rock Springs Creek 2
Broad River	3 - 10	3 - 11	8	10	Broad River 3, Broad River 4
Combahee River	1 - 4	1 - 4	3	3	Combahee River 1
Coastal	2	3	2	3	---

TABLE ES-3

PLANNING LEVEL COSTS FOR

PRIMARY STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

WATERSHED	NUMBER OF PROBLEMS	COST (MILLION DOLLARS)		
		TOTAL	PUBLIC	PRIVATE
Calibogue Sound *	6	1.2	0.6	0.6
May River	5	0.9	0.9	0.0
Colleton River	26	3.3	2.1	1.2
Chechessee River	2	0.1	0.0	0.1
New River	6	0.4	0.4	0.0
Beaufort River	17	2.7	2.7	0.0
Coosaw River	17	6.8	2.0	4.8
Whale Branch West	8	1.2	1.2	0.0
Morgan River	5	0.7	0.6	0.1
Broad River	17	3.3	3.1	0.2
Combahee River	2	0.2	0.2	0.0
Coastal	3	0.3	0.3	0.0
Hilton Head Island	5	1.8	1.2	0.6
TOTAL	119	22.9	15.3	7.6

* excludes Town of Hilton Head Island

Note: Cost estimates based on December 2004 dollars.

TABLE ES-4

WATER QUALITY LEVEL OF SERVICE BASED ON MONITORING DATA

WATERSHED	Number of Segments Having Level of Service				
	A	B	C	D	UNKNOWN
Calibogue Sound	8	0	3	1	15
May River	3	0	0	0	5
Colleton River	3	1	0	2	5
Chechessee River	6	0	0	1	8
New River	---	---	---	---	---
Beaufort River	5	5	0	0	11
Coosaw River	3	4	0	0	12
Whale Branch West	1	0	0	1	7
Morgan River	5	2	0	5	17
Broad River	---	---	---	---	---
Combahee River	---	---	---	---	---
Coastal	---	---	---	---	---
TOTAL	34	12	3	10	80
% OF TOTAL	24%	9%	2%	7%	58%
% OF MEASURED	58%	20%	5%	17%	---

TABLE ES-5

WATER QUALITY LEVEL OF SERVICE BASED ON MODEL RESULTS

	Number of Segments Having Level of Service							
	Model - Existing Land Use				Model - Future Land Use			
WATERSHED	A	B	C	D	A	B	C	D
Calibogue Sound	21	2	1	3	21	2	0	4
May River	7	0	0	1	7	0	0	1
Chechessee River	12	0	1	2	12	0	1	2
Colleton River	3	3	0	5	3	2	0	6
New River	---	---	---	---	---	---	---	---
Beaufort River	10	2	3	6	10	2	3	6
Coosaw River	11	4	0	4	10	5	0	4
Whale Branch West	4	2	0	3	4	1	1	3
Morgan River	11	6	4	8	10	5	3	11
Broad River	---	---	---	---	---	---	---	---
Combahee River	---	---	---	---	---	---	---	---
Coastal	---	---	---	---	---	---	---	---
TOTAL	79	19	9	32	77	17	8	37
% OF TOTAL	57%	14%	6%	23%	55%	12%	6%	27%

TABLE ES-6U

PLANNING LEVEL COST ESTIMATES FOR PSMS IMPROVEMENTS

BY WATERSHED

PRIVATE & PUBLIC PROJECTS

WATERSHED	PRIVATE PROJECTS	PUBLIC PROJECTS	ESTIMATED TOTAL COSTS (PUBLIC AND PRIVATE)
Calibogue Sound	$1,086,000	$872,000	$1,958,000
May River	N/A	$1,521,000	$1,521,000
Colleton River	$1,132,000	$2,413,000	$3,545,000
New River	N/A	$646,000	$646,000
Beaufort River	N/A	$3,932,000	$3,932,000
Coosaw River	$6,898,000	$2,931,000	$9,829,000
Morgan River	$117,000	$604,000	$721,000
Total	$9,233,000	$12,919,000	$22,152,000

Cost estimates based on January 2018 dollars

TABLE ES-6

PLANNING LEVEL COST ESTIMATES FOR PSMS IMPROVEMENTS
BY PRIORITY AND FLOODING CATEGORY -
PUBLIC PROJECTS ONLY

	FLOODING CATEGORY				
PRIORITY	A	B	C	D	TOTAL
1	$1,751,000	$1,879,000	$1,258,000	$1,080,000	$5,968,000
2	$772,000	$942,000	$843,000	$153,000	$2,710,000
3	$2,202,000	$317,000	$467,000	$183,000	$3,169,000
4	$1,042,000	$1,301,000	$576,000	$402,000	$3,321,000
5	$0	$0	$0	$185,000	$185,000
TOTAL	$5,767,000	$4,439,000	$3,144,000	$2,003,000	$15,353,000

Note: Cost estimates based on December 2004 dollars.

TABLE ES-7U

PLANNING LEVEL COST ESTIMATES

REGIONAL BMP WATER QUALITY PROJECTS

WATERSHED	WATER QUALITY BASIN NAME	BMP PROJECT IDENTIFIER	PLANNING LEVEL COST ESTIMATE
Calibogue Sound	Broad Creek 4	Broad Creek 4	$992,000
	Jarvis Creek 2	Jarvis Creek 2	$2,444,000
Colleton River	Sawmill Branch 1	Sawmill Branch 1	$2,064,000
	Sawmill Branch 2	Sawmill Branch 2	$1,071,000
Beaufort River	Battery Creek 2	Battery Creek N1	$1,370,000
		Battery Creek N2	$619,000
	Albergotti Creek 2	Albergotti Creek 2	$602,000
Coosaw River	Lucy Point Creek North 2	Lucy Pt. Creek	$438,000
Morgan River	Rock Springs Creek 1	Rock Springs Creek 1	$431,000
TOTAL			$10,030,000

Cost estimates based on January 2018 dollars

TABLE ES-7

PLANNING LEVEL COST ESTIMATES FOR PLAN ELEMENTS

PLAN ELEMENT	ANNUAL COST (DOLLARS PER YEAR)	PROJECT COST (DOLLARS)
Stormwater Control Regulations	$100,000	$0
PSMS Enhancements	$0	$15,353,000
Water quality controls (existing development)	$0	$14,300,000
Water quality monitoring	$300,000	$100,000
Annual maintenance	$3,200,000	$0
Inventory of secondary stormwater management system	$0	$3,000,000
Additional and on-going study and analysis	$50,000	$430,000
Public information	$100,000	$0
Bonded debt service (Town of Hilton Head Island)	$1,200,000	$0
Utility administration	$400,000	$0
TOTAL	$5,350,000	$33,183,000

NOTES:

1. Annual costs account for ongoing activities (BMP inspections, water quality sampling and analysis, maintenance of the primary and secondary stormwater management system, model updates, and public information)
2. Project costs include primary stormwater management system enhancements (e.g., culvert upgrades), land purchase and construction associated with regional BMPs to control existing development, collection of inventory data for secondary stormwater management systems, and specific recommended additional studies.
3. Cost estimates based on December 2004 dollars.

Beaufort County Watersheds

Hampton County

Charleston County

Colleton County

Jasper County

Combahee River

Whale Branch West

Coosaw River

Combahee River

Morgan River

Broad River

Beaufort River

Coastal

Colleton / Okatie River

Chechessee River

May River

New River

Calibogue Sound

Atlantic Ocean

0 10,000 20,000 Feet

1 inch equals 20,000 feet

Legend

- Major Roads
- Roads
- Watersheds
- Water
- Sand in Open Water
- Upland
- Wetland

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Figure ES-1

Job Number: 15178.00	Scale: 1" = 20,000'	Projection: South Carolina Stateplane, I' Feet	Datum: NAD83
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Disclaimer

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DATA	SOURCE	DATE
Roads	Beaufort County	2002
Land Use / Land Cover	USGS	

Thomas & Hutton used the above data "as is", and has made no independent investigation of the data nor makes any representation as to the accuracy or completeness of the data. Please see each source for available documentation of its respective data sets.

DATA	SOURCE	DATE
Watersheds	CDM / T&H	2004
PSMS	CDM / T&H	2004

Beaufort County
Areas of Detailed Hydrologic and Hydraulic Modeling

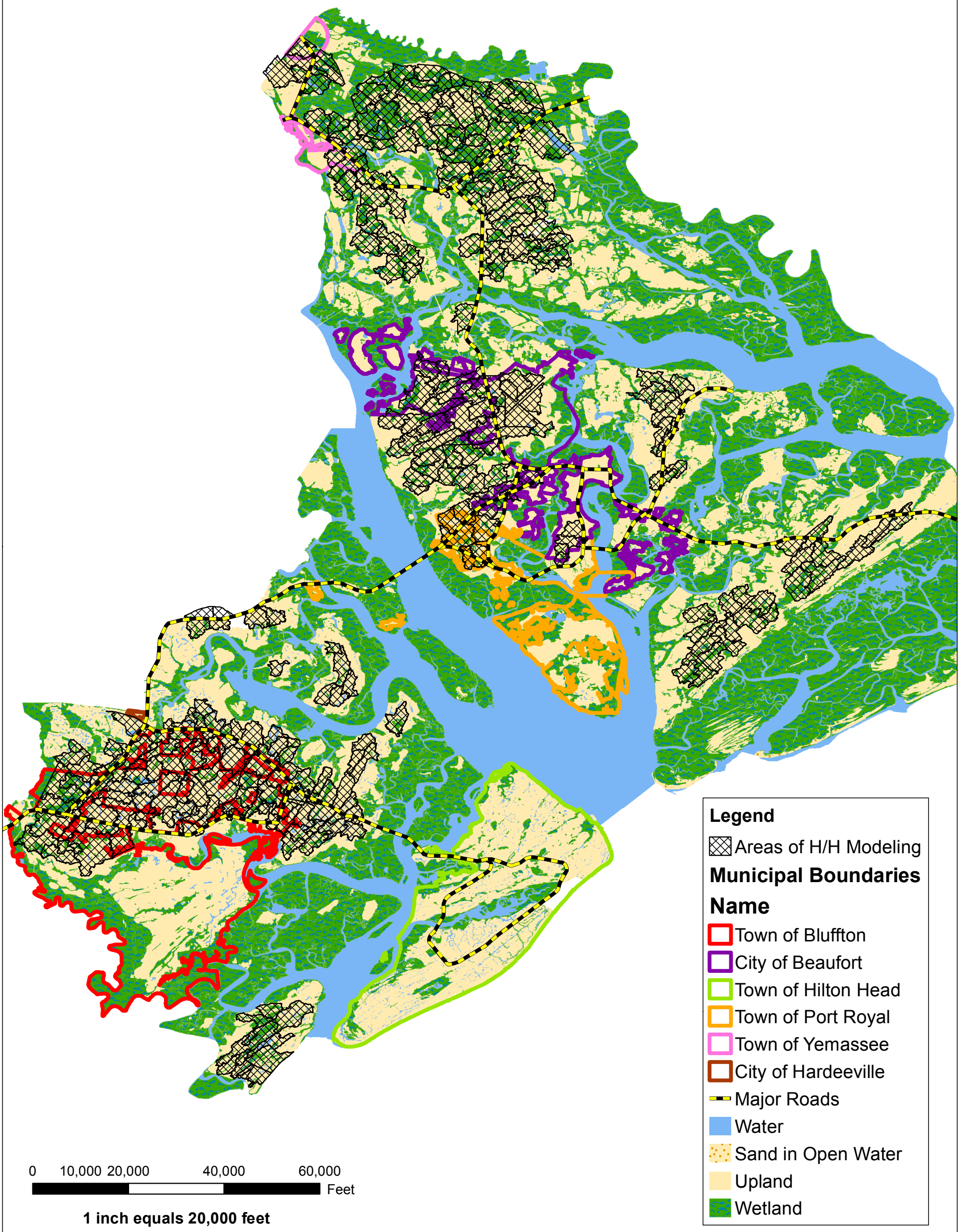
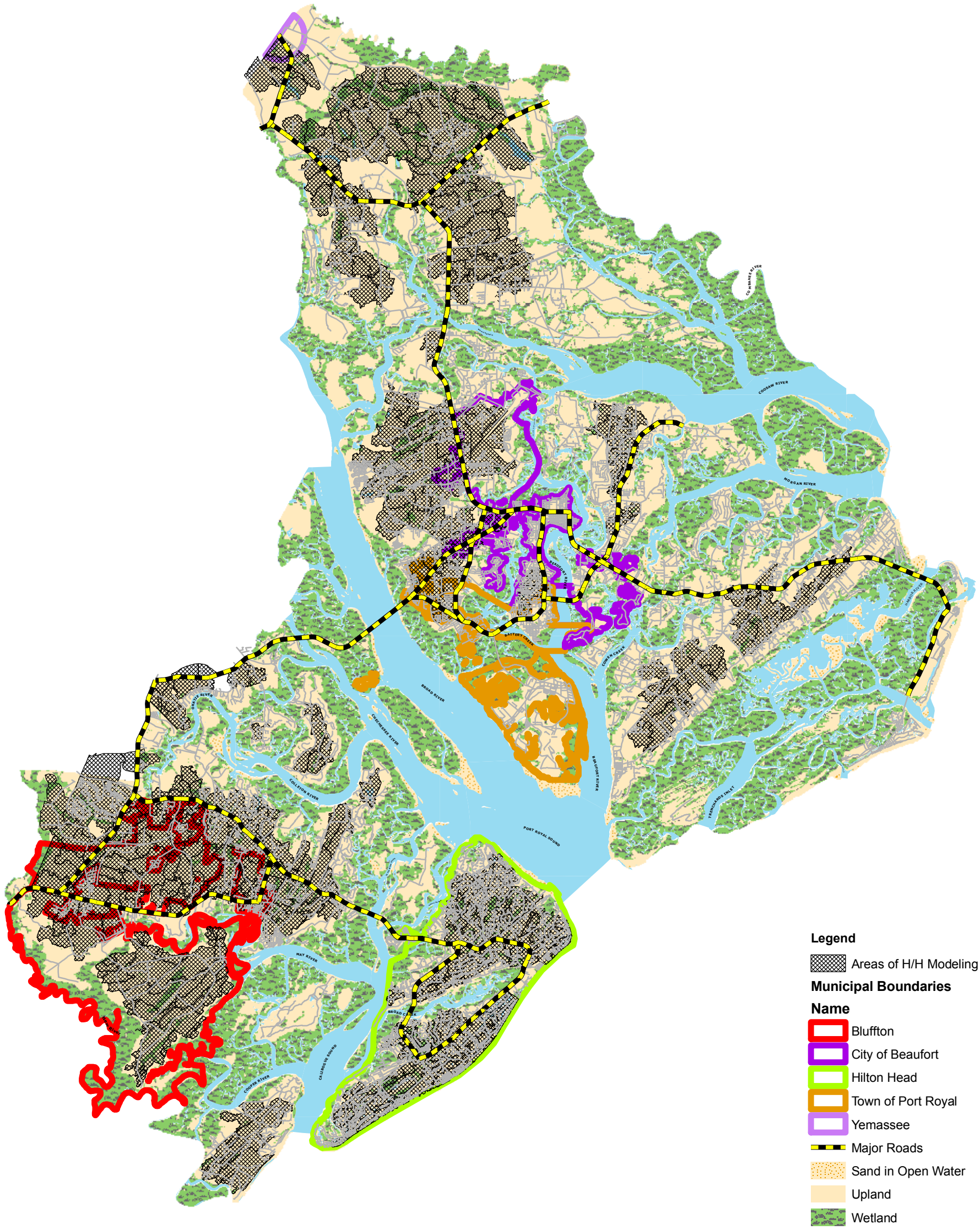


Figure ES-2U

ATM DESIGN ENGINEERING CONSULTING

Beaufort County
Areas of Detailed Hydrologic and Hydraulic Modeling



Legend

Areas of H/H Modeling

Municipal Boundaries

Name

- Bluffton
- City of Beaufort
- Hilton Head
- Town of Port Royal
- Yemassee

Major Roads

Sand in Open Water

Upland

Wetland

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Figure ES-2

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File: U:\J-15178_BeaufortCo_Stormwater\Task2\300_WatershedPlan\documentation\ThePlan\mxd\ExecSum_HHModeling_figureES-2.mxd				Vertical Datum: NAVD88

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Roads	Beaufort County	2002
Land Use / Land Cover	USGS	
Municipal Boundaries	Beaufort County	2002

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DATA	SOURCE	DATE
H/H Basins	CDM / T&H	2004
PSMS	CDM / T&H	2004

N

Beaufort County
Areas of Water Quality Modeling

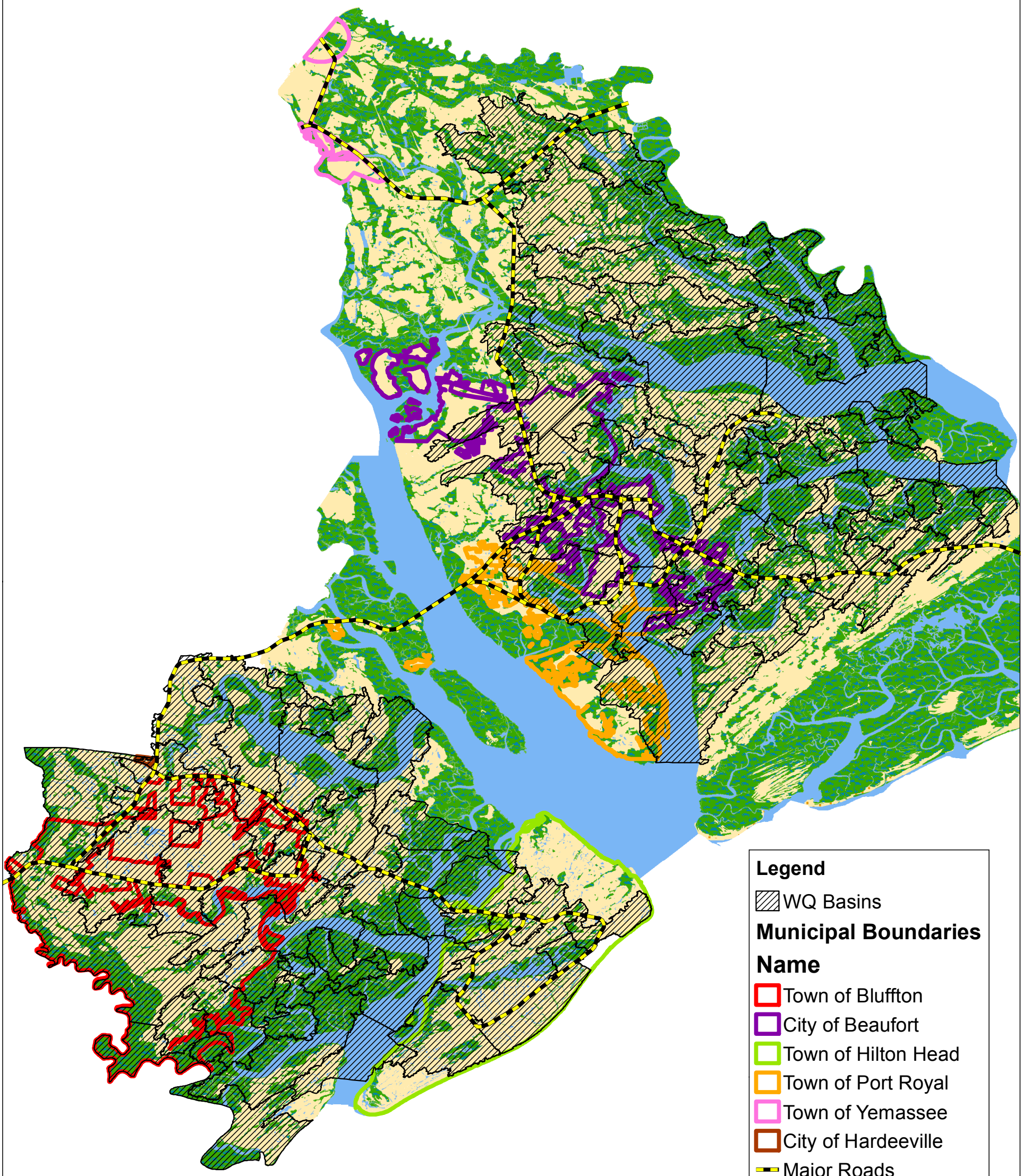

Figure ES-3U

ATM DESIGN ENGINEERING CONSULTING

Beaufort County
Areas of Water Quality Modeling

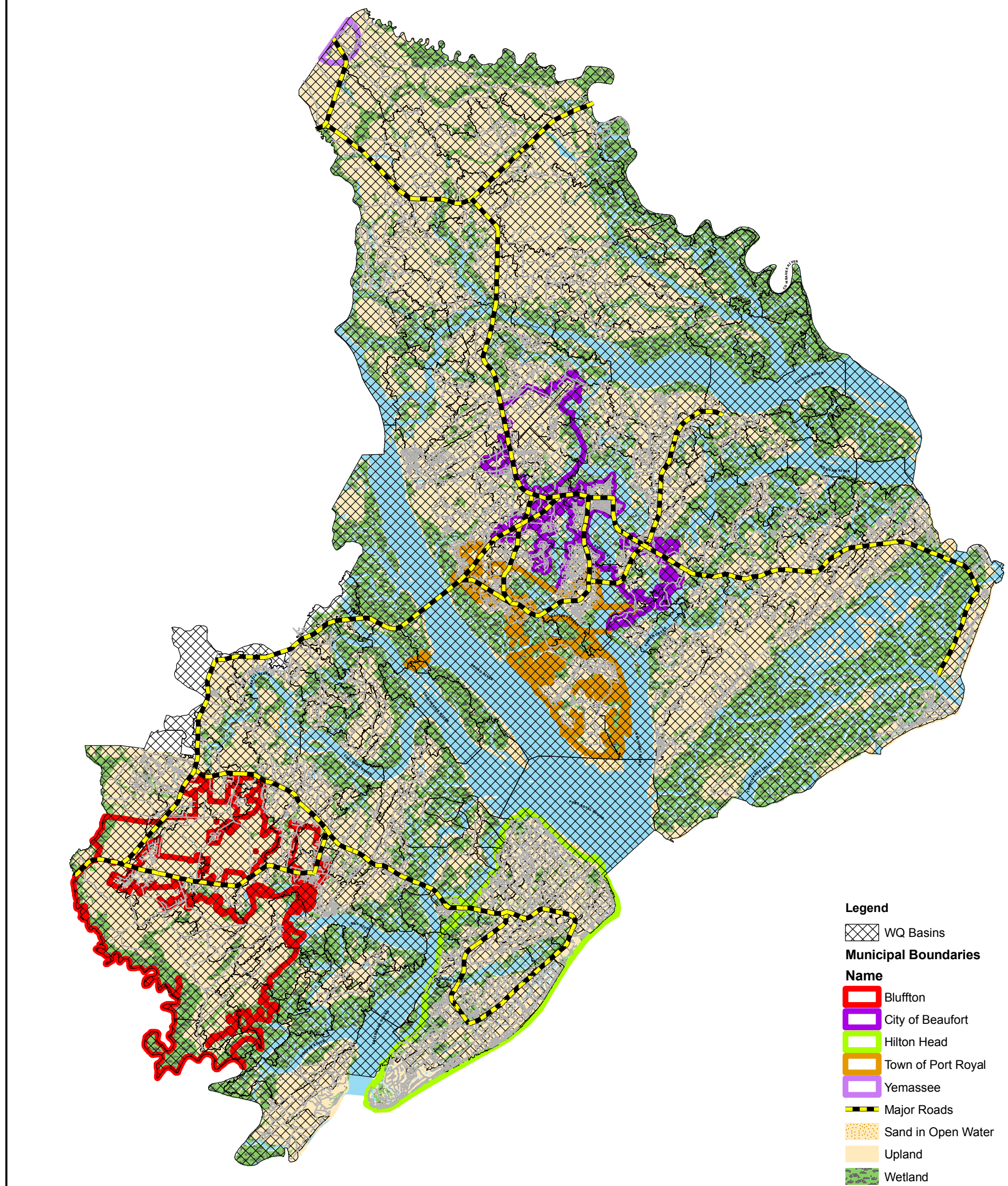

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Figure ES-3

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File: U:\J-15178_BeaufortCo_Stormwater\Task2\300_Watershed Plan\documentation\The Report\mxd\Exec Sum_WQ-Modeling_figureES-3.mxd				Vertical Datum: NAVD88

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Land Use / Land Cover	USGS	
Municipal Boundaries	Beaufort County	2002

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DATA	SOURCE	DATE
WQ Basins	CDM / T&H	2004
PSMS	CDM / T&H	2004

N

Beaufort County
Location of Overtopping Problems

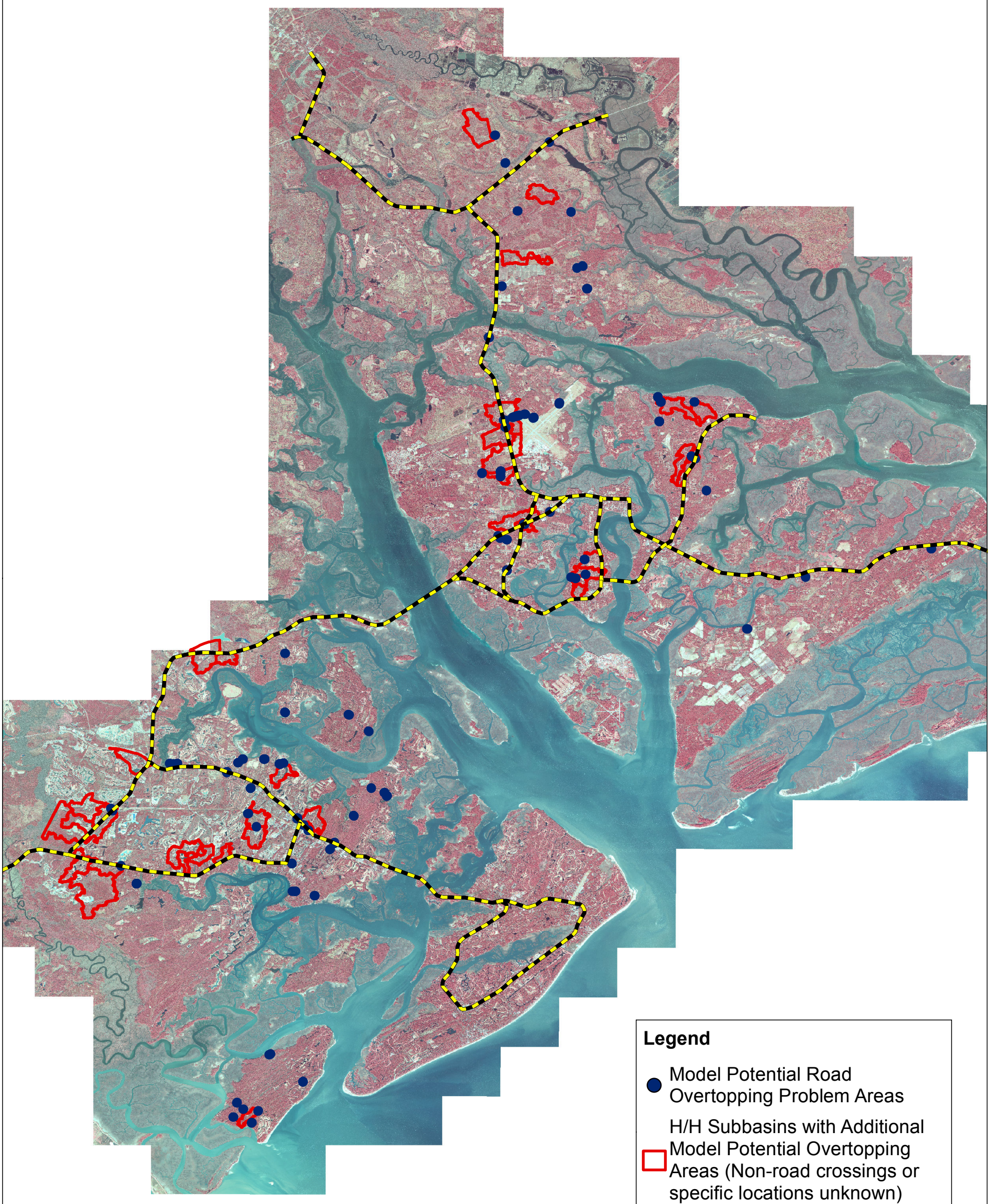

Figure ES-4U

ATM DESIGN ENGINEERING CONSULTING

Beaufort County
Location of Road
Overtopping Problems

Legend

- Model - Potential Problem Areas

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Figure ES-4

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Roads	Beaufort County	2002
Aerials	Beaufort County	2002

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DATA	SOURCE	DATE
Modeled Problem Areas	CDM / T&H	2004

Beaufort County
Potential Location for Water Quality Improvements and Monitoring

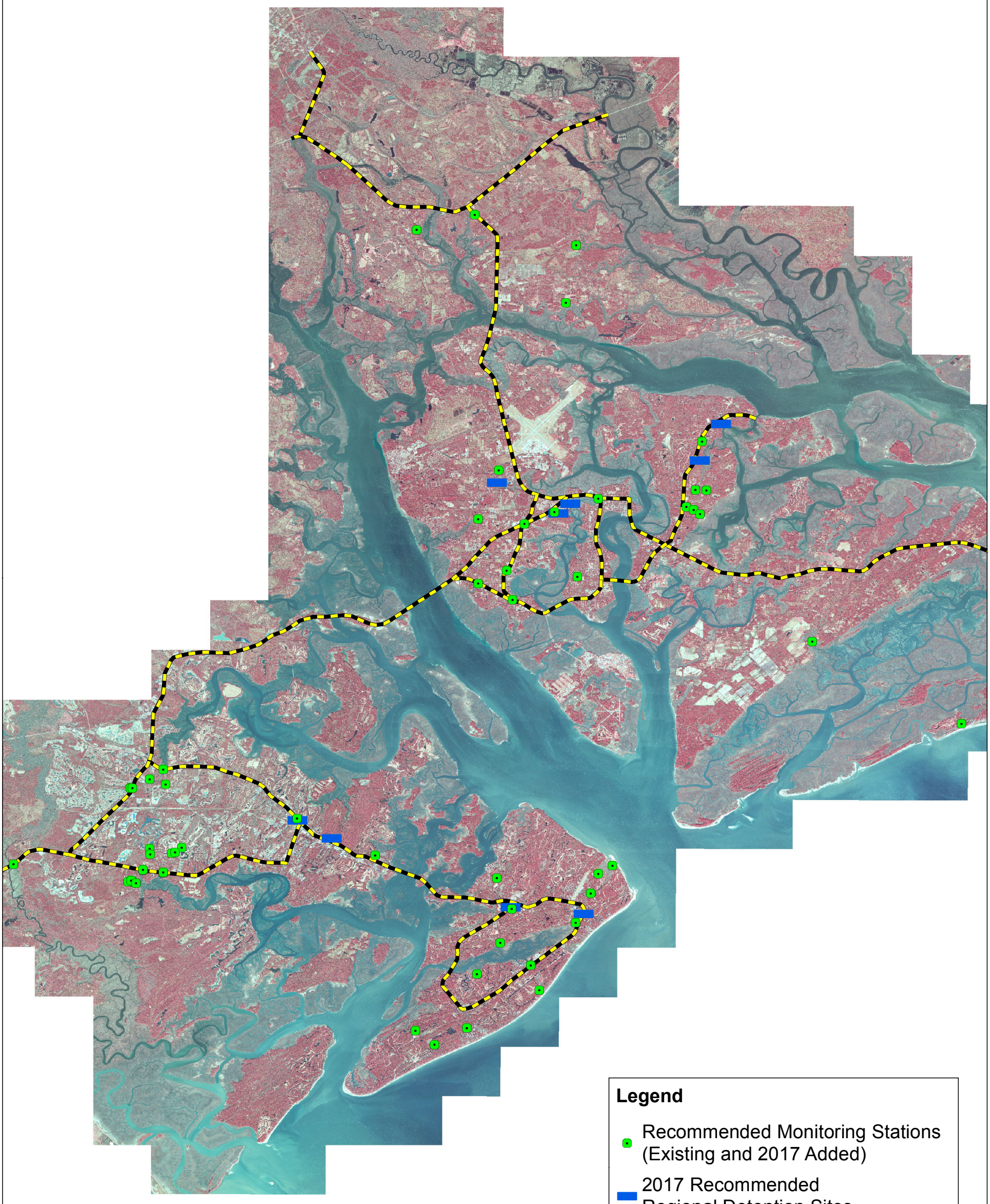

Figure ES-5U

ATM DESIGN ENGINEERING CONSULTING

Beaufort County Potential Locations for Water Quality Improvements and Monitoring

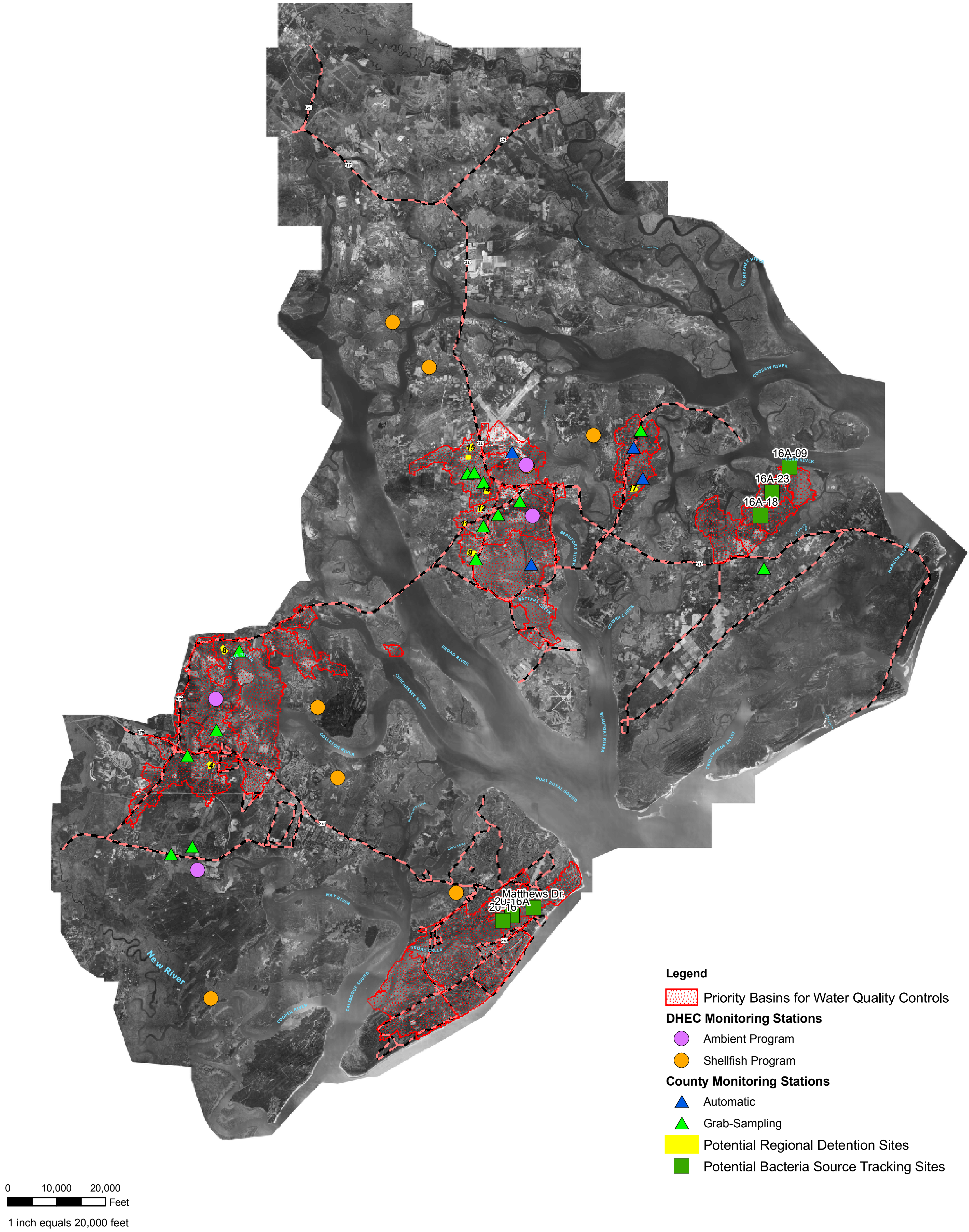

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Figure ES-5

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Produced: May 22, 2005	Produced by: GIS	Modified:	Modified by:
File: U:\J-15178_BeaufortCo_Stormwater\Task2000_WatershedPlan\documentation\TheReport\mxd\ExecSum_WQMonitoring_figureES-			Vertical Datum: NAVD88

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Aerials	Beaufort County	2002

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DATA	SOURCE	DATE
WQ Monitoring Plan	CDM / T&H	2004

Section 17
2018 Stormwater Implementation Guide Recommendations

This section summarizes the recommendations generated from the updated SWMP. Recommendations in this section are based upon the findings presented in Updated Sections 3,4,6,7,8,9, & 11 of the report. Section 17.1 describes the elements of the guide, and the planning level cost estimates are presented in Section 17.2.

17.1 Recommended Watershed Management Plan

The recommended implementation guide includes the following elements:

- PSMS enhancements
- Water quality monitoring
- Operations and maintenance (O&M) of the PSMS and secondary stormwater management systems
- Inventory of the secondary stormwater management system
- Additional and on-going study and analysis

For each plan element, the following sections identify objectives and recommended activities.

17.1.1 PSMS Enhancements

As a result of the updated to the hydrologic and hydraulic analyses, a total of 76 locations for improvements to mitigate overtopping were identified. These results were developed by analyzing evacuation routes for the 100-year design storm and analyzing all other roads for the 25-year design storm. Locations of the problem areas are presented in tables 3-6, 4-6, 6-6, 7-6, 8-6, 9-6, & 11-6 and Figures 3-4, 4-4, 6-4, 7-4, 8-4, 9-4, & 11-4 in this update.

The evaluation of solutions for overtopping focused primarily on comparing original 2006 models to current information and continued to focus on the upgrade of culverts at the stream crossings. Overtopping is mitigated by increasing the conveyance capacity of the culverts. In some cases, the culvert upgrade was supplemented by raising the road, particularly in locations where the road elevation was at or near the design downstream boundary water elevation, which was defined as the mean annual high tide.

Originally the 2006 SWMP considered regional detention along PSMS and concluded that the cost of detention was prohibitive compared to upgrading culverts or raising roads. It is recommended as part of this guide that where CIP water quality locations are considered, the effect of that detention should attempt to take into account any local overtopping that could be mitigated by the CIP project.

In general, consideration should be made for additional detention along all drainage systems wherever feasible to add more volume to the system, thus mitigating potential flooding for smaller storm events, and reducing duration of flooding for larger events.

17.1.2 Water Quality Controls for Existing Development

The water quality analysis identified a number of water quality basins in the County where treatment of runoff from existing development could improve the potential for meeting bacteria and other water quality standards.

In general, potential regional sites were located in areas of existing wetlands, which require the implementation of "off-line" detention facilities primarily excavated from upland areas outside of the existing wetlands.

A total of nine sites were recommended for regional BMPs. The evaluation included a review of the sites with participating jurisdictions staff, evaluation of potential wetlands impact, determination of site tributary area and existing land use, general order of magnitude sizing of the pond, and evaluation of construction costs, land acquisition costs and benefits (bacteria, TP, TN, and TSS load reduction). The locations of the proposed facilities are shown in and further described in Appendix O in the CIP recommendations.

17.1.3 Water Quality Monitoring

A monitoring program was in place in the County as a result of previous 2006 SWMP recommendations and other activities in the watershed. As part of this implementation guide, this data was evaluated, and a new set of monitoring locations as recommended. Details of this are located in Appendix Q of this guide.

The goals of the program include the following:

- Characterize baseline water quality via ambient (grab) sampling
- Identify seasonal trends and overall trends over time using long-term ambient sampling data
- Evaluate dry weather (ambient) and wet weather (automatic sampling) water quality in selected areas for comparison to pollutant concentration values used in the watershed water quality modeling effort
- Evaluate sources of bacteria (human, bird, pets, wildlife) in locations where measured bacteria levels are substantially higher than expected, based on the watershed and receiving water quality modeling

It is recommended that Beaufort County staff be responsible for monitoring on the tributaries to the major open water tidal river segments and BMP monitoring. Where

coordination with other municipalities is occurring, this should be continued. This monitoring will be done in conjunction with SCDHEC's existing monitoring programs.

Water quality data from Beaufort County, the Town of Bluffton and Hilton Head Island were collected and analyzed for standard statistical parameters and for trends. The identification of appropriate sampling sites for grab sampling and automatic storm event sampling was based on the water quality statistical analysis, the current LOS for water quality segments, and the existing land use distribution. In all, four sites were selected for automatic sampling, and 52 sites were selected for grab sampling. These sites are provided on Figure ES-6U in the Executive Summary of this guide.

Sampling would be conducted on a monthly basis. Sampling events will note weather conditions, flow conditions, and tidal condition (ebb and flood). Field parameters monitored during each sampling event include temperature, dissolved oxygen (DO), conductivity/salinity, pH and turbidity. Samples will be collected and analyzed for the following parameter list:

- *Enterococci* (saltwater)
- *Escherichia coli* (*E. coli*) (freshwater)
- Fecal coliform bacteria
- Total suspended solids (TSS)
- Biochemical oxygen demand (BOD)
- Ammonia nitrogen
- Nitrite and nitrate nitrogen
- Total Kjeldahl nitrogen (TKN)
- Total phosphorus
- Chlorophyll-a
- Total organic carbon (TOC) quarterly
- Metals (cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc) quarterly
- Hardness, quarterly

Samples collected will be characterized as either "dry" or "wet" samples, based on the amount of precipitation received over the 72 hours preceding sample collection. If less than 0.1 inch of rain fell in the 72 hours before the time of sampling, the samples will be classified as dry weather samples. If 0.1 inch of rain or more fell during the previous 72-hour period, the sample will be categorized as a wet weather sample. By identifying the weather conditions preceding each sampling event, it is hoped that contaminant concentrations can be linked to base- or low-flow conditions, or high-flow associated with stormwater runoff, thus providing valuable diagnostic information regarding potential source(s) of pollution.

Results from the laboratory analysis and field-collected parameters will be compared to the applicable water quality standards and criteria contained in SCDHEC Rule R.61-68, Water Classifications and Standards. Modifications to the plan, including stations to be

sampled and observed concentrations, will occur based on the results obtained. Recommended statistical evaluations include standard descriptive statistics including data distribution, trend analysis (Kendall-Tau) and inter-station comparison (Mann Whitney, Wilcoxon).

Four stations would also include automatic sampling stations, so that sampling will be activated during storm events and stormwater runoff sampling can be reliably conducted. The four sites will be selected to represent runoff quality from different urban land use types (e.g., industrial, residential/golf course) and observed receiving water quality. In general, the same parameters will be sampled. Measurements of rainfall, stage, velocity and flow rate will also be made at the automatic sampling stations. The purpose of this sampling is to provide additional information to better define relationships be runoff event mean concentrations (EMCs) and receiving water quality. Preliminary pollutant loading modeling has revealed locations where resultant fecal coliform loads from the model were not excessive as compared to other areas but associated receiving waters were known "hot spots" based on evaluation of water quality data (i.e., tidal creek areas of May River and Okatie River). Other factors such as salinity regime changes, flushing, etc., also have an effect on observed fecal coliform levels in receiving waters. In addition to providing local EMC data to support future modeling efforts, this also provides insights to the importance of the various factors that affect receiving quality. It is anticipated that 12 or more storm event samples will need to be collected at each location to estimate EMCs with a reasonable confidence (95%). The actual number will depend on the variability of the data record at each location.

SCDHEC stations, classified as "shellfish" stations, will be evaluated concurrently for bacteria and salinity data. The objective is to use the collected data for comparison to the water quality model results and to determine if the model parameters provided a reasonable simulation of bacteria conditions or whether the model should be refined with adjusted mixing and first-order loss parameter values.

In general, there was good agreement between the measured values and the model results. However, some of the reaches did not have good agreement. This is likely due to how the hydrodynamics of the systems are being modeled. The approach that has been used to date is based on the net flow advection of the various reaches and is a quasi-steady-state approach. This is an acceptable approach in most cases. However, given the tide range that exists in the county's receiving waters and the dynamic salinity regimes present, a detailed 3-dimensional hydrodynamic model, such as the Environmental Fluid Dynamics Code (EFDC), is required to adequately simulate the tidal fluctuations and salinity-density gradients that exist in the receiving waters. Development of a 3-D hydrodynamic model would be a significant effort but would provide the proper hydrodynamic foundation for improved water quality predictions.

17.1.4 Operation and Maintenance

Operations and Maintenance recommendations have not changed from the original recommendations in the 2006 study. For the PSMS, operations and maintenance would primarily include maintenance of culverts and bridges, and maintenance of open channels. Activities at culverts and bridges would generally include removal of silt or other obstructions. For open channels, activities would also include silt and debris removal, and may also include periodic mowing.

17.1.5 Inventory of Secondary Stormwater Management System

Both this guide and the original 2006 SWMP focused on the PSMS, and an inventory of the PSMS was reviewed and updated as part of the study. The PSMS includes the major drainage systems in the County, typically including any conveyance with a tributary area of 320 acres or more.

Future efforts should focus on improving the data associated with the PSMS to include inverts, culvert sizes, GPS/GIS location data, and efforts should be made to improve the accessibility of that data within the County and jurisdictions GIS models.

The inventory of the secondary stormwater management system, which conveys the stormwater to the PSMS should also begin to be assembled. In many areas, drainage system maps are not current, and often show information that is not accurate. An accurate and complete inventory will be useful in evaluating the stormwater management system and evaluating the extent of required maintenance in those areas.

17.1.6 Additional and On-Going Study and Analysis

One of the major recommendations for further analysis is the continued development and improvement of an up-to-date structure GIS coverage with finished first-floor elevation data, and flood inundation mapping as well as PSMS and secondary stormwater systems. The modeling in this study developed peak water elevation data for the various design storms evaluated, including the 100-year design storm. However, the current version of the ICPR model does not include the capability of automated flood inundation mapping. Furthermore, while additional information and data was gathered as part of the update, the County database can use additional improvements. Consequently, the model results and LiDAR topographic data may suggest that the ground surface near a structure is inundated, but there is no way to confirm whether or not the structure itself is flooded or not (e.g., is it elevated to prevent flooding). Specific activities would include updating and maintaining the structure database and GIS coverage, and to evaluate finished first-floor elevations, by building certificates or survey.

Additional recommendations based on the update include updating the models to current versions of the software or considering migration to other platforms. For example, ICPR3.0 that was utilized for this analysis is now no longer supported by the

vendor, and there is a new ICPR4.0 version which adds functionality and would be beneficial to consider updating the model to this platform. Additionally, the WMM and other water quality models are designed to run on older operating systems, and updated versions or new platforms should be considered for future work on this data.

17.2 Planning Level Costs for Plan Components

Conceptual costs have been estimated for some of the items discussed above as part of the implementation guide. In some cases, such as the water quality CIP projects and culvert upgrades, the cost is specified as a total cost in 2018 dollars. In contrast, other costs such as operations and maintenance are expressed as an annual cost.

17.2.1 PSMS Enhancements

The cost for the recommended improvements was presented in the watershed sections of this report. The total cost for updated watersheds was $22.2 million.

Analysis in the original 2006 SWMP had been done in order to prioritize the improvements based on the type of road and the depth of road overtopping for the design storm event. This criterion was not changed for this update analysis.

Consideration was also given to “public” versus “private” improvements, where “private” improvements would be in developments that would not be considered part of the “public” PSMS. This review indicated that the total projected cost for public projects as a result of this update is $9.2 million, and the projected cost of private projects is $12.9 million. This is shown in Table ES-6U in the Executive Summary of this guide.

17.2.2 Water Quality Controls for Existing Development

The water quality controls for existing development focuses on the implementation of regional BMP and detention facilities strategically located in areas with existing development that is not controlled by BMPs. The conceptual probable capital cost for the improvements was presented in the watershed sections and is further identified in Appendix O of this report. The total cost was $10.0 million, which includes the construction cost plus the land acquisition cost.

17.2.3 Additional and On-Going Study and Analysis

The major activity included in this category is the development of inundated area and evaluation of structural finished floor elevations. Cost of this task will need to be determined based on current state of the GIS and available FEMA data as well as other factors. For budgetary purposes, an allowance for $300,000 should be allocated towards this task.

Another on-going activity to consider is the update of the models developed for this study. An annual cost of $50,000 per year was previously stated in the 2006 study and is suitable for ongoing update costs to keep models current and prepare for future updates to the document and models. It is recommended to do this annually and coordinate this work in conjunction with updates to land use databases or other databases. Data required for model update such as land use and PSMS upgrades should be compiled as they occur to facilitate the model updates. This cost will not eliminate the need for future large-scale updates to models, it will only assist in maintenance of the models and keep costs down since the data will be better organized and available.

SCDHEC Shellfish Harvesting Monitoring Data Year-to-Date

ATTACHMENT 2

	19-19				19-19A			
	2015	2016	2017	2018	2015	2016	2017	2018
	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)
December	110.0	79.0	1600.0		33.0	23.0	920.0	
November	NS	33.0	49.0		NS	13.0	33.0	
October	23.0	NS	22.0		49.0	NS	49.0	
September	46.0	23.0	17.0		17.0	110.0	7.8	
August	6.8	NS	79.0		17.0	NS	70.0	
July	17.0	79.0	350.0		7.8	17.0	110.0	
June	33.0	79.0	23.0		46.0	130.0	49.0	
May	NS	70.0	17.0		NS	23.0	23.0	
April	1.8	23.0	7.8		33.0	23.0	23.0	
March	170.0	33.0	350.0		130.0	33.0	11.0	
February	13.0	23.0	13.0		14.0	17.0	7.8	
January	79.0	110.0	95.0	13.0	79.0	33.0	79.0	2.0
Additional Samples								
Additional Samples								
Average Annual GeoMean	26.0	46.8	56.5	13.0	30.9	30.6	39.8	2.0
** Truncated GeoMetric Mean	37.0	37.0	44.0	142.0	21.0	30.0	36.0	34.0
** Truncated 90th Percentile	205.0	105.0	203.0	712.0	95.0	89.0	133.0	166.0

	19-19B				19-19C			
	2015	2016	2017	2018	2015	2016	2017	2018
	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)
December	27.0	49.0	540.0		7.8	33.0	240.0	
November	NS	7.8	7.8		NS	14.0	31.0	
October	4.5	NS	33.0		23.0	NS	23.0	
September	9.3	23.0	11.0		17.0	13.0	4.5	
August	13.0	NS	21.0		13.0	NS	33.0	
July	6.8	22.0	130.0		11.0	17.0	49.0	
June	11.0	70.0	13.0		14.0	110.0	17.0	
May	NS	49.0	7.8		6.8	49.0	2.0	
April	17.0	13.0	4.5		17.0	13.0	7.8	
March	49.0	33.0	33.0		17.0	17.0	13.0	
February	1.8	13.0	13.0		1.8	11.0	9.3	
January	49.0	49.0	31.0	4.5	33.0	17.0	49.0	2.0
Additional Samples								
Additional Samples								
Average Annual GeoMean	12.3	26.7	23.3	4.5	12.0	21.7	18.8	2.0
** Truncated GeoMetric Mean	11.0	16.0	20.0	24.0	11.0	16.0	16.0	17.0
** Truncated 90th Percentile	51.0	69.0	83.0	97.0	55.0	65.0	57.0	75.0

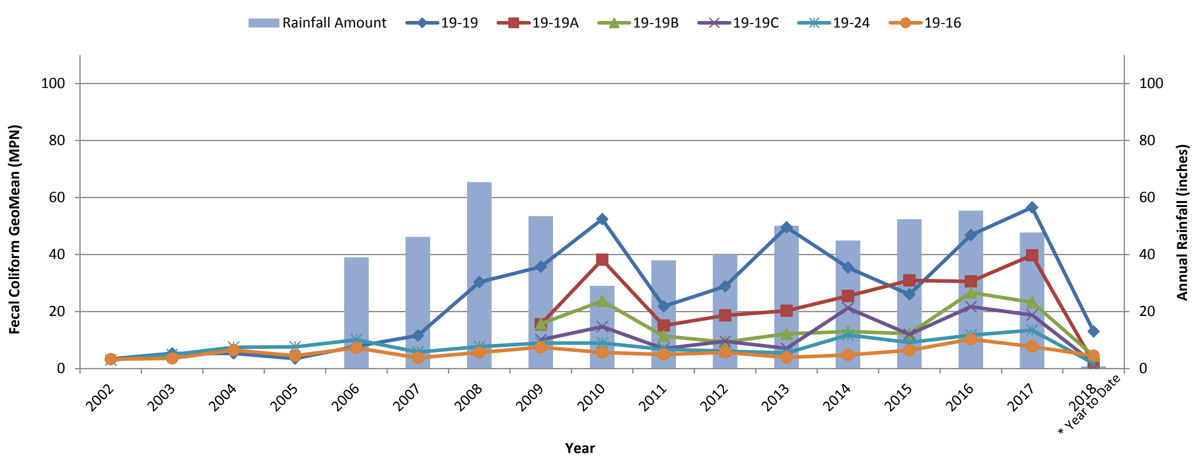
	19-24				19-16			
	2015	2016	2017	2018	2015	2016	2017	2018
	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)	Fecal Coliform (MPN)
December	6.8	7.8	220.0		4.5	23.0	49.0	
November	NS	13.0	2.0		NS	33.0	2.0	
October	7.8	NS	6.8		4.5	NS	2.0	
September	23.0	4.5	2.0		4.5	7.8	1.8	
August	24.0	NS	33.0		4.0	NS	33.0	
July	2.0	49.0	49.0		4.5	13.0	22.0	
June	4.5	33.0	7.8		11.0	23.0	4.5	
May	6.8	14.0	23.0		23.0	17.0	4.5	
April	13.0	7.8	13.0		17.0	1.8	4.5	
March	13.0	11.0	13.0		6.8	7.8	33.0	
February	7.8	6.8	4.5		2.0	1.8	1.8	
January	17.0	7.8	27.0	1.8	7.8	17.0	33.0	4.5
Additional Samples								
Additional Samples								
Average Annual GeoMean	9.2	11.7	13.5	1.8	6.4	10.3	7.7	4.5
** Truncated GeoMetric Mean	7.0	9.0	10.0	10.0	4.0	6.0	7.0	7.0
** Truncated 90th Percentile	30.0	29.0	37.0	49.0	13.0	21.0	29.0	33.0

NS = No Sample

AS = Additional Samples

** Town staff calculations utilizing DHEC statistics

SC DHEC Shellfish Monitoring Stations Average Annual Fecal Coliform

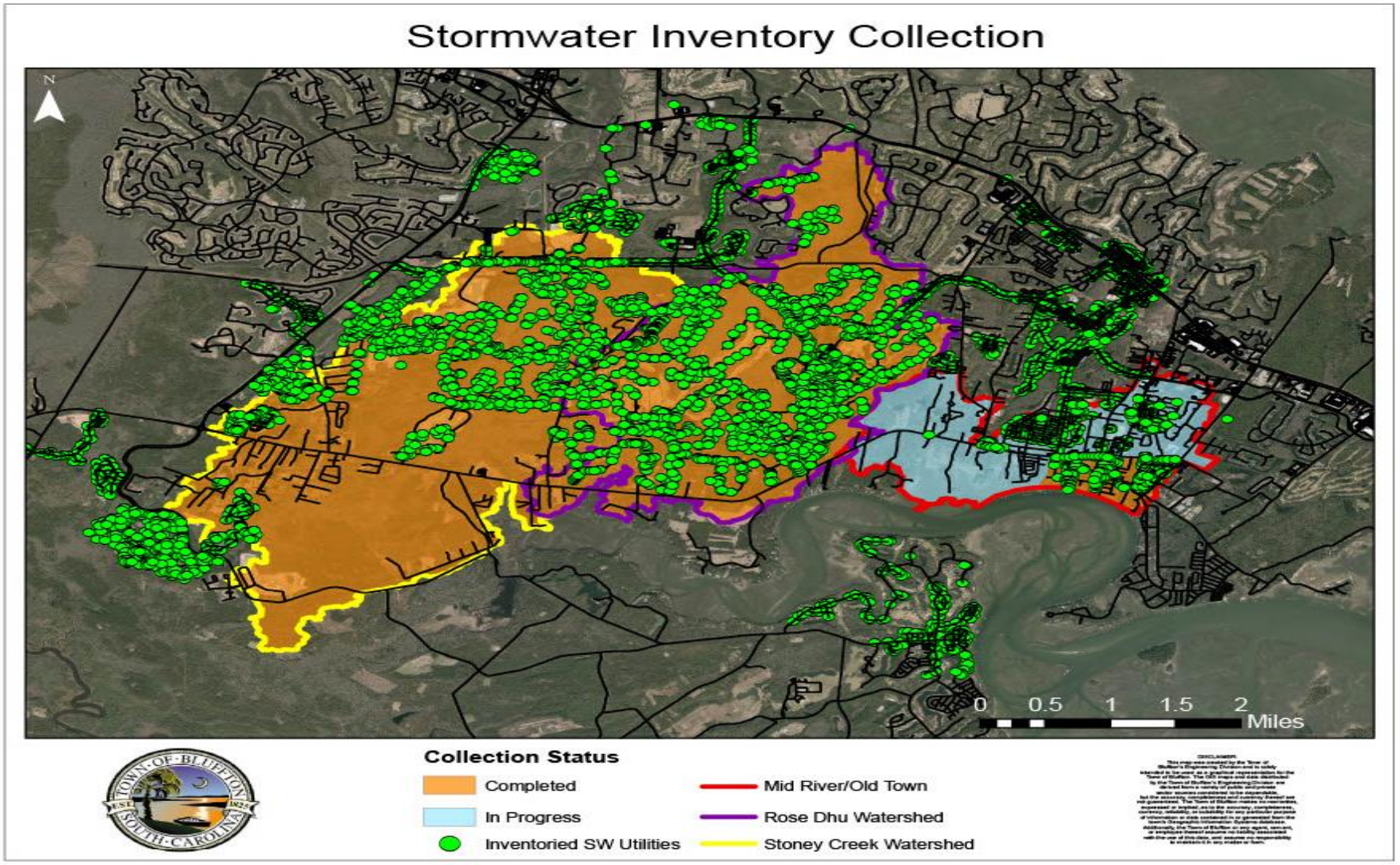


ACTIVITY - POLICY	STATUS
May River Watershed Action Plan Update (~~Grant award of $55,000 in 2017~~)	To be completed with direction and input from staff, the public, Water Quality Technical Advisory Committee, May River Watershed Advisory Committee, and Town Council. Action Plan Update is a FY19-20 priority of WAPAC and Council. **WAPAC provided direction on scope of Update on 2/22/18 to include indicators of watershed health including fecal coliform, other biotic/abiotic parameters and social/cultural/economic indicators.**
Sewer Connection & Extension Policy	Council adopted the Sewer Connection & Extension Policy on 9/26/17. **WAPAC proposed prioritization phases for sewer extension in Historic District for FY 19-23 and recommended revisions to Sewer Connection Ordinance on 2/22/18. Staff has initiated septic system maintenance education via personally and with Lowcountry Stormwater Partners. WAPAC reviewed a proposed Sewer Connection Program on 3/22/18.**
ACTIVITY - PROJECTS	**STATUS**
Sanitary Sewer Extension	Buck Island/Simmonsville Road (BIS) Phases I, II, III and IV are completed. Toy Fields is completed. **Sewer Extension & Connection is identified as a FY19-20 priority by the WAPAC. Current project updates are included in Engineering Consent Agenda under "Sewer & Water."**
May River 319 Grant Phase 1 - New Riverside Pond (Grant award of $483,500 in 2009)	Completed in 2013. Per water quality tests, a statistically significant reduction in fecal coliform bacteria concentration exists pre-pond versus post-pond. However, bacteria levels re-load prior to discharging into the May River, leading to additional BMP installation of Filtrexx proprietary filter socks. Installed 12/12/17 to maintain bacteria reduction. **Downstream failing septic system was located by Staff and reported to County & SCDHEC for remediation.**
May River 319 Grant Phase 2 - Pine Ridge (Grant award of $290,000 in 2011)	Completed in 2016. In post-construction monitoring phase to assess project efficacy.
May River 319 Grant Phase 3 - Town Hall Retrofit (Grant award of $231,350 in 2016)	Staff a workplan amendment for this grant award to include stormwater retrofits at Town Hall was approved by SCDHEC & EPA . **Current project updates are included in Engineering Consent Agenda.**
Stoney Creek Wetlands Restoration: Preliminary Design Phase	Wetlands restoration project with the goal to reduce stormwater volume reaching the May River. Conceptual design completed and approved by property owners. **Current project updates are included in Engineering Consent Agenda.**
May River Watershed Water Quality Model	Preliminary 2002 Palmetto Bluff Duck Pond Drainage area watershed model complete. Completed New Riverside BMP model for comparison to field observations. Rose Dhu Creek sub-watershed "Existing Conditions" portion of the Headwaters Water Quality Model is underway. Currently proposed for a future fiscal year following completion of the Beaufort County Stormwater Master Plan and the Action Plan Update. **Staff is re-initiating this project in anticipation of County Master Plan completion in March 2018.**
ACTIVITY - FINANCIAL	**STATUS**
Additional Funding Opportunities	Exploring partnership opportunities with BJWSA. **WAPAC FY19-20 priority to assess Stormwater Utility Fee structure to support initiatives.**

ACTIVITY - PROGRAMS	STATUS
Public Outreach/Participation/Involvement (MS4 Minimum Control Measure #1 & 2)	Outreach and involvement efforts continue through county-wide partnership with Carolina Clear as Lowcountry Stormwater Partners - Neighbors for Clean Water and through local cleanups and civic engagements and the May River Watershed Action Plan Advisory Committee. **Current updates are included in Engineering Consent Agenda and Attachment 4.**
Infrastructure Mapping/GIS (MS4 Minimum Control Measure #3)	Data points continue to be collected with new development to meet MS4 requirements & populate water quality model. **Current updates are included in Engineering Consent Agenda Attachment 5a.**
Water Quality Monitoring Program (MS4 Minimum Control Measure #3)	1. SCDHEC Shellfish monitoring results 2. Fecal coliform bacteria "hot spot" concentrations 3. Microbial Source Tracking of human sources of bacteria 4. Illicit Discharge investigation and monitoring 5. BMP efficacy monitoring 6. MS4 monitoring **Current updates are included in Engineering Consent Agenda Attachments 2, 5b, 5c, and 5d.**
Construction Site Stormwater Runoff Control Program (MS4 Minimum Control Measure #4)	Sediment and erosion control inspections with escalating enforcement response. **Current updates are included in Engineering Consent Agenda Attachment 6.**
Stormwater Plan Review & Related Activity Program (MS4 Minimum Control Measure #5)	SCDHEC delegated plan review-related activities. **Current updates are included in Engineering Consent Agenda Attachment 7.**
Ditch Inspection/Maintenance Program (MS4 Minimum Control Measure #6)	Continued coordination with SCDOT, Beaufort County and Town Public Works to inspect and maintain ditches within the Town's jurisdiction. Town is initiating an easement acquisition program. **Current updates are included in Engineering Consent Agenda Attachment 8 and under "Public Works."**
Septic System Maintenance Program	FY18 funding is $10,000 and administered by Growth Management via the Neighborhood Assistance Program (NAP). On-going assistance offered to Town residents regardless of financial status through Neighborhood Assistance Program. **Current updates, as reported by NAP, are included in Engineering Consent Agenda Attachment 9.**
Sewer Connection Program	In FY18 Council allocated $200,000 for a Sewer Connection Program as well as $10,000 for assistance to connect income-qualified individuals to existing sanitary sewer as part of the Neighborhood Assitance Program. Council adopted the Sewer Connection & Extension Policy at 9/26/17 meeting. **CIP sewer extension projects are prioritized for FY19-23 Budgeting Forecast Sewer Connection Ordinance changes anticipated 1st quarter 2018. Sewer Connection Policy is under development and presented for WAPAC review on 3/22/18.**

ATTACHMENT 5a

MS4 Minimum Control Measure #3 – IDDE (Illicit Discharge Detection & Elimination): Stormwater Infrastructure Inventory

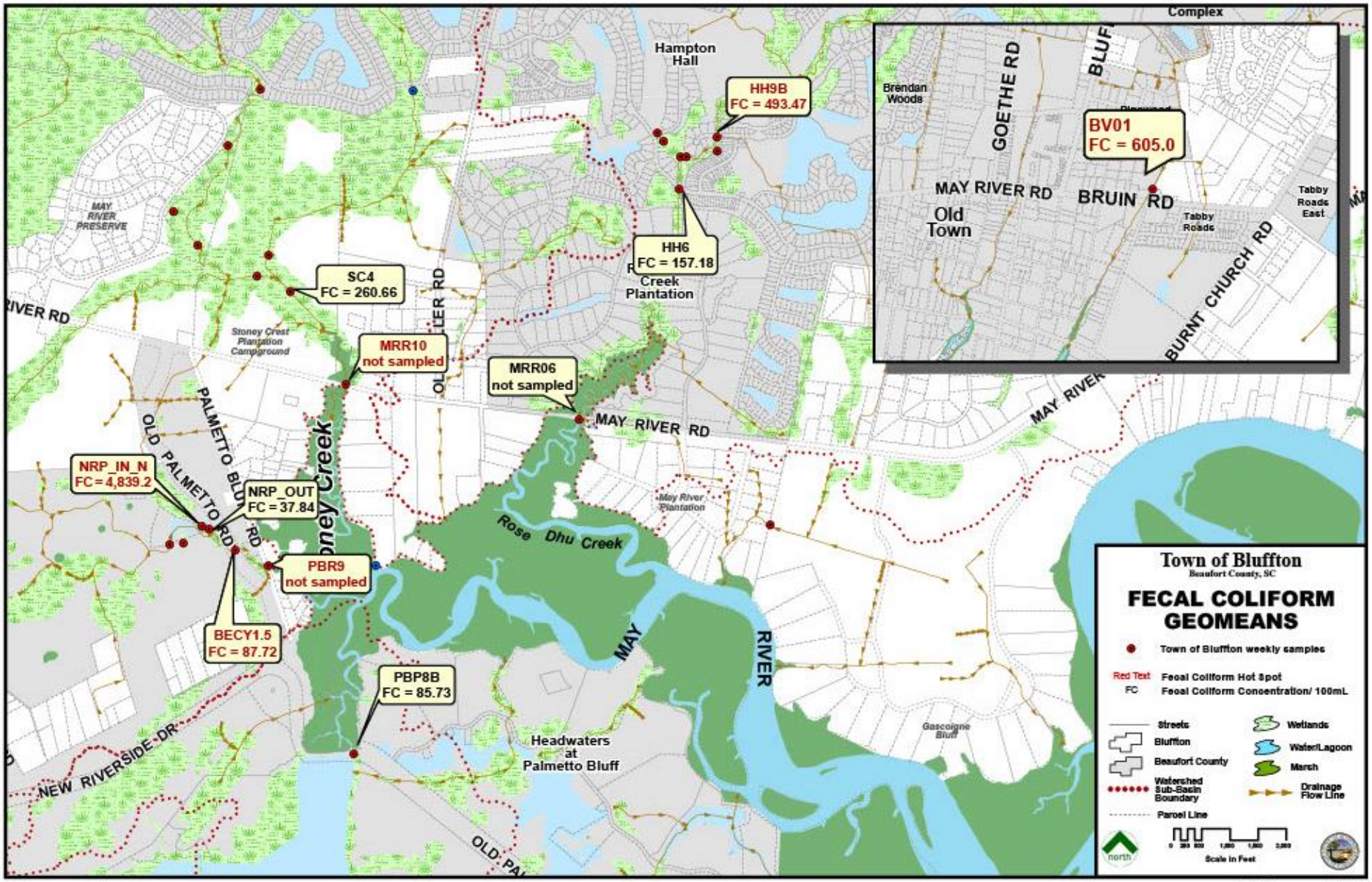


Stormwater Infrastructure Inventory Collection Status

FY 2018 YTD Collection Totals	3,324
FY 2017 Collection Totals	3,874

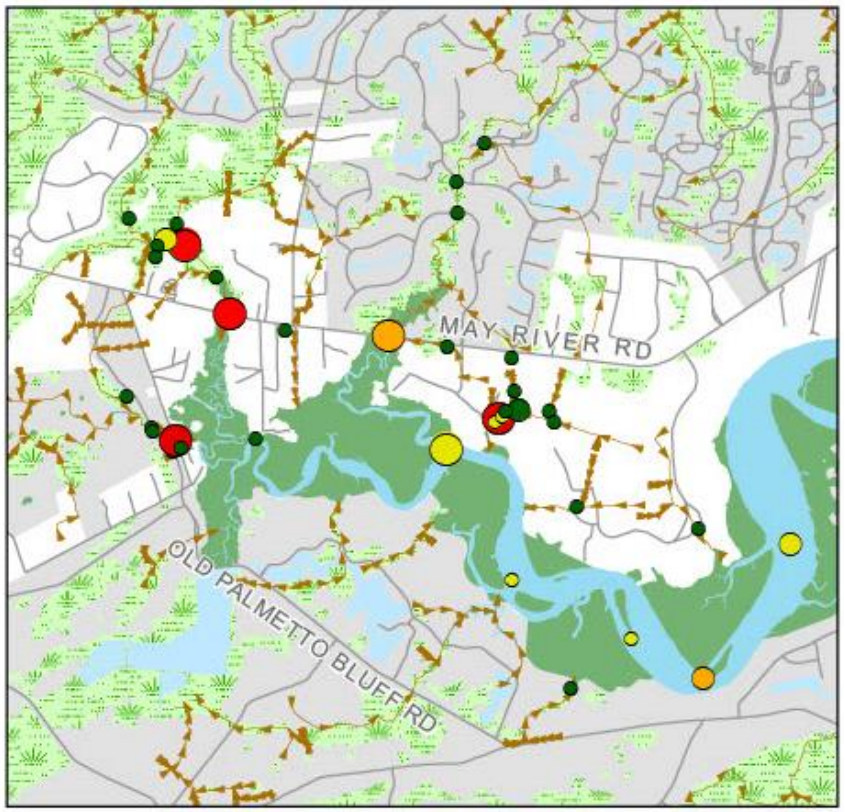
ATTACHMENT 5b

MS4 Minimum Control Measure #3 – IDDE: Fecal Coliform Concentrations Trend Map

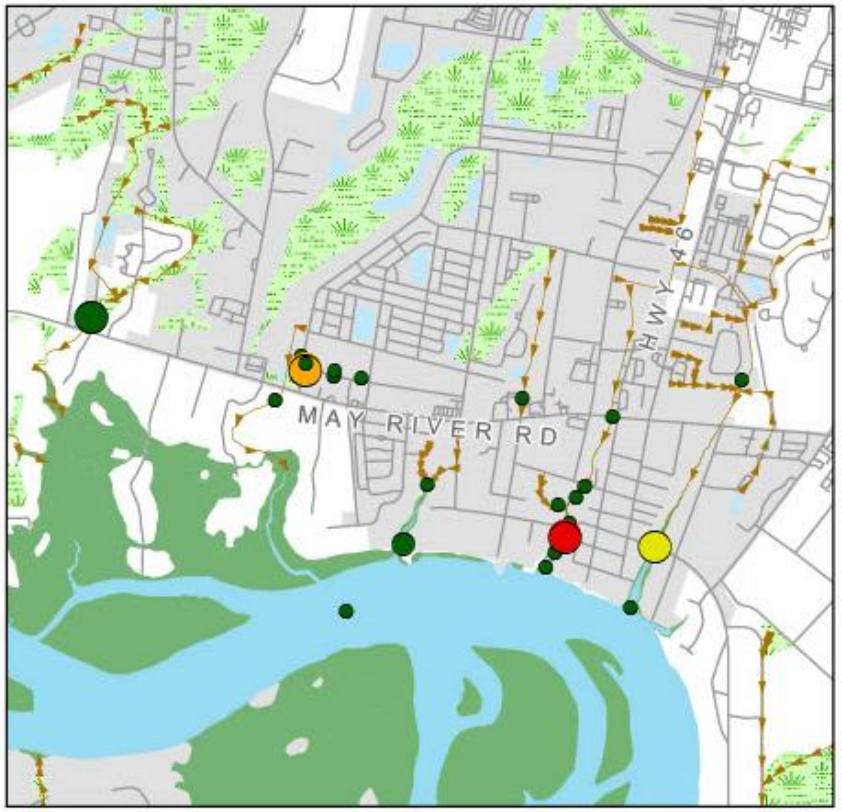


ATTACHMENT 5c

MS4 Minimum Control Measure #3 – IDDE: Microbial Source Tracking (MST) Trend Map



Microbial Source Tracking Trend Map
Headwaters May River



Microbial Source Tracking Trend Map
Old Town May River

MSTSamplingSites

Positive Hits: 0 1 2 >3

Times Sampled: 1 - 3 4 - 6 >7

Size of dot correlaes to # of times the site has been sampled.

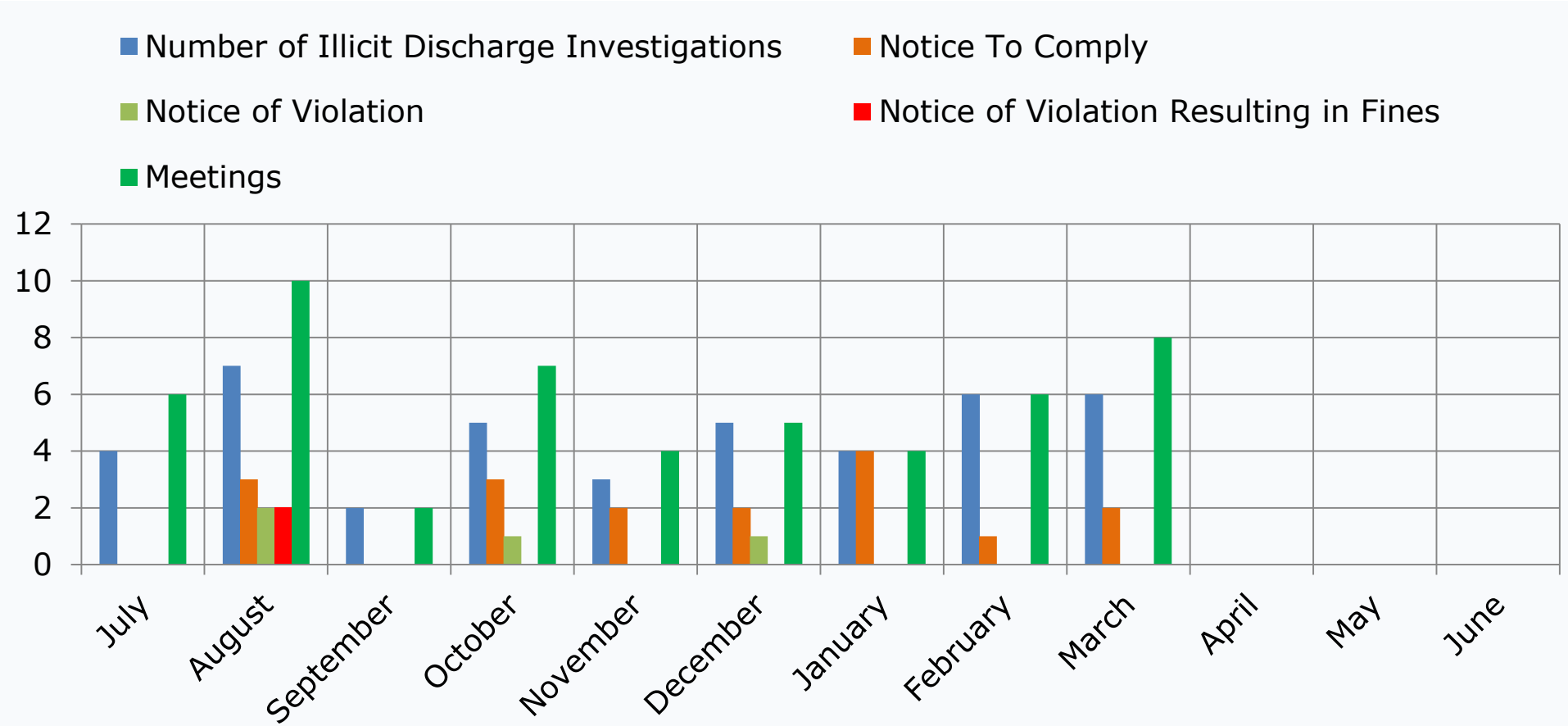
Drainage Flow Lines

Updated: 03/19/2018

north

ATTACHMENT 5d

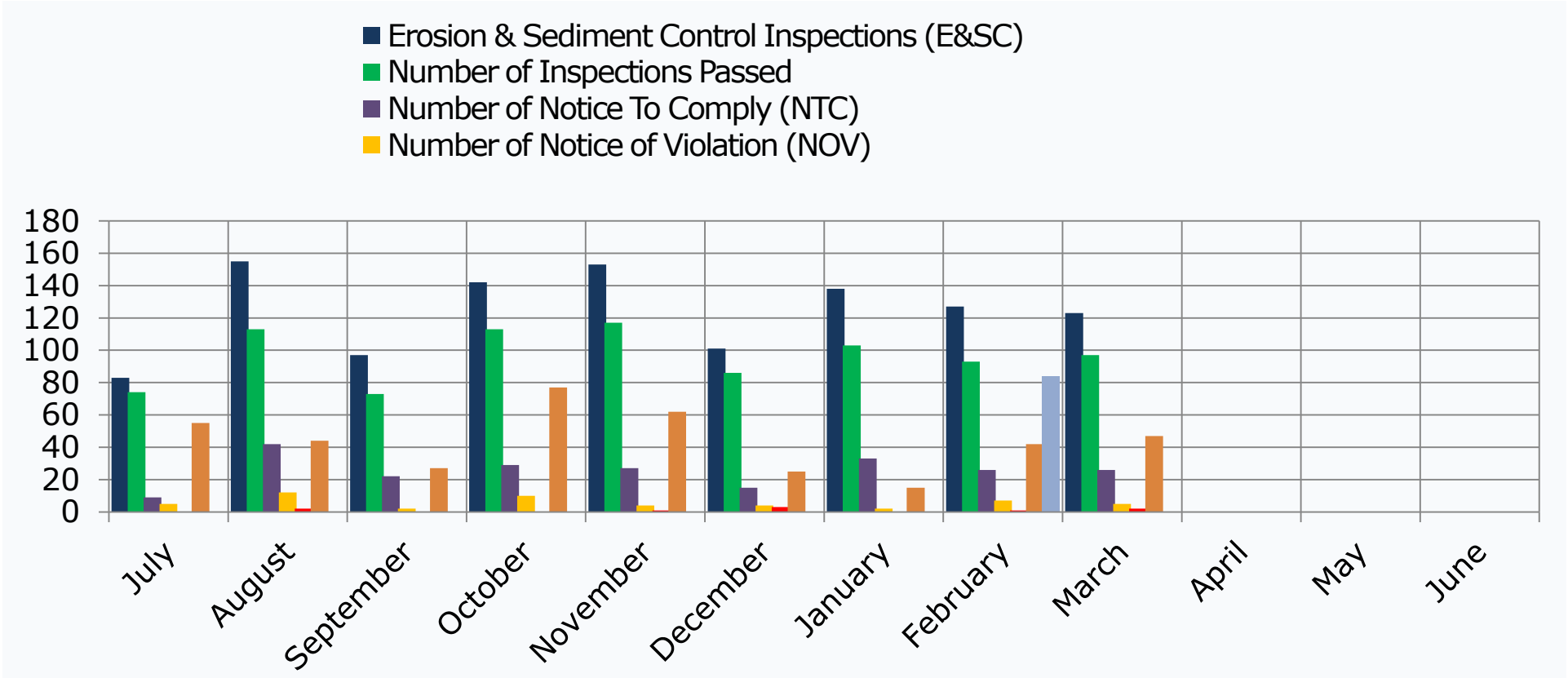
MS4 Minimum Control Measure #3 – IDDE: Illicit Discharge Investigations



	Number of Illicit Discharge Investigations	Number of Notices To Comply Issued	Number of Notices of Violation Issued	Number of NOV Enforcement Actions	Number of Meetings
FY 2018 YTD Totals	42	17	4	2	52
FY 2017 Totals	50	19	8	13	67

ATTACHMENT 6

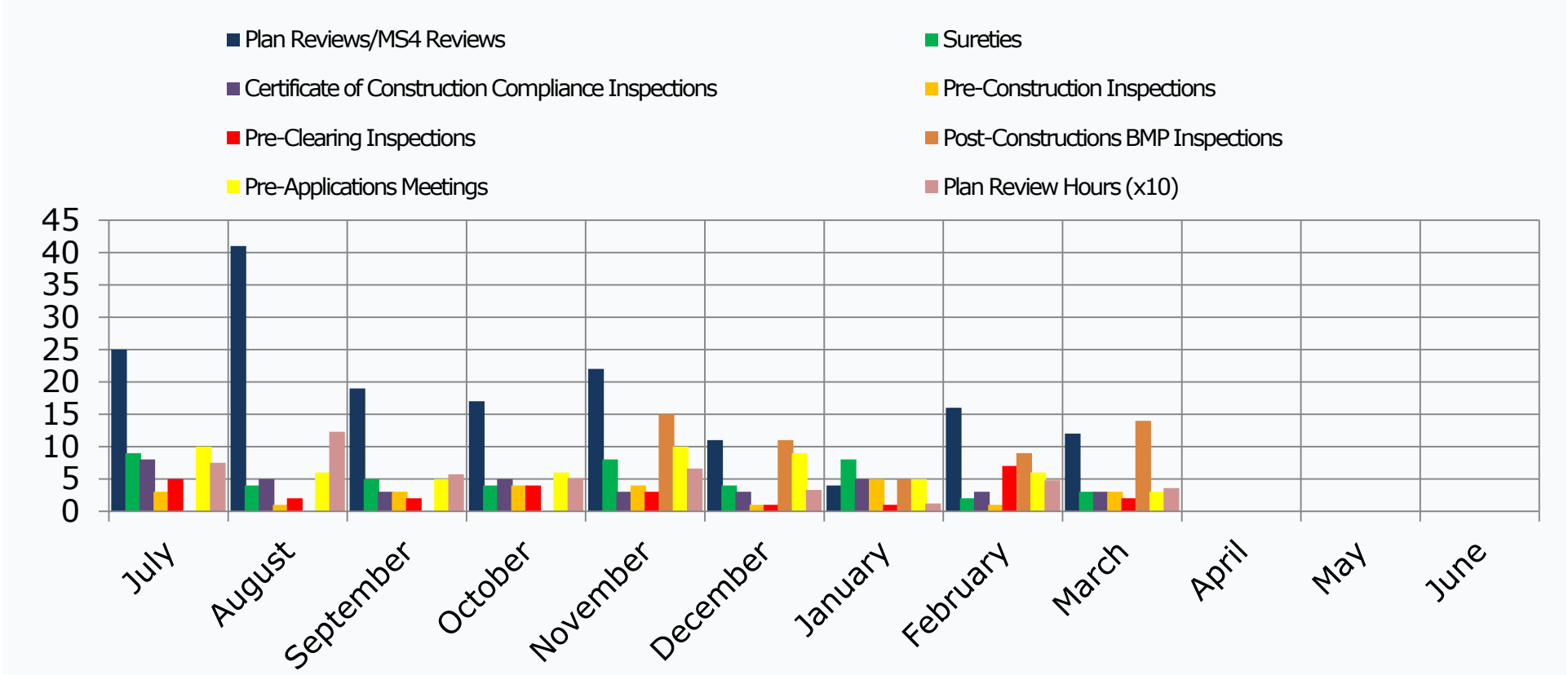
MS4 Minimum Control Measure #4 - Construction Site Stormwater Runoff Control



	Number of Sediment & Erosion Control Inspections	Number of Inspections Passed	Number of NTC Issued	Number of NOVs Issued	Number of NOV Enforcement Actions	Number of E&SC Meetings
FY 2018 YTD Totals	1119	869	229	51	9	394
FY 2017 Totals	1,219	862	233	58	10	237

ATTACHMENT 7

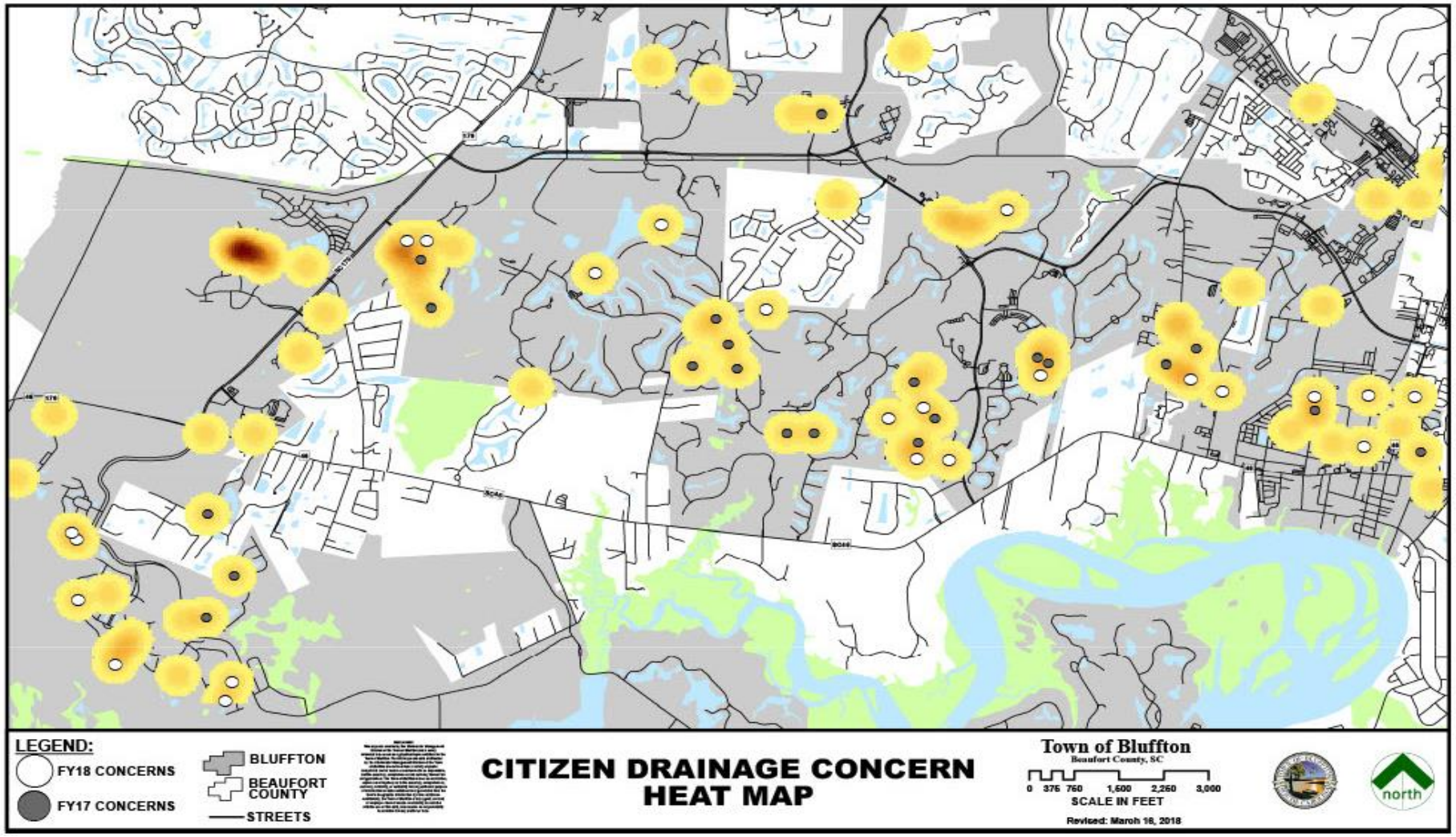
MS4 Minimum Control Measure #5
Stormwater Plan Review & Related Activity



	Plan Reviews MS4 Reviews	Sureties	Certificate of Construction Compliance Inspections	Pre-Construction Meetings	Pre-Clearing Inspections	Post Construction BMP Inspections	Pre-Application Meetings	Total Plan Review Hours
FY 2018 YTD Totals	167	47	38	25	27	54	60	835 Hrs.
FY 2017 Totals	253	62	96	47	45	7	23	1,265 Hrs.

ATTACHMENT 8

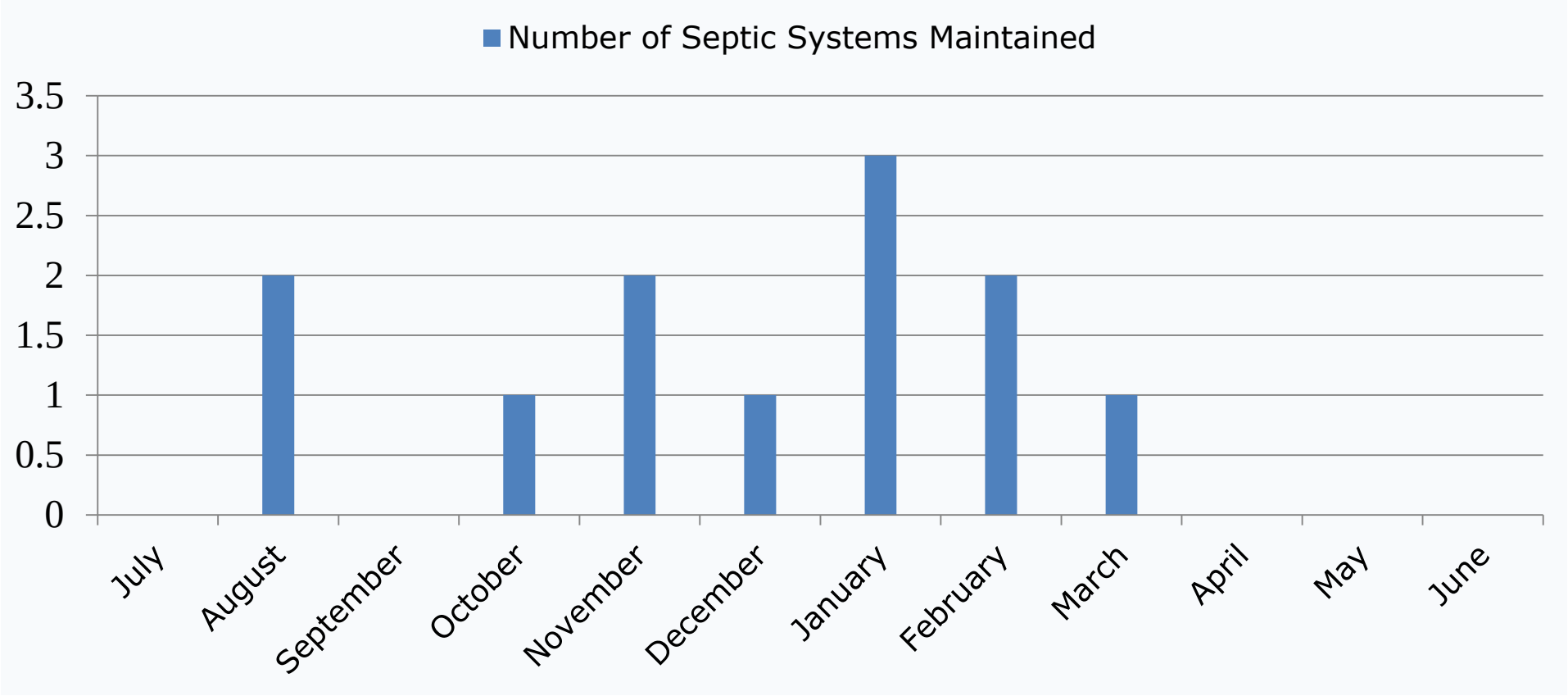
Citizen Drainage Concern Heat Map (Drainage, Maintenance and Inspections)



	Number of Drainage Concerns Investigated	Number of Meetings
FY 2018 YTD Totals	46	70
FY 2017 Totals	72	80

ATTACHMENT 9

Septic System Maintenance Assistance

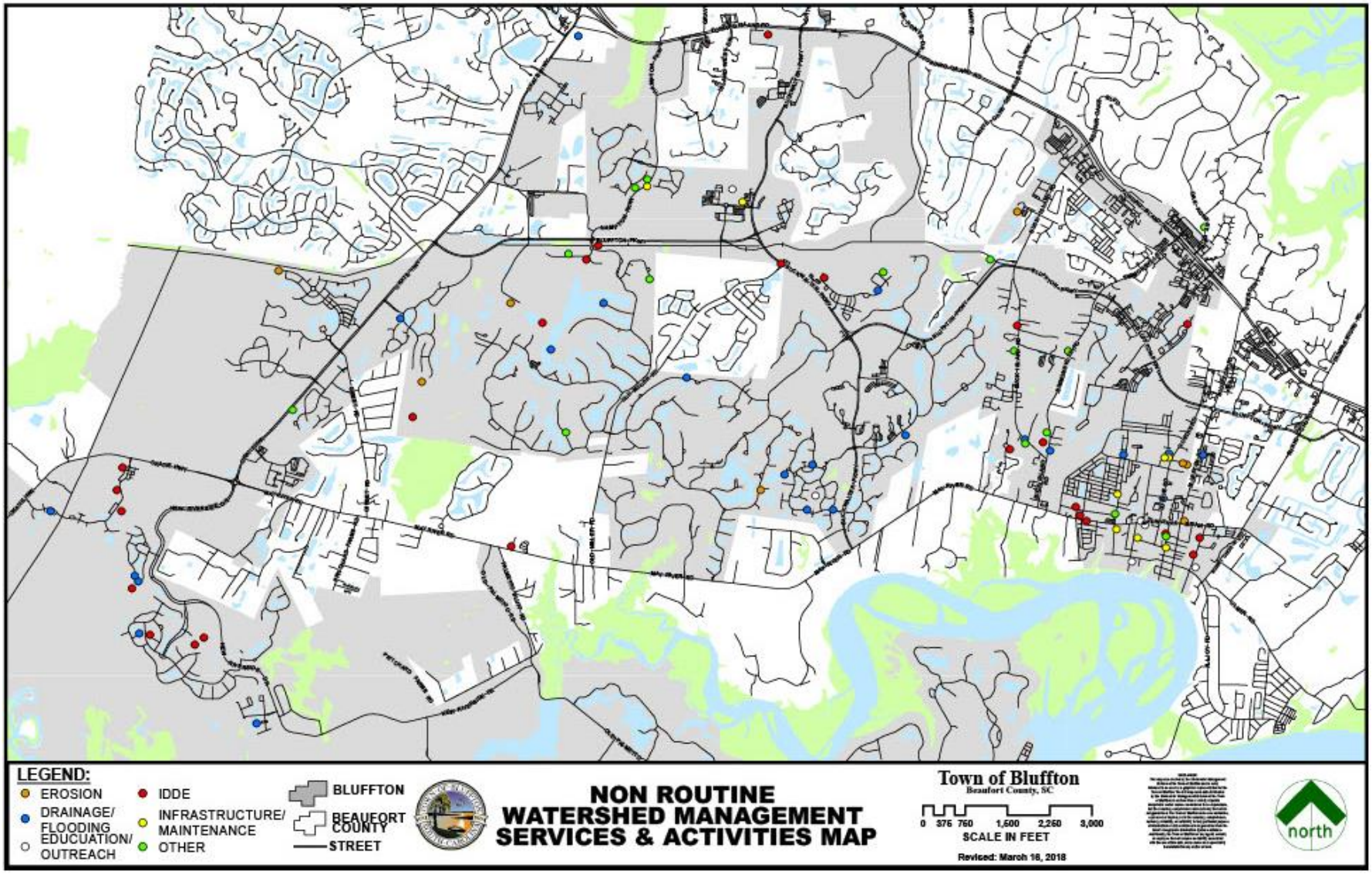


	Number of Septic Systems Maintained
FY 2018 YTD Totals	12
FY 2017 Totals	18

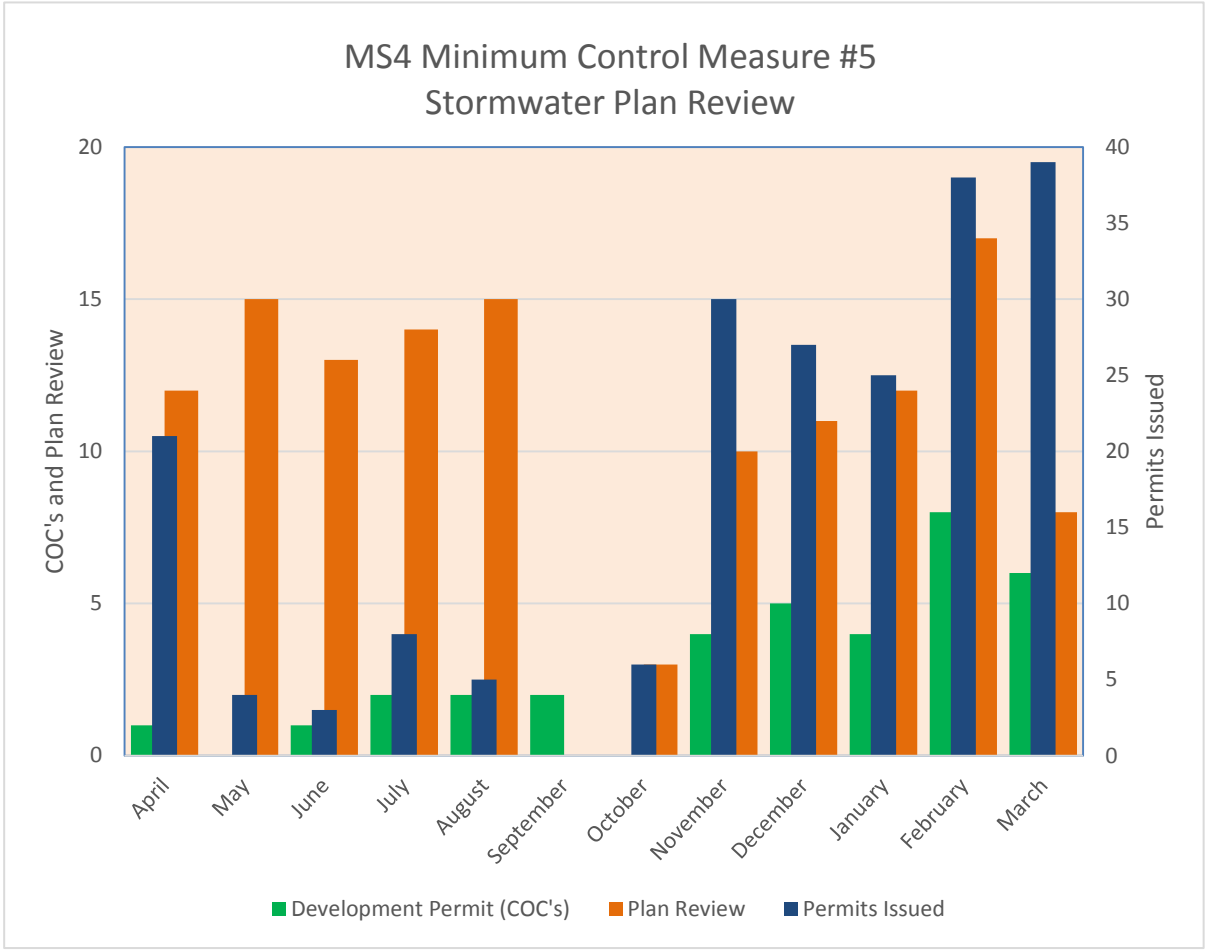
Requests for septic system maintenance are down due to completed connections along Jason St., Buck Island Road and Simmonsville Road as part of the Phase #3/4 BIS Sewer projects.

ATTACHMENT 10

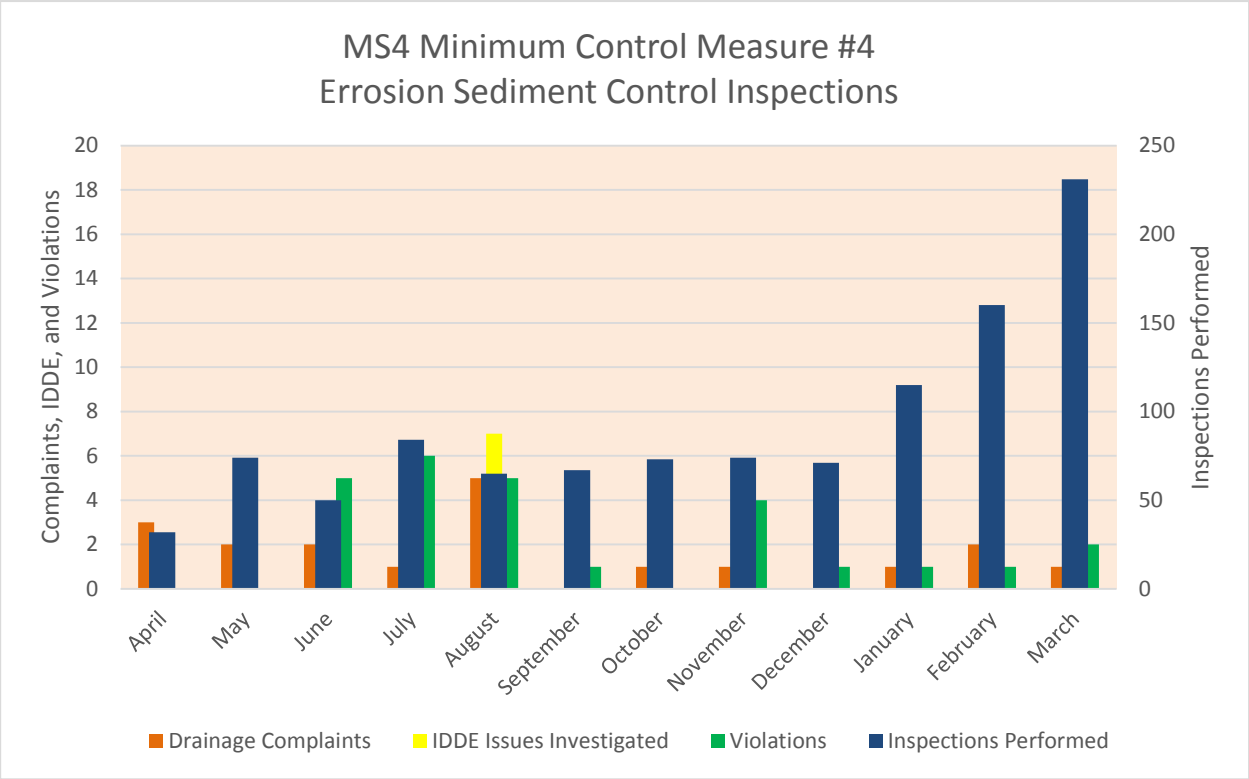
Citizen Request for Watershed Mngt. Services & Activities Map



	Number of Citizen Requests Investigated	Number of Meetings
FY 2018 YTD Totals	55	62
FY 2017 Totals	53	82



TYPE	April	May	June	July	August	September	October	November	December	January	February	March	Last 12 Months
Development Permit (COC's)	1	0	1	2	2	2	0	4	5	4	8	6	35
Plan Review	12	15	13	14	15	0	3	10	11	12	17	8	130
Permits Issued	21	4	3	8	5	0	6	30	27	25	38	39	206



TYPE	April	May	June	July	August	September	October	November	December	January	February	March	Last 12 Months
Inspections Performed	32	74	50	84	65	67	73	74	71	115	160	231	1096
Drainage Complaints	3	2	2	1	5	0	1	1	0	1	2	1	19
IDDE Issues Investigated	1	0	3	3	7	1	1	3	2	0	1	0	22
Violations	0	0	5	6	5	1	0	4	1	1	1	2	26

MEMORANDUM

Date: April 11, 2018

To: Stormwater Management Utility Board

From: David Wilhelm, P. E., Public Works Director

Re: **Maintenance Project Report**

This report will cover six minor projects. The Project Summary Reports are attached.

Minor or Routine Projects:

- **St. Helena Island Bush Hog - St. Helena Island (SWUD 8):** This project improved 111,259 L.F. of drainage system. The scope of work included bush hogging 103,083 L.F. of channel and 8,176 L.F. of roadside ditch. The total cost was **$73,205.83.**
- **Bible Camp Road - St. Helena Island (SWUD 8):** This project improved 5,300 L.F. of drainage system. The scope of work included cleaning out 5,300 L.F. of channel. The total cost was **$8,234.82.**
- **Smalls Hill Road - Port Royal Island (SWUD 6):** This project improved 1,050 L.F. of drainage system. The scope of work included cleaning out 875 L.F. of channel and 175 L.F. of roadside ditch. The total cost was **$3,166.67.**
- **JB Lane and Yoruba Lane – St. Helena Island (SWUD 8):** This project improved 1,289 L.F. of drainage system. The scope of work included cleaning out 1,289 L.F. of channel. The total cost was **$3,034.92.**
- **Audubon Subdivision – Port Royal Island (SWUD 6):** This project improved 1,162 L.F. of drainage system. The scope of work included cleaning out 1,162 L.F. of channel and repairing a washout. The total cost was **$3,013.67.**
- **Forest Field Road – Port Royal Island (SWUD 6):** This project improved 442 L.F. of drainage system. The scope of work included cleaning out 442 L.F. roadside ditch. The total cost was **$1,997.41.**

Beaufort County Public Works
Stormwater Infrastructure
Project Summary

Project Summary: St. Helena Island Bush Hog

Activity: Routine/Preventive Maintenance
Duration: 03/20/17-10/20/17

Narrative Description of Project:

Second rotation from 3/20/17-10/20/17: Project improved 111,259 L.F. of drainage system. Bush hogged 103,083 L.F. of workshelf and 8,176 L.F. of roadside ditch. This projected consisted of the following areas: James Grant Road (650 L.F.), Mattis Drive (1,691 L.F.), Major Road (2,630 L.F.), Warsaw Island Road (5,457 L.F.), Patch Work Lane (856 L.F.), JB Lane (1,289 L.F.), St. Helena Drop Off Center (1,647 L.F.), Polowana Road (2,410 L.F.), Lands End Road (1,703 L.F.), Orange Grove Road (3,551 L.F.), Jack Johnson Drive (1,404 L.F.), James D. Washington Road (400 L.F.), Bridgewood Road (1,550 L.F.), Storyteller Road (610 L.F.), Capers Island Road (844 L.F.), Sycamore Hill Drive (1,800 L.F.), David Green Road (1,080 L.F.), Scott Hill Road (6,804 L.F.), Candy Johnson Drive (852 L.F.), Peaches Hill Circle (8,442 L.F.), No Man Land (1,705 L.F.), Wiggfall Road (410 L.F.), Toomer Road (3,395 L.F.), Vineyard Point Road (2,536 L.F.), Cuffy Drop Off Center (1,112 L.F.), Tombee Lane (1,954 L.F.), Archer Fields Lane (1,841 L.F.), Kelis Lane (5,673 L.F.), Ephraim Road (1,783 L.F.), White Sands Circle (5,492 L.F.), J&J Drive (530 L.F.), Shiney Road (900 L.F.), Luther Warren Drive (695 L.F.), Tropicana Road (470 L.F.), Ladson Road (2,130 L.F.), Folly Road (3,260 L.F.), Simmons Road (2,748 L.F.), John Fripp Circle (836 L.F.), Nathan Pope Road (5,405 L.F.), Langford Road (670 L.F.), Cee Cee Road (2,608 L.F.), Bible Camp Road (7,168 L.F.), Ball Park Road (3,009 L.F.), Halifax Drive (4,414 L.F.), Dulamo Bluff Road (325 L.F.), Eddings Point Road (420 L.F.) Penn Center Road (1,105 L.F.), Penn Center Circle East (723 L.F.), Earnest Drive (802 L.F.), Queens Road (1,470 L.F.)

2017-300A / St. Helena Island Bush Hog	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$10.90	$0.00	$0.00	$0.00	$0.00	$10.90
CBH / Channel- bushhogged	1,504.5	$33,389.21	$12,475.16	$3,004.38	$0.00	$21,343.54	$70,212.30
ONJV / Onsite Job Visit	10.0	$222.83	$18.00	$13.58	$0.00	$143.40	$397.81
RDBH / Roadside ditch - bushhogged	56.0	$1,244.95	$504.32	$130.20	$0.00	$705.36	$2,584.83
2017-300A / St. Helena Island Bush Hog Sub Total	1,571.0	$34,867.88	$12,997.48	$3,148.16	$0.00	$22,192.30	$73,205.83
Grand Total	**1,571.0**	**$34,867.88**	**$12,997.48**	**$3,148.16**	**$0.00**	**$22,192.30**	**$73,205.83**

Before

During

After

Beaufort County Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Bible Camp Road

Activity: Routine/Preventive Maintenance

Duration: 11/14/17-11/21/17

Narrative Description of Project:

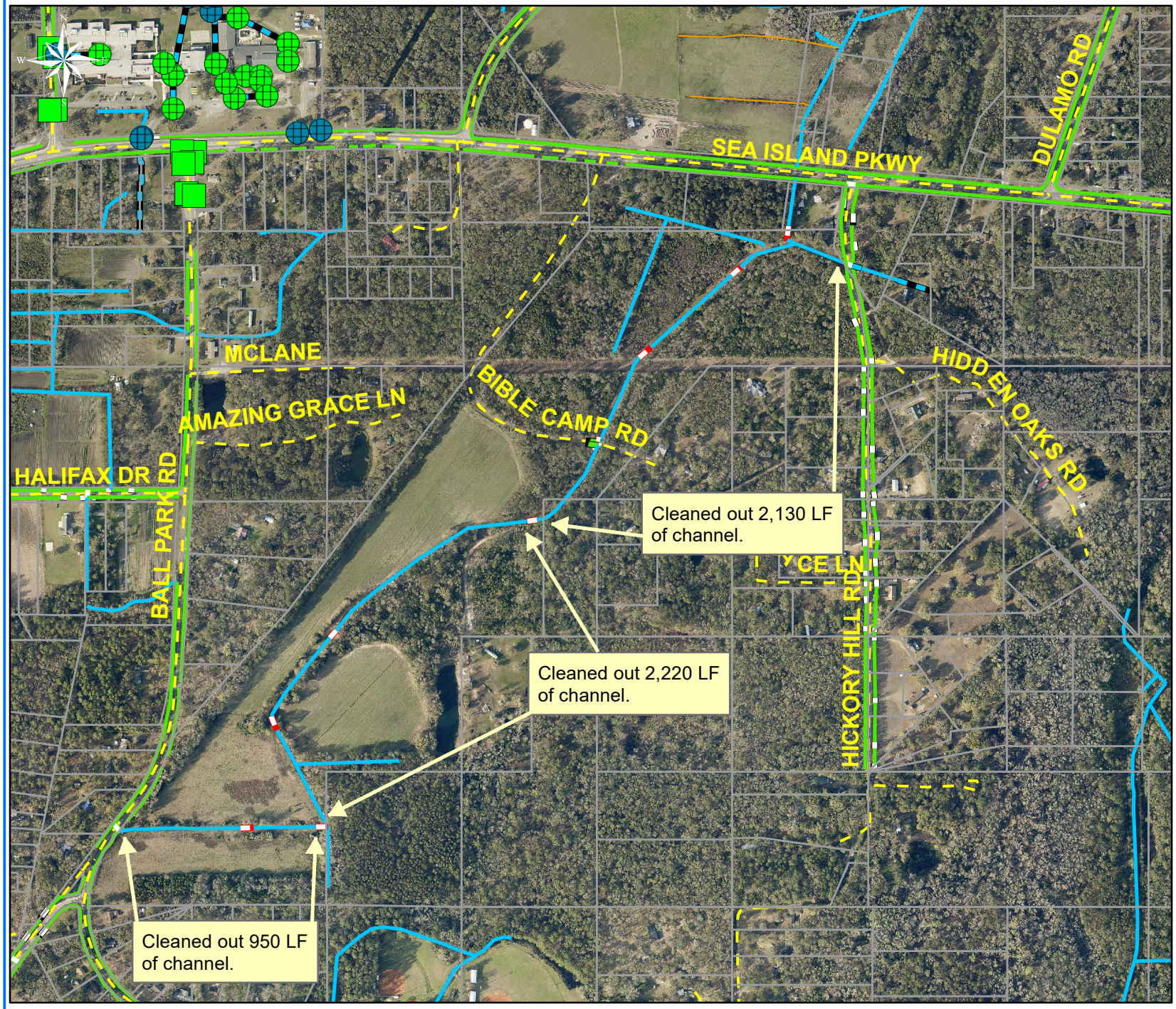
Project improved 5,300 L.F. of drainage system. Cleaned out 5,300 L.F. of channel.

2018-543 / Bible Camp Road	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$10.90	$0.00	$0.00	$0.00	$0.00	$10.90
CCO / Channel - cleaned out	145.0	$3,302.40	$1,565.24	$304.90	$0.00	$1,951.50	$7,124.04
HAUL / Hauling	16.0	$395.20	$150.72	$55.75	$0.00	$263.52	$865.19
PL / Project Layout	5.0	$135.60	$19.20	$7.80	$0.00	$72.10	$234.70
2018-543 / Bible Camp Road Sub Total	166.5	$3,844.10	$1,735.16	$368.45	$0.00	$2,287.12	$8,234.82
Grand Total	**166.5**	**$3,844.10**	**$1,735.16**	**$368.45**	**$0.00**	**$2,287.12**	**$8,234.82**

Before

During

After



Project: Bible Camp Road

Activity: Routine/ Preventive Maintenance

Project #: 2018-543

Township/SW Dist: St. Helena Island/8

Completed: November 2017

Legend

Drainage Type

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

0 160 320 640 960 1,280 Feet

1 inch = 670 feet

Prepared By: BC Stormwater Management Utility
Date Print:02/20/18
File:C:\project summaries map/Bible Camp Road_2018-543

Beaufort County Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Smalls Hill Road

Activity: Routine/Preventive Maintenance

Duration: 12/04/17-12/05/17

Narrative Description of Project:

Project improved 1,050 L.F. of drainage system. Cleaned out 875 L.F. of channel and 175 L.F. of roadside ditch.

2018-549 / Smalls Hill Road	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$10.90	$0.00	$0.00	$0.00	$0.00	$10.90
CCO / Channel - cleaned out	60.0	$1,312.60	$319.70	$49.28	$0.00	$594.00	$2,275.58
HAUL / Hauling	17.0	$395.60	$160.14	$64.96	$0.00	$259.49	$880.19
2018-549 / Smalls Hill Road Sub Total	77.5	$1,719.10	$479.84	$114.24	$0.00	$853.49	$3,166.67
Grand Total	**77.5**	**$1,719.10**	**$479.84**	**$114.24**	**$0.00**	**$853.49**	**$3,166.67**

Before

During

After

Project: Smalls Hill Road

Activity: Routine/ Preventive Maintenance

Project #: 2018-549

Township/SW Dist: Port Royal Island/6

Completed: December 2017

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:02/20/18
File:C:\project summaries map/Smalls Hill Road_2018-549

Beaufort County Public Works
Stormwater Infrastructure
Project Summary

Project Summary: JB Lane and Yoruba Lane

Activity: Routine/Preventive Maintenance

Duration: 12/06/17-12/12/17

Narrative Description of Project:

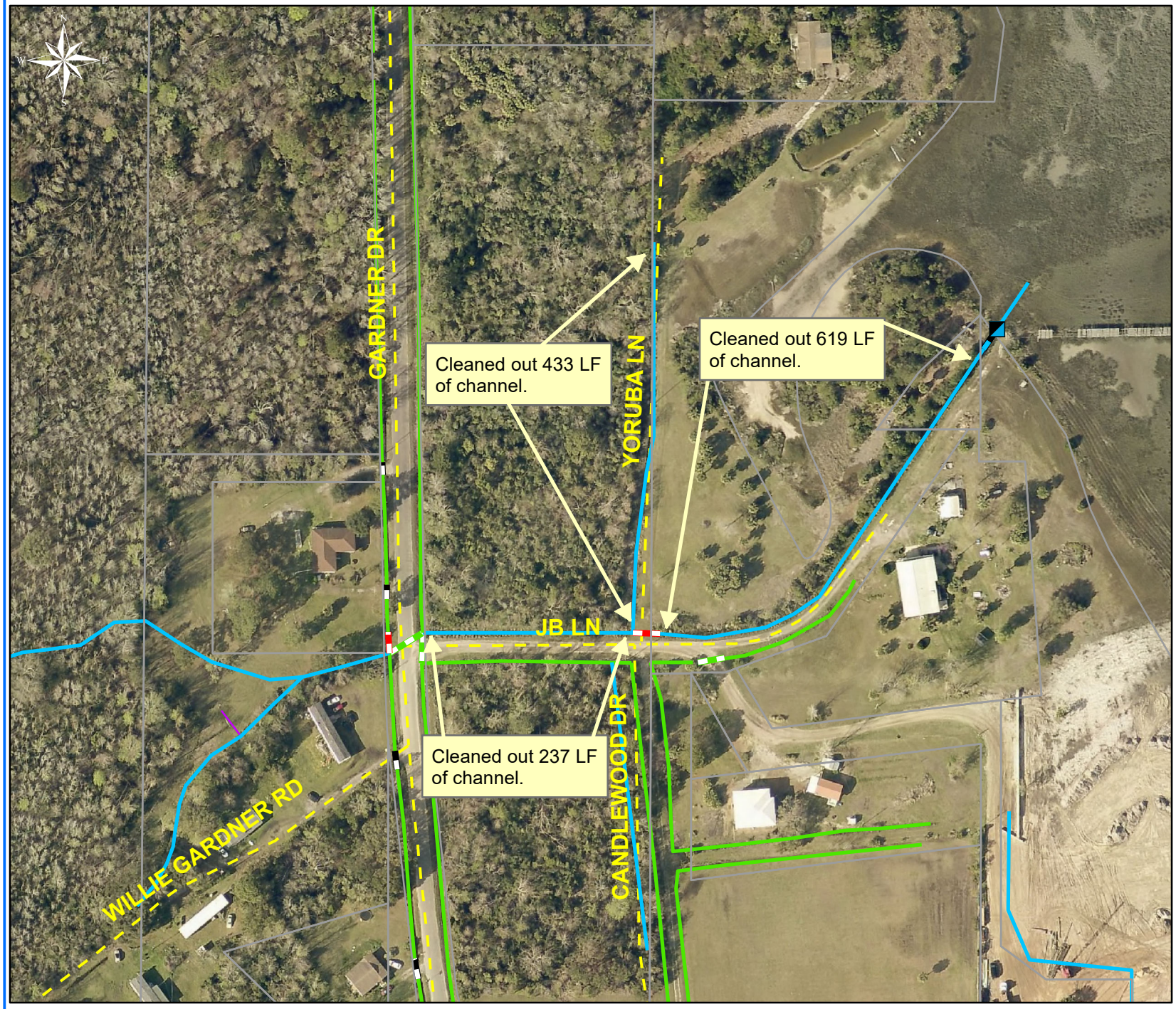
Project improved 1,289 L.F. of drainage system. Cleaned out 1,289 L.F. of channel.

2018-550 / JB Lane and Yoruba Lane	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$10.90	$0.00	$0.00	$0.00	$0.00	$10.90
CCO / Channel - cleaned out	60.0	$1,215.60	$243.78	$60.48	$0.00	$753.00	$2,272.86
HAUL / Hauling	17.0	$333.74	$160.14	$88.48	$0.00	$28.84	$611.20
STAGING / Staging Materials/Equipment	4.0	$79.44	$7.20	$4.48	$0.00	$48.84	$139.96
2018-550 / JB Lane and Yoruba Lane Sub Total	81.5	$1,639.68	$411.12	$153.44	$0.00	$830.68	$3,034.92
Grand Total	**81.5**	**$1,639.68**	**$411.12**	**$153.44**	**$0.00**	**$830.68**	**$3,034.92**

Before

During

After



Project: JB Lane & Yoruba Lane

Activity: Routine/ Preventive Maintenance

Project #: 2018-550

Township/SW Dist: St. Helena Island/8

Completed: December 2017

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:02/20/18
File:C:\project summaries map/JB Lane & Yoruba Lane 2018-550

Beaufort County Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Audubon Subdivison

Activity: Routine/Preventive Maintenance

Duration: 3/02/17-3/08/17

Narrative Description of Project:

Project improved 1,162 L.F. of drainage system. Cleaned out 1,162 L.F. of channel. Repaired washout.

2017-537 / Audubon Subdivision	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$10.90	$0.00	$0.00	$0.00	$0.00	$10.90
CCO / Channel - cleaned out	40.0	$960.70	$135.08	$28.35	$0.00	$565.80	$1,689.93
HAUL / Hauling	15.0	$346.20	$141.30	$35.15	$0.00	$226.55	$749.20
PP / Project Preparation	15.0	$331.80	$18.00	$13.30	$0.00	$200.55	$563.65
2017-537 / Audubon Subdivision Sub Total	70.5	$1,649.60	$294.38	$76.80	$0.00	$992.90	$3,013.67
Grand Total	**70.5**	**$1,649.60**	**$294.38**	**$76.80**	**$0.00**	**$992.90**	**$3,013.67**

Before

During

After

Project: Audubon Subdivision

Activity: Routine/ Preventive Maintenance

Project #: 2017-537

Township/SW Dist: Port Royal Island/6

Completed: March 2017

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:02/20/18
File:C:\project summaries map/Audubon Subdivision_2017-537

Beaufort County Public Works
Stormwater Infrastructure
Project Summary

Project Summary: Forest Field Road

Activity: Routine/Preventive Maintenance

Duration: 12/11/17

Narrative Description of Project:

Project improved 442 L.F. of drainage system. Cleaned out 442 L.F. of roadside ditch.

2018-553 / Forest Field Road	**Labor Hours**	**Labor Cost**	**Equipment Cost**	**Material Cost**	**Contractor Cost**	**Indirect Labor**	**Total Cost**
AUDIT / Audit Project	0.5	$10.90	$0.00	$0.00	$0.00	$0.00	$10.90
HAUL / Hauling	10.0	$222.70	$94.20	$35.84	$0.00	$144.20	$496.94
RSDCL / Roadside Ditch - Cleanout	40.0	$916.50	$135.08	$27.09	$0.00	$410.90	$1489.57
2018-553 / Forest Field Road Sub Total	50.5	$1,150.10	$229.28	$62.93	$0.00	$555.10	$1,997.41
Grand Total	**50.5**	**$1,150.10**	**$229.28**	**$62.93**	**$0.00**	**$555.10**	**$1,997.41**

Before

During

After

Project: Forest Field Road

Activity: Routine/ Preventive Maintenance

Project #: 2018-553

Township/SW Dist: Port Royal Island/6

Completed: December 2017

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 30 60 120 180 240 Feet

1 inch = 130 feet

Prepared By: BC Stormwater Management Utility
Date Print:02/20/18
File:C:\project summaries map/Forest FIeld Road_2018-553

BEAUFORT COUNTY
STORMWATER MANAGEMENT UTILITY BOARD AGENDA
Wednesday, May 9, 2018
2:00 p.m.
Executive Conference Room, Administration Building
Beaufort County Government Robert Smalls Complex
100 Ribaut Road, Beaufort, South Carolina
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 – April 11, 2018 (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. Municipal Reports – Eric Larson, P.E. (backup)
   H. MS4 Update – Eric Larson, P.E. (backup)
   I. Maintenance Projects Report – David Wilhelm, P.E. (backup)

5. UNFINISHED BUSINESS

6. NEW BUSINESS
   A. Special Presentation - TBD

7. PUBLIC COMMENT

8. NEXT MEETING AGENDA
   A. June 13, 2018 (backup)

9. ADJOURNMENT