South Carolina NPDES Permit # SCR030000
Small Municipal Separate Storm Sewer System (SMS4)
Annual Report

Permit Coverage #SCR031902 **Reporting Period:** 01/01/2021 - 12/31/2021

Permittee: Charleston County

Program Name: Stormwater Management Program

Reporting for more than one Program: ☒
(Prepare copies of this page for each Program and attach to this report.)

Responsible Official Information
(Enter the information of the principal executive officer, mayor, or other duly authorized employee/elected official.)

Name: Steve Thigpen, P.E. **Title:** Public Works Director

Telephone Number: (843) 202-7600 **E-mail Address:** SThigpen@CharlestonCounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Program Manager Information
(Enter the information of the person who is responsible for daily implementation of the program.)

Name: Chris Wannamaker, P.E. **Title:** Stormwater Utility Manager

Telephone Number: (843) 202-7635 **E-mail Address:** CWannamaker@CharlestonCounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Certification
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official Signature: Steven L Thigpe **Date:** 12/8/22
(The responsible official may authorize another person or person occupying a specific position to certify this report if this authorization is made in writing and submitted to the Department. Please attach a copy of the authorization with this report, if applicable)

Submit the annual report to:
South Carolina Department of Health and Environmental Control
Bureau of Water, Water Pollution Compliance Section
2600 Bull Street
Columbia, SC 29201-1708
Questions? Contact (803) 898-4300

Permit Coverage #SCR031911 **Reporting Period:** 01/01/2021 – 12/31/2021

Permittee: Town of James Island

Program Name: Stormwater Management Program

Reporting for more than one Program: ☒
(Prepare copies of this page for each Program and attach to this report.)

Responsible Official Information
(Enter the information of the principal executive officer, mayor, or other duly authorized employee/elected official.)

Name: Niki Grimball **Title:** Town of James Island Administrator

Telephone Number: (843) 795-4141 **E-mail Address:** NGrimball@JamesIslandsc.us

Mailing Address: 1122 Dills Bluff Road, James Island, SC 29412

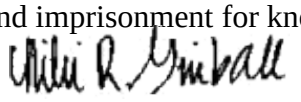
Program Manager Information
(Enter the information of the person who is responsible for daily implementation of the program.)

Name: Chris Wannamaker, P.E. **Title:** Stormwater Utility Manager

Telephone Number: (843) 202-7600 **E-mail Address:** stormwater@charlestoncounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Certification
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official Signature:  **Date:** 12/12/2022
(The responsible official may authorize another person or person occupying a specific position to certify this report if this authorization is made in writing and submitted to the Department. Please attach a copy of the authorization with this report, if applicable)

Submit the annual report to:
South Carolina Department of Health and Environmental Control
Bureau of Water, Water Pollution Compliance Section
2600 Bull Street
Columbia, SC 29201-1708
Questions? Contact (803) 898-4300

Permit Coverage #SCR031903 **Reporting Period:** 01/01/2021 – 12/31/2021

Permittee: City of Folly Beach

Program Name: Stormwater Management Program

Reporting for more than one Program: ☒
(Prepare copies of this page for each Program and attach to this report.)

Responsible Official Information
(Enter the information of the principal executive officer, mayor, or other duly authorized employee/elected official.)

Name: Tim Goodwin **Title:** Mayor

Telephone Number: (843) 588-2447 **E-mail Address:** tgoodwin@follybeach.gov

Mailing Address: PO Box 48, Folly Beach, SC 29439

Program Manager Information
(Enter the information of the person who is responsible for daily implementation of the program.)

Name: Chris Wannamaker, P.E. **Title:** Stormwater Utility Manager

Telephone Number: (843) 202-7600 **E-mail Address:** stormwater@charlestoncounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Certification
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official Signature: _____ **Date:** 12-16-22
(The responsible official may authorize another person or person occupying a specific position to certify this report if this authorization is made in writing and submitted to the Department. Please attach a copy of the authorization with this report, if applicable)

Submit the annual report to:
South Carolina Department of Health and Environmental Control
Bureau of Water, Water Pollution Compliance Section
2600 Bull Street
Columbia, SC 29201-1708
Questions? Contact (803) 898-4300

Permit Coverage #SCR031904 **Reporting Period:** 01/01/2021 – 12/31/2021

Permittee: City of Isle of Palms

Program Name: Stormwater Management Program

Reporting for more than one Program: ☒
(Prepare copies of this page for each Program and attach to this report.)

Responsible Official Information
(Enter the information of the principal executive officer, mayor, or other duly authorized employee/elected official.)

Name: Desirée Fragoso **Title:** City of Isle of Palms Administrator

Telephone Number: (843) 886-6428 **E-mail Address:** desireef@iop.net

Mailing Address: PO Box 508, Isle of Palms, SC 29451

Program Manager Information
(Enter the information of the person who is responsible for daily implementation of the program.)

Name: Chris Wannamaker, P.E. **Title:** Stormwater Utility Manager

Telephone Number: (843) 202-7600 **E-mail Address:** stormwater@charlestoncounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Certification
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official Signature: _____ **Date:** 12/20/2022
(The responsible official may authorize another person or person occupying a specific position to certify this report if this authorization is made in writing and submitted to the Department. Please attach a copy of the authorization with this report, if applicable)

Submit the annual report to:
South Carolina Department of Health and Environmental Control
Bureau of Water, Water Pollution Compliance Section
2600 Bull Street
Columbia, SC 29201-1708
Questions? Contact (803) 898-4300

Permit Coverage #SCR031908 **Reporting Period:** 01/01/2021 – 12/31/2021

Permittee: Town of Sullivan's Island

Program Name: Stormwater Management Program

Reporting for more than one Program: ☒
(Prepare copies of this page for each Program and attach to this report.)

Responsible Official Information
(Enter the information of the principal executive officer, mayor, or other duly authorized employee/elected official.)

Name: Andy Benke **Title:** Town of Sullivan's Island Administrator

Telephone Number: (843) 883-3198 **E-mail Address:** abenke@sullivansisland.sc.gov

Mailing Address: PO Box 427, Sullivan's Island, SC 29482

Program Manager Information
(Enter the information of the person who is responsible for daily implementation of the program.)

Name: Chris Wannamaker, P.E. **Title:** Stormwater Utility Manager

Telephone Number: (843) 202-7600 **E-mail Address:** stormwater@charlestoncounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Certification
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official Signature: Andy Benke **Date:** 12-12-22
(The responsible official may authorize another person or person occupying a specific position to certify this report if this authorization is made in writing and submitted to the Department. Please attach a copy of the authorization with this report, if applicable)

Submit the annual report to:
South Carolina Department of Health and Environmental Control
Bureau of Water, Water Pollution Compliance Section
2600 Bull Street
Columbia, SC 29201-1708
Questions? Contact (803) 898-4300

Permit Coverage #SCR031905 **Reporting Period:** 01/01/2021 – 12/31/2021

Permittee: Town of Lincolnville

Program Name: Stormwater Management Program

Reporting for more than one Program: ☒
(Prepare copies of this page for each Program and attach to this report.)

Responsible Official Information
(Enter the information of the principal executive officer, mayor, or other duly authorized employee/elected official.)

Name: Enoch Dickerson III **Title:** Mayor

Telephone Number: (843) 873-3261 **E-mail Address:** EnochDickerson@hotmail.com

Mailing Address: 141 W. Broad Street, Lincolnville, SC 29484

Program Manager Information
(Enter the information of the person who is responsible for daily implementation of the program.)

Name: Chris Wannamaker, P.E. **Title:** Stormwater Utility Manager

Telephone Number: (843) 202-7600 **E-mail Address:** stormwater@charlestoncounty.org

Mailing Address: 4045 Bridge View Drive, Suite A301, North Charleston, SC 29405

Certification
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official Signature: Enoch Dickerson III **Date:** 12-12-22
(The responsible official may authorize another person or person occupying a specific position to certify this report if this authorization is made in writing and submitted to the Department. Please attach a copy of the authorization with this report, if applicable)

Submit the annual report to:
South Carolina Department of Health and Environmental Control
Bureau of Water, Water Pollution Compliance Section
2600 Bull Street
Columbia, SC 29201-1708
Questions? Contact (803) 898-4300

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YEAR 8 NPDES ANNUAL REPORT

Enter Permit Years

Name of Permittee:	Charleston County, Folly Beach, Isle of Palms, Lincolnville, Sullivan's Island, James Island (herein referenced as "Charleston County")

Annual Report Information

The following information is applicable to the above referenced permittee:

§1.4 OBTAINING AUTHORITY

Sec.	*Item*	*Yes*	*No*	*NA*
1.4.8	Have there been any areas annexed into your MS4 area after you received coverage under this general permit?	☒	☐	☐
	ANSWER / COMMENT There have been areas annexed into the Charleston County SMS4 area since receiving coverage under this general permit. There have also been areas annexed by other communities, thus being removed from the Charleston County SMS4 area.			
1.4.8 & 4.5.4.1	If yes, has your SWMP been updated to include these areas and a schedule for BMP implementation in these areas?	☒	☐	☐
	ANSWER / COMMENT The Charleston County SWMP has been updated to include the areas annexed into the MS4 area after coverage under the general permit. BMP implementation in these areas will occur following the same schedule as the Charleston County SMS4 area as a whole.			

§3.1 DETERMINATION OF RECEIVING WATER CONDITIONS AND IMPACTS

Sec.	*Item*	*Yes*	*No*	*NA*
3.1.1.1	Refer to the most recent CWA §303(d) list approved by EPA to determine WQMS impairment status. Have there been any impaired stations ***added*** to the 303(d) list that your SMS4 discharges to?	☐	☒	☐
	ANSWER / COMMENT The 2018 CWS 303(d) list of impaired stations is the current list and was the current list during the preparation of the prior annual report. As such, no stations to which Charleston County discharges have been added.			
3.1.1.1	Refer to the most recent CWA §303(d) list approved by EPA to determine WQMS impairment status. Have there been any impaired stations ***removed*** from the 303(d) list that your SMS4 discharges to?	☐	☒	☐
	ANSWER / COMMENT The 2018 CWS 303(d) list of impaired stations is the current list and was the current list during the preparation of the prior annual report. As such, no stations have been removed since the prior annual report.			
3.1.1.1	If there have been impaired stations added to or removed from the 303(d) list that your SMS4 discharges to, identify the pollutant(s) of concern (POC) and update POCs in the SWMP.	☐	☐	☒
	ANSWER / COMMENT The 2018 CWS 303(d) list of impaired stations is the current list and was the current list during the preparation of the prior annual report. As such, there are no changes to the pollutants of concern (POC).			
3.1.1.2	Have any new TMDLs been approved that your SMS4 discharges to?	☒	☐	☐
	ANSWER / COMMENT No new TMDLs were approved in 2021 within Charleston County.			

§3.2 TMDL MONITORING AND ASSESSMENT

Sec.	Item	Yes	No	NA
3.2.1.2.1.d	Does your SMS4 discharge to TMDL waters? ANSWER / COMMENT The Charleston County SMS4 discharges to the Wando River TMDL watershed, impaired for fecal coliform. Charleston County developed a TMDL Monitoring Plan and submitted the Plan to SCDHEC in October 2017 in accordance with Section 3.2.1.1.3 of the SMS4 General Permit. Per Section 3.2.1.2.1 of the SMS4 General Permit, and in agreement with the submitted Monitoring Plan, Charleston County began monitoring activities in the Wando River in June 2018, Year 5 of the permit. These monitoring activities are ongoing. The Charleston County SMS4 also discharges to the Ashley-Cooper-Wando-Charleston Harbor TMDL watershed, impaired for dissolved oxygen. This TMDL states that available data and modeling indicates that stormwater and nonpoint sources do not contribute to the DO depression, and are thus not assigned a WLA. Per Section 3.2.1 of the SMS4 general permit, a TMDL Monitoring and Assessment Plan is not required for the Ashley-Cooper-Wando-Charleston Harbor TMDL. The Charleston County SMS4 also discharges to the Shem Creek TMDL watershed, impaired for Enterococcus. This TMDL is dated November 2019 and became effective on January 2020. Charleston County developed a TMDL Monitoring Plan in accordance with Section 3.2.1.1.3 of the SMS4 General Permit in January 2021 for submittal to SCDHEC. The James Island Creek TMDL was also developed by SCDHEC for Enterococcus, dated November 2019 with an effective date of January 2020. Charleston County's SMS4 area discharges to this TMDL watershed and developed a TMDL Monitoring Plan in accordance with Section 3.2.1.1.3 of the SMS4 General Permit in January 2021 for submittal to SCDHEC.	☒	☐	☐
3.2.1.2.1d	If yes, include the resulting data in Appendix. ANSWER / COMMENT Charleston County began monitoring activities in June 2018 in the Wando River; the results for 2021 are included in Appendix C of the SWMP. Monitoring activities in both Shem Creek and James Island Creek began in 2021 in accordance with the associated TMDL Monitoring and Assessment Plans. The results for 2021 are included in Appendix C of the SWMP.	☒	☐	☐
3.2.1.2.2.c	Have updates to the TMDL Monitoring and Assessment Plans been made? ANSWER / COMMENT Charleston County developed a Wando River TMDL Monitoring and Assessment Plan and submitted the Plan to SCDHEC in October 2017. No updates have been made. Charleston County also developed a Shem Creek TMDL Monitoring and Assessment Plan and a James Island Creek TMDL Monitoring and Assessment Plan and submitted both plans to SCDHEC in January 2021.	☒	☐	☐
3.2.1.2.2.d and 3.3.6	Provide a brief narrative on the progress of the TMDL Monitoring and Assessment Plan. ANSWER / COMMENT Charleston County began monitoring activities June 2018 by collecting grab samples, which were sent to Trident Laboratories in Ladson, SC for analysis for fecal coliform. Beginning in Fall 2020, monthly grab samples were analyzed for fecal coliform and enterococcus. This monitoring will continue as indicated in the Monitoring Plan.	☒	☐	☐
Appendix B (page 56)	Provide a brief narrative identifying the water quality improvements or degradation. ANSWER / COMMENT There have been no observed water quality improvements or degradation during this monitoring period.	☒	☐	☐

§3.3 TMDL IMPLEMENTATION AND ANALYSIS

Sec.	Item	Yes	No	NA
3.3.2	Was your SMS4 required to submit a TMDL Implementation Plan? ANSWER / COMMENT A TMDL Implementation Plan was submitted to SCDHEC in November of 2020 for the Wando River TMDL.	☒	☐	☐

3.3.6	Provide a brief narrative on the progress of the TMDL Implementation and Analysis Plan.	☒	☐	☐
	ANSWER / COMMENT The Wando River TMDL Implementation Plan is focused on education efforts to reduce the human influence of bacteria on the watershed and continued monitoring efforts.			

§4.1 PERMIT REQUIREMENTS

Sec.	*Item*	*Yes*	*No*	*NA*
4.1.6.1, 5.3.1, and Appendix B (p56)	Has your SWMP been reviewed and updated to include the status of your compliance with permit conditions, an assessment of the appropriateness of the identified BMP, progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and the measurable goals for each of the minimum control measures.	☒	☐	☐
	ANSWER / COMMENT Charleston County's SWMP has been reviewed and updated. The Minimum Measure Permit Requirements tables were adjusted as appropriate to more accurately represent progress and the BMP Minimum Measures Tables were appended with measurable goal updates to show progress for each program component. The BMPs in the SWMP have been developed and updated with the intent of reducing the discharge of pollutants to the MEP. Progress made towards implementing these BMPs indicates progress towards reducing the discharge of pollutants.			
4.1.6.2 and Appendix B (p56)	Have your proposed changes to the stormwater management programs that are established as permit conditions been updated in your SWMP?	☒	☐	☐
	ANSWER / COMMENT The Charleston County SWMP has been updated to record the progress made towards implementing the stormwater management programs established as permit conditions.			
4.1.6.3 and Appendix B (p56)	Include/revise an assessment of controls and the fiscal analysis. In this, include a description of staff resources necessary to meet the requirements of this permit.	☒	☐	☐
	ANSWER / COMMENT The Charleston County Stormwater Management Program employs sixteen (16) staff members with the primary responsibility of ensuring compliance with the SMS4 general permit. Charleston County understands the importance of the requirements of the permit as a legal obligation as well as a responsibility to protect Charleston County's water quality and has maintained its dedication to meeting these responsibilities through dedicated staff resources.			
4.1.6.4, 5.3.2, and Appendix B	Has a summary of data, including monitoring data, that has been accumulated been added to the appendix?	☒	☐	☐
	ANSWER / COMMENT Charleston County began monitoring the Wando River TMDL in June 2018, while monitoring began for Shem Creek and James Island Creek TMDL's in January 2021. The monitoring data for 2021 is included in Appendix C of the SWMP.			
4.1.6.5 and Appendix B	Include a summary describing the number and nature of enforcement actions.	☒	☐	☐
	ANSWER / COMMENT The County has developed an Enforcement Response Plan (ERP), located in Appendix F of the SWMP, to provide guidance in identifying specific violation types and defining appropriate responses for construction/permitting violations, illicit discharge/illicit connection/improper waste disposal, failure to comply with permanent stormwater management requirements, failure to comply with a permit, and failure to comply with a city request. This document was developed in December 2014. Enforcement actions taken during the reporting period are described below.			
4.1.6.5 and	Include a summary describing the number and nature of inspections	☒	☐	☐

Appendix B	ANSWER / COMMENT The County also conducts inspections as established in their Permitting Standards and Procedures Manual (updated in 2017). All inspections and follow-up inspections are documented and kept on record. The inspections performed during the reporting period, January 2021 through December 2021, are listed below. MS4 Permitted Sites Total inspections 5,940 Routine Inspections 5786 Follow Up Inspections 54 Post-Con inspections 79 Permit Investigation Requests 21 Total Enforcement Actions Initiated 67 Corrective Orders 36 Notice of Violation (NOV) 7 Stop Work Orders 20 IDDE Program Total IDDE Inspections 969 IDDE FOG Inspections 0 Outfall Screenings 605 County Ditch IDDE Inspections 272 IDDE Investigations (Cartegraph) 86 IDDE Investigation requests (Energov) 4 Illicit Enforcement 2 Illicit ID requests 0 MS4 sites Good Houskeeping Inspections 22 Corrective actions initiated 0 Other inspections of County assetts 0			
4.1.6.5 and Appendix B	Include a summary describing the number and nature of public education programs. ANSWER / COMMENT Charleston County maintains a contract with Clemson University/ Carolina Clear for the Ashley Cooper Stormwater Education Consortium (ACSEC) to manage the Public Education and Outreach (MCM #1) and Public Involvement/ Participation (MCM #2) program components. The ACSEC 13th Annual Report Permit Year 8 can be found on the ACSEC website at the following address: https://www.clemson.edu/extension/carolinaclear/regional-consortiums/acsec/archives.html It is important to note that the ACSEC implements a region-wide outreach strategy, so the numbers presented by the ACSEC are for the Charleston tri-County area, not specific to the Charleston County SMS4 area. In addition to the activities conducted by the ACSEC, Charleston County staff conducts public education and outreach efforts through outreach to schools, attendance at various conferences and festivals, and direct communications with concerned citizens and the design community.	☒	☐	☐
4.2.1.1.11	Include an assessment of the stormwater education/outreach program. Note any adjustments to educational materials and the delivery of such materials to address any shortcomings found as a result of these assessments. ANSWER / COMMENT ACSEC manages the stormwater education/outreach program for Charleston County. Discussions on adjustments and shortcomings are included in the link above.	☒	☐	☐
4.2.3.2.3.b	Include an assessment of the effectiveness of the Field Screening component of the IDDE program to determine if the level of effort is adequate in attaining the effective prohibition of non-stormwater discharges into the SMS4. ANSWER / COMMENT	☒	☐	☐

	The County regularly inspects/screens county owned ditches and outfall points for IDDE purposes. This approach has increased the number of IDDE's discovered. The County intends to continue this effort			
4.2.3.2.7.e	Include any corrective actions taken/resulting enforcement actions to eliminate illicit discharges.	☒	☐	☐
	ANSWER / COMMENT The County has developed an Enforcement Response Plan (ERP), located in Appendix F of the SWMP, which provides guidance on identifying specific violation types and defining appropriate responses for illicit discharge/illicit connection/improper waste disposal. This document was developed in December 2014. During the reporting period, Charleston County performed 92 inspections of potential illicit discharges that were observed during routine County operations or reported by the public. Notifications were sent with all illicit discharges removed within an appropriate time frame and sites/conveyances were restored back into compliance.			

§4.5 REVIEWING AND UPDATING STORMWATER MANAGEMENT PLANS

Sec.	*Item*	*Yes*	*No*	*NA*
4.5.1, 5.3.4, and Appendix B (p56)	Have you reviewed and updated your SWMP, including changes to any BMP or any identified measurable goals that apply to the program elements?	☒	☐	☐
	ANSWER / COMMENT Charleston County's SWMP has been reviewed and updated. The Minimum Measure Permit Requirements tables were adjusted as appropriate to more accurately represent progress and the BMP Minimum Measures Tables were appended with measurable goal updates to show progress for each program component.			
5.3.3	Has a summary of the stormwater activities you plan to undertake during the next reporting cycle been developed and updated?	☒	☐	☐
	ANSWER / COMMENT Charleston County's SWMP Appendix A has been updated with a summary of revisions in the 2021 SWMP, as well as tasks Charleston County plans to undertake in the upcoming years.			
5.3.5	Is your SMS4 relying on another entity to satisfy some of your permit obligations?	☒	☐	☐
	ANSWER / COMMENT Charleston County relies on Clemson University's Carolina Clear Education Program, which encompasses ACSEC, to ensure compliance with the permit for MCM #1 (Public Education and Outreach) and MCM #2 (Public Involvement/ Participation. Charleston County's contract with Clemson University is Appendix G of their SWMP.			
Appendix B (p56)	Provide annual expenditures and proposed budget, including legal restrictions in the use of such funds for the following year.	☒	☐	☐
	ANSWER / COMMENT Charleston County implements a stormwater utility fee as the primary means to fund the Stormwater Management Program. The adjusted budget for the reporting period, January 1, 2021 through December 31, 2021, was $1,800,000. The proposed budget for the same period was $2,100,000.			

Appendix A

Charleston County

Updated/Revised SWMP

Charleston County
Stormwater Management Plan (SWMP)

4045 Bridge View Drive
North Charleston, SC 29405-7464
(843) 202-7639

Adopted August 1, 2014
Revised April 2016
Revised June 2018
Revised March 2020 (Covers through December 2019)
Revised March 2021 (Covers through December 2020)
Revised November 2022 (Covers through December 2021)

Prepared in accordance with SCDHEC Permit #SCR030000

CERTIFICATION OF STORMWATER MANAGEMENT PLAN

I certify that Charleston County has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in the NPDES General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SMS4), Permit Number SCR030000.

Steve Thigpen, PE	Charleston County Public Works Director
Name (Print)	Title
Steven L Thigpen	12/8/22
Signature	Date

Table of Contents

*Table of contents follows section numbers of the SMS4 General Permit; accordingly, section numbers of the SWMP are not in continuous sequential order.

List of Tables

Appendices

List of Acronyms and Abbreviations

BMP	Best Management Practice
CEPSCI	Certified Erosion Prevention and Sediment Control Inspector
CSR	Construction Site Runoff
ERP	Enforcement Response Plan
EPA	Environmental Protection Agency
IDDE	Illicit Discharge Detection and Elimination
IECA	International Erosion Control Association
MEP	Maximum Extent Practicable
MCM	Minimum Control Measure
MS4	Municipal Separate Storm System
NPDES	National Pollutant Discharge Elimination System
NOI	Notice of Intent
PP&GH	Pollution Prevention and Good House Keeping
PCR	Post Construction Runoff
PEO	Public Education and Outreach
PIP	Public Involvement and Participation
SMS4	Small Municipal Separate Storm System
SCDHEC	South Carolina Department of Health and Environmental Control
SOP	Standard Operating Procedure
SWMP	Stormwater Management Plan
SWP3	Storm Water Pollution Prevention Plan
TMDL	Total Maximum Daily Load
WLA	Waste Load Allocation

Charleston County, South Carolina
NPDES Stormwater Management Plan (SWMP)

1.0 Introduction

This Stormwater Management Plan (SWMP) is designed to reduce the discharge of pollutants from Charleston County's Small Municipal Separate Storm Sewer System (SMS4) to the maximum extent practicable (MEP), to protect water quality and to satisfy the appropriate requirements of the Clean Water Act. The contents are expected to change with time due to the iterative process of developing the SWMP recognized by the Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). EPA predicts that it will likely take two to three SMS4 general permit terms (5-year terms) to fully develop and implement the SWMP. The first permit term focused heavily on data collection, organization, development of necessary programs, and initial implementation. During the current second SMS4 general permit cycle, the SWMP will need to be amended based on the observed effectiveness of existing program components and to address the terms and conditions of the new permit. This document is meant to be a living document that will be reviewed and revised as necessary on an annual basis to reflect accomplishments, potential revisions to program components, and additions of other or expanded efforts.

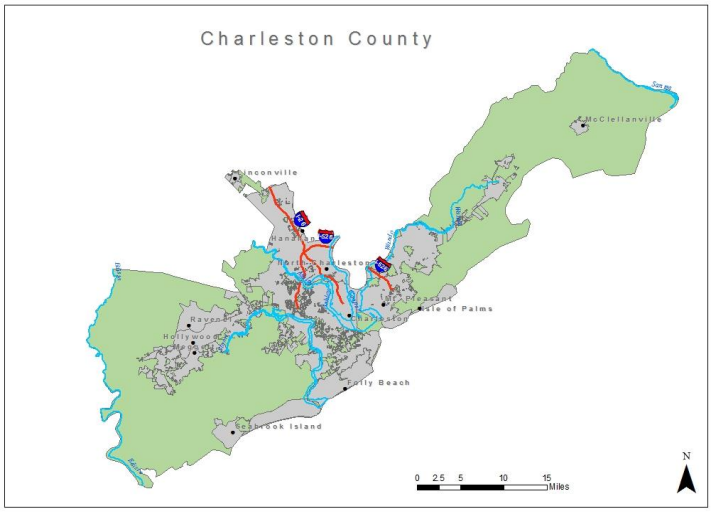
This SWMP addresses the requirements of the NPDES General Permit for Discharges from Regulated SMS4s; Permit No. SCR030000, effective January 1, 2014 and expiring December 31, 2018. Specific language from the SMS4 general permit has been copied and pasted into the SWMP for consistency. The section numbers used in this SWMP correspond with the general permit section numbers.

Updates to the SWMP will be included in Appendix A.

2.0 Notice of Intent (NOI) Information

The following information is applicable to Charleston County.

Table 1: NOI Information

General Permit Section	NOI Information	Description
2.2.1 Information on the Permittee:		
2.2.1.1	Name of Municipality:	Charleston County
	Mailing Address:	Charleston County Public Works Department Attn: Stormwater Management 4045 Bridge View Drive North Charleston, SC 29405-7464
	Telephone Number:	(843) 202-7639
2.2.1.2	Public Entity Type:	County
2.2.2 Information on the SMS4:		
2.2.2.1	Map of Charleston County:	**SMS4 Location:** Charleston County **SMS4 Center Coordinates:** Latitude: N32.7797° Longitude: W-79.9349° **SMS4 Urbanized Area:** 187 square miles 
2.2.2.2	Major Receiving Waters:	*Abbapoola Creek, Adams Creek, Adams Run, *Alligator Creek, Alston Creek, Anderson Creek, **Ashley River, Atlantic Ocean, *Atlantic Intracoastal Waterway, *Awendaw Creek, Back Creek, *Bailey Creek, *Bass Creek, Bay Creek, Belvedere Creek, Bermuda Creek, Big

General Permit Section	NOI Information	Description
		Bay Creek, Blind Creek, *Block Island Creek, *Bohicket Creek, *Boone Hall Creek, Breach Inlet, Brickyard Creek, Bryans Creek, Bull Creek, Bull Harbor, Bull Narrows, Bull River, Bulls Bay, Bulls Creek, Bullyard Sound, Caddin Bridge Swamp, Cape Romain Harbor, Capers Creek, Capers Inlet, Captain Sams Creek, Casino Creek, Cedar Creek, Chaplin Creek, **Charleston Harbor, *Church Creek, *Cinder Creek, Clark Creek, Clauson Creek, Clubhouse Creek, Cole Creek, Collins Creek, Conch Creek, Congaree Boat Creek, **Cooper River, Copahee Sound, *Dawho River, *Deep Creek, Deepwater Creek, *Devils Den Creek, Dewees Creek, Dewees Inlet, Dill Creek, *Doe Hall Creek, Drayton Swamp, Dupre Creek, *Edisto River, *Elliott Cut, Fickling Creek, *Filbin Creek, First Sister Creek, *Fishing Creek, *Five Fathom Creek, *Fludds Creek, Folly Creek, Folly River, Foster Creek, Framton Creek, *Goose Creek, *Graham Creek, Gray Bay, Green Creek, Guerin Creek, Hamlin Creek, Hamlin Sound, Hampton Creek, Harbor River, Haulover Creek, Hickory Bay, Hobcaw Creek, Holland Island Creek, *Horlbeck Creek, Horsebend Creek, Hut Creek, Inlet Creek, Jack Creek, *James Island Creek, *Jeremy Creek, **Jeremy Inlet, Key Bay, Key Creek, Kiawah River, King Flats Creek, Kushiwah Creek, *Leadenwah Creek, Lighthouse Creek, *Little Papas Creek, *Log Bridge Creek, Long Creek, Lower Toogoodoo Creek, Mark Bay, *Matthews Creek, Mellichamp Branch Creek, Mill Creek, Milton Creek, Molasses Creek, Montgomery Creek, Morgan Creek, Mud Creek, Muddy Bay, Nellie Creek, New Cut Creek, Noisette Creek, North Creek, *North Edisto River, Oak Island Creek, Ocella Creek, Oldtown

General Permit Section	NOI Information	Description
		Creek, Olive Branch, Orangegrove Creek, Ormand Hall Creek, Oyster Bay, Oyster House Creek, Papas Creek, *Parrot Point Creek, *Penny Creek, Penny's Creek, *Pine Creek, Popperdam Creek, Price Creek, Privateer Creek, Raccoon Creek, Ramhorn Creek, *Rantowles Creek, Rat Island Creek, *Rat Hall Creek, *Raven Point Creek Robbins Creek, Romain River, Russel Creek, Sall Creek, Saltpond Creek, *Sand Creek, Sandy Bay, *Sandy Point Creek, Santee Pass, Santee Path Creek, Schooner Creek, **Scott Creek, Seaside Creek, Secessionville Creek, Second Sister Creek, Seven Reaches, Sewee Bay, *Shem Creek, *Shingle Creek, Shipyard Creek, Simpson Creek, Skrine Creek, South Creek, South Edisto River, **South Santee River, Spencer Branch, St. Pierre Creek, Steamboat Creek, *Stono Inlet, *Stono River, *Store Creek, Sullivan's Island Narrows, Summerhouse Creek, Swinton Creek, The Cove, *Tibwin Creek, Tom Point Creek, **Toogoodoo Creek, *Toomer Creek, Town Creek, Townsend River, *Upper Inlet Creek, *Venning Creek, Wadmalaw River, Wagner Creek, Wallace River, *Wambaw Creek, **Wando River, Wappoo Creek, Watermelon Creek, Watts Cut, Westbank Creek, Whiteside Creek, Whooping Island Creek, Wolfpit Run
2.2.2.3	Indian Lands:	No portion of Charleston County's MS4 is located on Indian Country Lands.
2.2.2.4	List of Significant Entities within Charleston County:	The following entities operate a separate storm sewer system within the SMS4 area of Charleston County. • SCDOT • Folly Beach (inter-governmental agreement partner) • Isle of Palms (inter- governmental agreement partner) • Sullivan's Island (inter-governmental agreement partner) • Lincolnville (inter-local governmental partner)

General Permit Section	NOI Information	Description
		• Town of James Island (inter-governmental agreement partner)
2.2.2.5 2.2.2.6	BMP Information:	See Section 4.0 for a discussion of the BMPs for each minimum measure. Each minimum measure contains all available information on the BMPs that are to be implemented, their measurable goals, a schedule for their implementation, and the person(s) responsible.

*Listed on the CWA 303(d) list
**Allocated a TMDL

2.4 Inter-governmental Agreement Partners

Charleston County has Intergovernmental Agreements (IGA) with Folly Beach, Isle of Palms, Sullivan's Island, James Island and Lincolnville that state that Charleston County will manage the stormwater programs for these municipalities. For the purposes of this SWMP, references to Charleston County will include unincorporated Charleston County and the five IGA agreement partners. Clemson University/Carolina Clear implements MCMs 1 and 2 for Charleston County and the other municipalities. Charleston County implements MCMs 3 – 6 for the County and five municipalities. Charleston County is not responsible for construction, installation or maintenance of the storm sewer system for municipal facilities outside of unincorporated Charleston County.

3.0 Special Conditions Applicable to Permitted Stormwater Discharges to Sensitive Waters

The SMS4 general permit requires that Charleston County determine whether its systems discharge to sensitive waters. For the purpose of the permit, sensitive waters are waters:

- With a Total Maximum Daily Load (TMDL) developed and approved, or established by EPA,
- Included in the most recent SC DHEC Section 303(d) list,
- In Source Water Protection Areas (SWPA), and
- Pursuant to DHEC Water Classifications & Standards (R.61-68) and Regulations (R.61-69) classified as either:
  - Outstanding National Resource Waters (ONRW);
  - Outstanding Resource Waters (ORW);
  - Trout Waters; or,
  - Shellfish Harvesting Waters (SFH).

3.1 Determination of Receiving Water Conditions and Impacts

The SMS4 general permit requires Charleston County to determine whether their SMS4 discharges to receiving waters within a TMDL watershed or on the most recent SC DHEC Section 303(d) impaired waters list. To meet this permit requirement, Charleston County has collected information from SCDHEC on the location of existing TMDLs and impaired waters, as determined from results of the State's monitoring program, that could potentially be impacted by discharges from Charleston County's SMS4. Tables 2 and 3 in the sections below provide a list of approved TMDLs and the impaired waterbodies on the 2016 303(d) list. These tables include information for all of Charleston County. Those waterbodies that the SMS4 area contributes to, either directly or indirectly, are noted as such.

3.2 TMDL Monitoring and Assessment

In compliance with Section 3.2.1 of the SMS4 general permit, TMDL monitoring and assessment plans will be developed for all TMDL waters receiving SMS4 discharges of pollutant(s) of concern, except where Section 3.1.1.2 of the SMS4 general permit is applicable. For TMDLs existing before the effective date of permit coverage, TMDL monitoring and assessment plans will be completed, submitted to SCDHEC, and appended to this SWMP within 12 months of the effective date of permit coverage. For newly established TMDLs, Charleston County will complete a TMDL monitoring and assessment plan within 12 months of the effective date of the TMDL. As completed, TMDL monitoring and assessment plans will be submitted to SCDHEC and attached to this SWMP in Appendix C. Sampling will be initiated within 18 months of the effective date of permit coverage for TMDLs existing before the effective date of permit coverage. For newly established TMDLs, Charleston County will initiate sampling within 18 months of the effective date of TMDL.

A list of approved TMDLs for the waterbodies within Charleston County can be found in Table 2. This table includes three (3) TMDLs that are within the County, but four (4) of these TMDL watersheds do not receive discharge from the Charleston County SMS4 area.

The Ashley-Cooper-Wando-Charleston Harbor TMDL states that available data and modeling indicates that stormwater and nonpoint sources do not contribute to the DO depression, and are thus not assigned a waste load allocation (WLA). According to the general permit, Charleston County is not responsible for TMDL Monitoring and Assessment for the Ashley-Cooper-Wando-Charleston Harbor TMDL.

Charleston County is responsible for addressing the Wando River TMDL for fecal coliform. Charleston County developed a TMDL Monitoring Plan and submitted the Plan to SCDHEC in October 2017 in accordance with Section 3.2.1.1.3 of the SMS4 General Permit. Per Section 3.2.1.2.1 of the SMS4 General Permit, and in agreement with the submitted Monitoring Plan, Charleston County began monitoring activities in the Wando River in June 2018.

The Shem Creek watershed was assigned a TMDL with an effective date of January 2020 for fecal coliform. Charleston County developed a TMDL Monitoring Plan for Shem Creek with Town of Mount Pleasant and submitted the Plan to SCDHEC in January 2021 in accordance with Section 3.2.1.1.3 of the SMS4 General Permit. Per Section 3.2.1.2.1 of the SMS4 General

Permit, and in agreement with the submitted Monitoring Plan, Charleston County has an Memorandum of Agreement (MOA) with the Town of Mount Pleasant that began monitoring activities in the Shem Creek watershed in July 2021.

The James Island Creek TMDL for fecal coliform was also released with an effective date of January 2021. Charleston County submitted a TMDL Monitoring Plan in January 2021 and began monitoring in the James Island Creek watershed by July 2021.

Table 2: List of Approved/Under Development TMDLs within Charleston County's SMS4 Area

TMDL Watershed	Pollutant of Concern	Effective TMDL Date
South Santee Coastal*	Fecal Coliform	August 2010
Ashley-Cooper-Wando-Charleston Harbor	Dissolved Oxygen	Revised March 2013
Toogoodoo Creek*	Fecal Coliform	September 2010
Jeremy Inlet/Scott Creek*	Fecal Coliform	April 2010
Wando River	Fecal Coliform	November 2016
James Island Creek	Fecal Coliform	January 2020
Shem Creek	Fecal Coliform	January 2020

*Does not receive SMS4 discharge

3.3 TMDL Implementation and Analysis

In compliance with Section 3.3.2 of the SMS4 general permit, TMDL Implementation Plans will be developed for all TMDL waters receiving SMS4 discharges of pollutant(s) of concern, except where Section 3.1.1.2 of the SMS4 general permit is applicable. TMDL Implementation Plans will be completed and submitted to SCDHEC within 48 months from the effective date of permit coverage, or, for TMDLs established after the effective date of permit coverage, within 48 months of the effective date of the TMDL.

Charleston County submitted a TMDL Implementation Plan for the Wando River watershed in November 2020 in accordance with the permit.

3.4 Discharges to Impaired Waterbodies

For impaired waterbodies for which no TMDL has been assigned, protection will be provided through BMP applications conducted through implementation of the minimum control measures in Section 4.2. The BMP implementation strategies will not cause or contribute to violations of water quality standards in water bodies with impaired monitoring stations.

A list of all impaired water bodies receiving discharges from Charleston County can be found in the Table 3 below. These tables include information for all of Charleston County. Those waterbodies that the SMS4 area contributes to, either directly or indirectly, are noted as such.

Table 3: 2018 303(d) List of Impaired Stations into which Charleston County's SMS4 Drains

Major Receiving Waters	Station Description	Station	Pollutant of Concern	Priority Ranking^
Edisto River	EDISTO RIVER ABOVE HWY 17 (MARTINS LANDING)	CSTL-589*	HG	3
	EDISTO RIVER @ WILLTOWN BLUFF	CSTL-590*	HG	3
	EDISTO RVR AT US17 12.5 MI NW RAVENEL	MD-119*	HG	3
St. Pierre Creek	ST. PIERRE CREEK AT PETERS PT.	13-04*	FC	3
Alligator Creek	ALLIGATOR CREEK AND S. FORK EDISTO RVR NORTHERN CONFLUENCE	13-20*	FC	3
	S EDISTO RVR AT NORTHERN CONFLUENCE WITH ALLIGATOR CREEK -13-20	MD-260*	TURBIDITY	3
Folly Creek	FOLLY CREEK AT SECESSIONVILLE POLLUTION LINE (10A-15A)	MD-274	TURBIDITY	3
Penny Creek	PENNY CREEK	CSTL-591*	HG	3
Fishing Creek	FISHING CREEK AT SANDY CREEK CONFLUENCE OF SHINGLE CREEK AND BAILEY CREEK (D7-01)	13-05*	FC	3
	~~FISHING CREEK AT POLLUTION LINE~~	~~13-10~~	~~FC~~	~~3~~
	FISHING CK NEAR JEHOSSEE ISLAND	RT-02005*	TURBIDITY	3
	UNNAMED TRIB TO FISHING CREEK 0.8 MILES UPSTREAM FROM INACTIVE SHELLFISH SITE 13-05A	RT-11016	TURBIDITY	3
Frampton Inlet	FRAMPTON INLET AT NORTH END OF JEREMY CAY	13-24	FC	3
Big Bay Creek	BIG BAY CR. HDWTRS AT FIRST BEND TO RIGHT PAST THE NECK	13-21	FC	3
Orangegrove Creek	ORANGEGROVE CREEK SE OF LOOP IN BOARDMAN RD	RT-12020	ENTERO	3
Store Creek	STORE CREEK OPPOSITE HOUSE WITH DOCKS ON RIGHT	13-07*	FC	3
Shingle Creek	SHINGLE CREEK AND MILTON CREEK CONFLUENCE	13-28*	FC	3
Bailey Creek	BAILEY CREEK, FIRST BEND ADJACENT TO BLUFF ON BAILEYISLAND (NEAR CONFLUENCE WITH ST. PIERRE CREEK) (C7-01)	13-29*	FC	3
	BAILEY CREEK AT CONFLUENCE WITH UNNAMED TRIBUTARY NEAR SOUTHWESTERN POINT OF SCANAWAH ISLAND (C7-01)	13-30*	FC	3
Raven Point Creek	RAVEN POINT CREEK AT CONFLUENCE WITH CHURCH CREEK	12A-29*	FC	3
Church Creek	CHURCH CREEK AT DRAINAGE DISCHARGE 1/8 MILE EAST OF POWER LINES, NORTH BANK OF	12A-38*	FC	3
	CHURCH CREEK ~ 350 YDS WEST S.C. HWY.700 BRIDGE	12A-39*	FC	3
	CHURCH CREEK AND NEW CUT CONFLUENCE	12A-41	FC	3
	CHURCH CREEK, MOUTH AT MARKER #77	12B-01	FC	3
	WADMALAW SOUND AT GOSHEN POINT, MARKER #69	12B-02	FC	3
	CHURCH CR AT SC 700 1 MI SW OF CEDAR SPRINGS	MD-195*	DO	3
	CHURCH CREEK APPROX 0.5 MI NW OF SC700 BRIDGE-.25 MI NW 12A-39	RT-13044	DO, ENTERO	3
Pine Creek	PINE CREEK AT FIRST FORK	12A-40*	FC	3

Major Receiving Waters	Station Description	Station	Pollutant of Concern	Priority Ranking^
Leadenwah Creek	UNNAMED CREEK TO LEADENWAH CREEK 3.7 MI NW OF ROCKVILLE	RT-052099*	Turbidity	3
	LEADENWAH CREEK, AFTER FOURTH BEND AT THE FORK	12B-56*	FC	3
Bohicket Creek	S.C. HIGHWAY 700 BRIDGE OVER BOHICKET CREEK	12A-14*	FC	3
	BOHICKET CK AT FICKLING CK	MD-209*	DO	3
	BOHICKET CK 3 MI SW SC 700 BRIDGE	RO-036041*	DO	3
	BOHICKET CREEK ABOUT 50 YARDS NORTHEAST OF SHELLFISH SITE 12A-20.	RT-09111*	DO, ENTERO	3
	BOHICKET CREEK MIDWAY BETWEEN STATIONS 21 AND 22 AT SMALL UNNAMED TRIBUTARY ON WEST BANK	12A-46	FC	3
	BOHICKET CREEK OPPOSITY HOOPSTICK ISLAND	12A-20	FC	3
	BOHICKET CREEK OPPOSITE OLD DAM BEHIND RAST HOUSE RESTAURANT	12A-21	FC	3
Russel Creek	RUSSEL CREEK AND CREEK FARM ROAD	12B-43A*	FC	3
Sand Creek	SAND CREEK BRIDGE AT HIGHWAY 174	12B-47*	FC	3
	SAND CREEK AT INTAKE TO WESTENDORF CLAM FARM	12B-50*	FC	3
Dawho River	DAWHO RIVER, MARKER #126	12B-53*	FC	3
	DAWHO RIVER, 10.5 M N OF EDISTO BEACH	RT-01665*	DO, TURBIDITY	3
	DAWHO RIVER 0.2 MI US OF CONFLUENCE WITH NORTH CREEK/ICWW	RT-07055*	ENTERO	3
	DAWHO RVR AT SC 174 9 MI N OF EDISTO BCH SP	MD-120	ENTERO	3
Tom Point Creek	TOM POINT CREEK 3 BENDS US STATION 3	12B-54*	FC	3
Westbank Creek	WESTBANK CREEK APPROX 210 YDS IN FROM MOUTH/SHELLFISH SITE 12B-07	RO-14356*	DO	3
Privateer Creek	PRIVATEER CREEK AT SPLIT TO TWO MAIN BRANCHES	RT-14076	DO	3
N. Edisto River	NORTH EDISTO RIVER 200 YARDS FROM THE MOUTH OF WEST BANK CREEK	RO-08343*	TURBIDITY	3
Wambaw Creek	WAMBAW CK AT EXTENSION OF S-10-857 (BRIDGE NEAR BOAT LANDING)	CSTL-112*	HG, ECOLI	3
South Santee River	SOUTH SANTEE RIVER 400 YARDS UPSTREAM FROM THE INTRACOASTAL WATERWAY SOUTH OF GOAT ISLAND	RO-08344*	TURBIDITY	3
	S SANTEE RVR AT US 17	ST-006*	ENTERO, HG	3
Toomer Creek	TOOMER CREEK 2.5 MI E SC 41 BRIDGE OVER WANDO RIVER	RT-06012*	DO	3
Hobcaw Creek	HOBCAW CREEK 1 - NEXT TO THE PIER LOCATED AT THE END OF E HOBCAW DR.	HC1	ENTERO	3
	HOBCAW CREEK 2 - END OF THE FLOATING L-SHAPED DOCK AT I'ON NEIGHBORHOOD CREEK CLUB	HC2	ENTERO	3
Boone Hall Creek	BOONE HALL CREEK 1.5 MI WNW OF INTERSECTION OF US 17 AND SC 41	RT-052100*	ENTERO	3
Ashley River	ASHLEY RVR AT MAGNOLIA GARDENS	MD-049	PH, TURBIDITY	3
			FC	3
	ASHLEY RV 1.8 MI NW RUNNYMEDE PLANTATION	RT-032046*	ENTERO	3

Major Receiving Waters	Station Description	Station	Pollutant of Concern	Priority Ranking^
	ASHLEY RIVER BETWEEN OLDTOWN CREEK AND THE ASHLEY RIVER MEMORIAL BRIDGE NEAR MIDCHANNEL.	RO-09363*	ENTERO	3
	ASHLEY RIVER 1 – TRIANGULATE BETWEEN TREE LINE ON ISLAND, PEAK OF ROOF ON RICE BUILDING, AND ROAD SIGN ON JAMES ISLAND CONNECTOR	AR1	ENTERO	3
	BRITTLEBANK PARK – END OF FLOATING DOCK FACING SOUTHEAST	AR2	ENTERO	3
James Island Creek	JAMES ISLAND CREEK N OF WHITE HALL PLANTATION	RT-052098*	DO	3
Wappoo Cut	WAPPOO CUT PUBLIC BOAT LANDING - END OF WESTERN FLOATING DOCK AT THE WAPPOO CUT PUBLIC BOAT RAMP	WC1	ENTERO	3
Goose Creek	GOOSE CK AT S-08-136 BRIDGE	MD-039	ENTERO	3
	GOOSE CREEK RESERVOIR 0.55 MI W OF DAM	RL-05412	TP	3
	GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	TP	3
	GOOSE CREEK RESERVOIR 0.1 MILE NORTHEAST OF THE JOHN R. BETTIS BOAT LANDI	RL-09081	Chlorophyll-a, TP	3
	GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	ST-033	TP	3
	GOOSE CREEK RESERVOIR 1.0 MI NW OF SPILLWAY NEAR W SHORELINE	RL-03340	Chlorophyll-a, DO, TP	3
	GOOSE CK RESERVOIR 0.6 MI NW OF 2ND POWERLINES US OF BOAT RAMP, NEAR W SH	RL-07017	DO	3
	GOOSE CK RESERVOIR MIDLAKE IN LINE WITH NORTHBROOK BLVD	RL-08065	TP	3
	GOOSE CREEK RESERVOIR 2 MI N OF SPILLWAY	RL-06434	DO	3
	GOOSE CK RES 2.3 M S OF GOOSE CREEK TOWN CENTER	RL-01008	DO	3
	GOOSE CREEK RESERVOIR 2.8 MI NW OF SPILLWAY NEAR OTRANTO	RL-04390	Chlorophyll-a, DO, TP	3
	GOOSE CK AT US 52 N CHTN	MD-114	DO	3
	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	Chlorophyll-a, DO, E-COLI, TP	3
	LAKE, GOOSE CK RESERVOIR 2.5MI SW OF POPPENHEIM CROSSING	RL-10108	Chlorophyll-a, DO, TP	3
	GOOSE CREEK RESERVOIR APPROXIMATELY 1.3 MILES UPSTREAM FROM THE DAM	RL-1118	Chlorophyll-a , PH, TP	3
Clark Sound	CLARK SOUND AT OCEAN VIEW FLATS	10A-16*	FC	3
	CLARK SOUND, 550 YDS EAST OF STATION 10A-16A	10A-16B*	FC	3
Fludds Creek	FLUDD'S CREEK AT CLARK SOUND	10A-16A*	FC	3
Block Island Creek	OUTFALL OF MORRIS ISLAND DISCHARGE	10A-29*	FC	3
Filbin Creek	FILBIN CREEK AT VIRGINIA AVE, NORTH CHARLESTON	MD-249*	ENTERO	3
Charleston Harbor	DEMETRE PARK (SUNRISE PARK) - END OF SUNRISE PARK DOCK FACING NORTHEAST TOWARDS THE OLD VILLAGE OF M	CH1	ENTERO	3
	CHARLESTON HARBOR 0.5 MI SE OF MOUTH OF SHEM CK	RO-036044*	CU	3
	CHARLESTON HARBOR, COOPER RIVER SIDE APPROX 365 YRD E OF BATTERY BETWEEN SHELLFISH SITES 10B-05 AND 10B-06	RO-12316	ENTERO	3
Clark Sound	CLARK SOUND APPROX 85 YARDS S OF END OF LIGHTHOUSE RD	RT-14088	DO, ENTERO	3
Cedar Creek	CEDAR CREEK AT CNTY RD 857 HAMDTPN PLANTATION STATE PARK	RS-01056	ECOLI	3

Major Receiving Waters	Station Description	Station	Pollutant of Concern	Priority Ranking^
Parrot Point Creek	UNNAMED TRIBUTARY TO PARROT POINT CREEK 0.8 MI S OF FT JOHNSON	RT-042072*	TURBIDITY	3
Rantowles Creek	RANTOWLES CREEK AT CONFLUENCE OF STONO RIVER	11-18*	FC	3
Stono River	STONO RVR AT SC 700	MD-026	DO	3
	STONO RVR AT S-10-20 2 MI UPSTRM OF CLEMSON EXP STA	MD-202	ENTERO	3
	AIWW AT MARKER #21A	11-11	FC	3
	STONO RIVER (AIWW) AT MARKER #27	11-12	FC	3
	STONO RIVER (AIWW) AT MARKER #63	11-15	FC	3
	STONO RIVER (AIWW) AT MARKER #51	11-16	FC	3
	STONO RIVER (LOG BRIDGE CREEK) AT MARKER #54	11-17	FC	3
	STONO RIVER AT ELLIOT'S CUT	11-01	FC	3
	STONO RIVER AT SOUTHERN BOUNDARY OF ST. JOHN'S YACHT HARBOR MARINA CLOSURE ZONE	11-02A	FC	3
	STONO RIVER AT MOUTH OF PENNY CREEK NEAR MARKER #25	11-27	FC	3
Elliott Cut	MOUTH OF ELLIOTT CUT AT EDGE WTR DR (S-10-26 OFF HW 17)	MD-025	DO	3
Chaplin Creek	UNNAMED TRIB APPROX 0.4 MI NNE OF MOUTH OF CHAPLIN CREEK	RT-13052	DO	3
Abbapoola Creek	ABBAPOOLA CREEK@ BLIND ROAD	MD-802*	ENTERO	3
	ABBAPOOLA CREEK AT FIRST LARGE BEND	11-06	FC	~~3~~
	ABBAPOOLA CREEK AT CONFLUENCE WITH SMALL CREEK ON WEST BANK AT SEVENTH BEND (C-4/99)	11-06A	FC	3
Bass Creek	BASS CREEK AT PUBLIC DOCK (5TH BEND FROM CONFLUENCE WITH CINDER CREEK (C5-01)	11-35*	FC	3
	N BASS CREEK APPROX 140 M SW OF SHELLFISH SITE 11-31	RT-16116	TURBIDITY	3
Stono Inlet	TRIBUTARY TO STONO INLET, 11 M SW OF CHARLESTON	RT-01642*	TURBIDITY	3
Cinder Creek	CINDER CREEK AT PUBLIC DOCK (3RD BEND FROM CONFLUENCE WITH BASSK CREEK) (C5-01)	11-34	FC	3
Alligator Creek	ALLIGATOR CREEK AT STATE SHELLFISH GROUND (06B-12)	MD-265*	TURBIDITY	3
	UNNAMED TIDE CREEK ACROSS ICWW 0.5 MI NE OF MOUTH OF ALLIGATOR CREEK	RT-12033	TURBIDITY	3
Devils Den Creek	E FORK OF DEVILS DEN CK HEADWATERS	RT-02016*	CU	3
	DEVILS DEN CREEK JUST UPCREEK OF FIRST MAJOR TRIB	RT-13053	TURBIDITY	3
Little Papas Creek	LITTLE PAPAS CREEK 0.5 MILES NNE OF CONFLUENCE WITH PAPAS CREEK	RT-11009	TURBIDITY	3
Ramhorn Creek	RAMHORN CREEK 4.5 MILES EAST OF MCCELLANVILLE	RT-15097*	TURBIDITY	3
Awendaw Creek	AWENDAW CREEK AT US 17	MD-250*	ENTERO	3
	AWENDAW CREEK AT MARKER #57 (07-03)	MD-268*	TURBIDITY	3
Tibwin Creek	TIBWIN CREEK PAST FIRST BEND, AT FIRST SMALL CREEK ON RIGHT	07-22	FC	3
	TIBWIN CREEK AT MARKER #42	07-05*	FC	3
	AIWW, MIDWAY BETWEEN TIBWIN CREEK AND MATTHEWS CREEK	07-21*	FC	3
Sandy Point Creek	SANDY POINT CREEK - 4TH BEND	07-15*	FC	3

Major Receiving Waters	Station Description	Station	Pollutant of Concern	Priority Ranking^
AIWW	AIWW MIDWAY BETWEEN AWENDAW AND GRAHAM CREEK	MD-793*	ENTERO	3
	AIWW DOCK ACROSS FROM THE ENTRANCE OF GRAHAM CREEK	MD-794*	ENTERO	3
	AIWW TRIB NORTH OF SEWEE CAMP AND SOUTH OF HOUSES	MD-796*	ENTERO	3
	AIWW ADJACENT TO WILD DUNES GOLF COURSE STORM DRAINAGE OUTFALL	09A-18	FC	3
Jeremy Creek	JEREMY CK NEAR BOAT LANDING AT MCCLELLANVILLE TOWN HALL	MD-203*	DO, ENTERRO	3
Mathews Creek	TRIBUTARY TO MATHEWS CREEK, 1 M S OF MCLELLANVILLE	RT-01623*	TURBIDITY	3
Venning Creek	VENNING CREEK 0.7 MI FROM MOUTH OF VANDERHORST CREEK	RT-07060*	TURBIDITY	3
Upper Inlet Creek	UPPER INLET CREEK AT JENNIE CREEK	09A-30*	FC	3
	BAY AT END OF UPPER INLET CREEK	09A-31*	FC	3
Little Sett Creek	LITTLE SETT CREEK BETWEEN SETT CREEK AND FIVE FATHOM CREEK	RT-16137	TURBIDITY	3

*Does not receive SMS4 discharge
^1: Current Priorities with TMDL development during the 2016-2018 time frame
2: Near-Term Priorities with TMDL development during the 2019-2022 time frame
3: Long-Term Priorities with TMDL development after 2022

3.5 Discharges to Classified Waters

For discharges to Classified Waters, protection will be provided through BMP applications conducted through implementation of the minimum control measures in section 4.2. The BMP implementation strategies will not cause or contribute to violations of water quality standards in water bodies with impaired monitoring stations. A list of Classified Waters in Charleston County is provided in the Table 4 below.

Table 4: Discharges to Classified Waters

Water Body	Classification	Waterbody Description and Site Specific Standard
Adams Creek	ORW(SFH)	The entire creek tributary to Bohicket Creek
Alston Creek	SFH	The entire creek tributary to Wando River
Atlantic Intracoastal Waterway	SFH	That portion of the waterway from South Santee River to the Ben Sawyer Bridge
		That portion of the waterway from the confluence of Elliott Cut and Stono River to the S.C.L. Railroad Bridge over Stono River
		That portion of the waterway from the S.C.L. Railroad Bridge over Stono River to the confluence of Wadmalaw Sound and Stono River
	ORW(SFH)	That portion of the waterway from the confluence of Wadmalaw Sound and Stono River to Gibson Creek

Water Body	Classification	Waterbody Description and Site Specific Standard
		That portion of the waterway from Gibson Creek along Wadmalaw River and Dawho River to North Creek
		That portion of the waterway from North Creek through Watts Cut to South Edisto River
		That portion of the waterway from South Edisto River at Watts Cut to South Edisto River at Fenwick Cut
Bailey Creek	ORW(SFH)	The entire creek tributary to St. Pierre Creek
Big Bay Creek	ORW(SFH)	The entire creek tributary to South Edisto River
Bohicket Creek	ORW(SFH)	The entire creek tributary from North Edisto River to Church Creek
Boone Hall Creek	SFH	The entire creek tributary to Horlbeck Creek
Bull's Bay	ORW(SFH)	The entire bay
Bullyard Sound	ORW(SFH)	The entire sound
Cape Romain Harbor	ORW(SFH)	The entire harbor
Caper's Inlet	ORW(SFH)	The entire inlet tributary to the Atlantic Ocean
Church Creek	ORW(SFH)	That portion of the creek from Wadmalaw Sound to Ravens Point
	SFH	That portion of the creek from Ravens Point to Hoopstick Island
Coastal Waters	SFH	From the land to the 3 mile limits of State jurisdiction in the Atlantic Ocean
Copahee Sound	ORW(SFH)	The entire sound
Darrell Creek	SFH	The entire creek tributary to Wando River
Dawho River	ORW(SFH)	The entire river from South Edisto River to North Edisto River
Dewee's Inlet	SFH	The entire inlet tributary to the Atlantic Ocean
Edisto River	ORW(FW)	That portion of the river from U.S. 17 to its confluence with Dawho River and South Edisto River
Fishing Creek	ORW(SA)	That portion of the creek from its headwaters to a point 2 miles from its mouth
	ORW(SFH)	That portion of the creek from a point 2 miles from its mouth to its confluence with St. Pierre Creek
		The entire creek tributary to Dawho River
Five Fathom Creek	SFH	The entire creek tributary to Bull's Bay
Folly River	SFH	The entire river tributary to Stono river
Foster Creek	SFH	The entire creek tributary to the Wando River

Water Body	Classification	Waterbody Description and Site Specific Standard
Frampton Creek	ORW(SFH)	The entire creek tributary to Frampton Inlet
Frampton Inlet	ORW(SFH)	The entire inlet tributary to the Atlantic Ocean
Garden Creek	ORW(SFH)	The entire creek tributary to Toogoodoo Creek
Gibson Creek	ORW(SFH)	The entire creek tributary to Wadmalaw River
Graham Creek	SFH	The entire creek tributary to Bull's Bay
Grays Sound	SFH	The entire sound
Guerin Creek	SFH	The entire creek tributary to Wando river
Hamlin Sound	SFH	The entire sound
Hobcaw Creek	SFH	The entire creek tributary to Wando River
Horlbeck Creek	SFH	The entire creek tributary to Wando River
Jeremy Inlet	ORW(SFH)	The entire inlet tributary to the Atlantic Ocean
Leadenwah Creek	ORW(SFH)	The entire creek tributary to North Edisto River
Long Creek	ORW(SFH)	The entire creek tributary to Steamboat Creek
Lower Toogoodoo Creek	SFH	That portion of the creek from its headwaters to a point 3 miles from its mouth
	ORW(SFH)	That portion of the creek from a point 3 miles from its mouth to its confluence with Toogoodoo Creek
Mark Bay	ORW(SFH)	The entire bay
McLeod Creek (also called Tom Point Creek)	ORW(SFH)	The entire creek tributary to North Edisto River
Milton Creek	ORW(SFH)	The entire creek tributary to St. Pierre Creek
Molasses Creek	SFH	The entire creek tributary to Wando River
Mud Creek (also called Fields Cut)	ORW(SFH)	The entire creek tributary to South Edisto River
New Cut	SFH	The entire cut between Church Creek and Stono River
North Edisto River	ORW(SFH)	That portion of the river from its headwaters to the Atlantic Intracoastal Waterway
		That portion of the river from Steamboat Creek to the Atlantic Ocean
	SFH	That portion of the river from the Atlantic Intracoastal Waterway to Steamboat Creek
Ocella Creek	ORW(SFH)	The entire creek tributary to South Creek
Oyster House Creek	ORW(SFH)	The entire creek tributary to Wadmalaw River
Price Inlet	ORW(SFH)	The entire inlet tributary to the Atlantic Ocean
Privateer Creek	ORW(SFH)	The entire creek tributary to North Edisto River

Water Body	Classification	Waterbody Description and Site Specific Standard
Rathall Creek	SFH	The entire creek tributary to Wando River
Russell Creek	ORW(SFH)	The entire creek tributary to Dawho River
Sand Creek	ORW(SFH)	The entire creek tributary to Steamboat Creek
Scott Creek	ORW(SFH)	The entire creek from Big Bay Creek to Jeremy Inlet
Sewee Bay	SFH	The entire bay
Shem Creek	ORW(SFH)	The entire creek tributary to St. Pierre Creek
South Creek	ORW(SFH)	The entire creek tributary to North Edisto River
South Edisto River	ORW(SFH)	That portion of the river from Dawho River to Mud Creek
	SFH	That portion of the river from Mud Creek to the Atlantic Ocean
South Santee River	ORW(SFH)	That portion of the river from U.S. Hwy 17 from 1000 feet below the Atlantic Intracoastal Waterway to the Atlantic Ocean
St. Pierre Creek	ORW(SFH)	The entire creek tributary to South Edisto River
Steamboat Creek	ORW(SFH)	The entire creek tributary to North Edisto River
Stono River	SFH	That portion of the river extending eastward to S.C.L. Railroad Bridge
		That portion of the river from the S.C.L. Railroad Bridge to Abbapoola Creek
		That portion of the river from Abbapoola Creek to Folly River
Store Creek	ORW(SFH)	The entire creek tributary to St. Pierre Creek
Swinton Creek	ORW(SFH)	The entire creek tributary to Lower Toogoodoo Creek
Tom Point Creek (also called McLeod Creek)	ORW(SFH)	The entire creek tributary to North Edisto River
Toogoodoo Creek	ORW(SFH)	The entire creek tributary to North Edisto River
Toomer Creek	SFH	The entire creek tributary to Wando River
Townsend River	ORW(SFH)	The entire river tributary to Frampton Inlet
Wadmalaw River	ORW(SFH)	The entire river from Wadmalaw Sound to North Edisto River
Wadmalaw Sound	ORW(SFH)	The entire sound
Wagner Creek	SFH	The entire creek tributary to Wando River

Water Body	Classification	Waterbody Description and Site Specific Standard
Wando River	SFH	That portion from its headwaters to a point 2.5 miles north of its confluence with Cooper River
Westbank Creek	ORW(SFH)	The entire creek tributary to North Edisto River
Whooping Island Creek	ORW(SFH)	The entire creek tributary to Steamboat Creek

3.6 Discharges to Source Water Protection Areas

For discharges to Source Water Protection Areas, protection will be provided through BMP applications conducted through the implementation of the minimum control measures in Section 4.2.

4.0 Stormwater Management Plan (SWMP)

Table 5: SWMP Requirements

SWMP REQUIREMENTS			
Develop and Implement SWMP	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.1.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Revise and update written SWMP document and submit the SWMP to SCDHEC Bureau of Water.	Deadline: July 1, 2014	Once	Charleston County Stormwater Manager
Update Stormwater Management Ordinance	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.1.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Review and revise the Stormwater Management Ordinance, or adopt any new ordinances or other regulatory mechanisms that provide adequate legal authority to control pollutant discharges into and from the SMS4, and to meet the requirements of the MS4 permit.	Deadline: January 1, 2015	Once	Charleston County Stormwater Manager
Develop Enforcement Response Plan (ERP)	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.1.5		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop & Implement an enforcement response plan (ERP).	Deadline: January 1, 2015	Once	Charleston County Stormwater Manager
Update Stormwater Management Plan	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.1.10		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Review and revise the SWMP document to keep it up to date during the term of the permit.	Throughout the Permit Term	Annually	Charleston County Stormwater Manager

4.1.1 Requirements of the NPDES SMS4 General Permit

Charleston County will implement this SWMP to reduce the discharge of pollutants from its SMS4 to the maximum extent practicable to protect water quality.

4.1.2 SWMP Development

The SWMP was first submitted to the SCDHEC Bureau of Water on August 1, 2014. This document was updated in April 2016 and submitted to SCDHEC as an Appendix to the SMS4 Annual Report. This document was updated again in June 2018 and March 2020. The County will continue to revise and update the written SWMP document as necessary.

4.1.3 Contents of the SWMP

At a minimum, the County must include ordinances, or other regulatory mechanisms, providing the legal authority necessary to implement and enforce the requirements of the SMS4 general permit. See Appendix D for Charleston County Stormwater Management Ordinance. The County has reviewed the Stormwater Management Ordinance to ensure that it provides adequate legal authority to control pollutant discharges into and from the SMS4, and to meet the requirements of the SMS4 general permit.

4.1.4 Requirement to Develop Adequate Legal Authority

At a minimum the legal authority will address the following:

- Authority to Prohibit Illicit Discharges
- Determination of Allowable Non-Stormwater Discharges
- Authority to Prohibit Spills or Other Releases
- Authority to Require Compliance
- Authority to Require Installation, Implementation, and Maintenance of Control Measures
- Authority to Receive and Collect Information
- Authority to Inspect
- Response to Violations
- Monetary Penalties
- Civil/Criminal Penalties
- Interagency Agreements (if applicable)

A certification statement has been included in this SWMP that certifies Charleston County has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in the NPDES SMS4 general permit (see Page i).

4.1.5 Enforcement Measures and Tracking

The County implemented an enforcement response plan (ERP) in December 2014, included as Appendix F. The ERP describes Charleston County's potential responses to violations and addresses repeat and continuing violations through progressively stricter responses as needed to achieve compliance. This document will be revised as necessary.

4.1.6 Report Requirements

Charleston County will at a minimum submit the following information in the report (See Section 5.3 for details).

- The status of implementing the components of the SWMP that are established as permit conditions;

- Proposed changes to the SWMP that are established as permit conditions;

- Revisions, if necessary, to the assessment of controls and the fiscal analysis, including a description of staff resources necessary to meet the requirements of the permit;

- A summary of data, including monitoring data, that is accumulated throughout the reporting year; and,

- A summary describing the number and nature of enforcement actions, inspections, and public education programs.

4.1.7 SWMP Minimum Control Measure Requirements

Charleston County SWMP will include the following information for each of the six minimum control measures (MCM).

Each MCM is described in Section 4.2 of this SWMP in detail:

- Best management practices (BMP) that the County or another entity will implement for each of the MCM;
- Measurable goals for each of the BMP including, as appropriate, the months and years in which the County will undertake required actions, including interim milestones and the frequency of the action; and,
- Person, or persons, responsible for implementing or coordinating the BMP for the County's SWMP.

4.1.10 SWMP Modifications

SCDHEC Bureau of Water may notify Charleston County of the need to modify the SWMP document to be consistent with the permit, in which case Charleston County will have 90 days to finalize such changes to the plan.

Charleston County will keep the SWMP document up to date during the term of the permit. Where Charleston County determines that Ordinance modifications are needed to address any procedural, protocol, or programmatic change, such changes must be made as soon as practicable, but not later than 365 days.

4.2 Minimum Control Measures

In compliance with the SMS4 general permit requirements; this SWMP includes a description of the six minimum control measures (MCMs) and details on the development and implementation of the plan to address MCM requirements. The details on each minimum measure include the proposed BMP measurable goals for each proposed BMP, the responsible departments and staff to implement the BMP, and the implementation schedule for the BMP (i.e. start date, frequency of activities, etc.).

4.2.1 Public Education and Outreach (Minimum Measure #1)

4.2.1.1 Permit Requirements

In order to meet the requirements of Minimum Measure #1, Charleston County has partnered with Clemson University/Carolina Clear to focus on the development and implementation of educational programs designed to inform the public about the impacts that stormwater discharges could have on local waterbodies and the steps that the public can take to reduce pollutants in stormwater runoff. Charleston County intends to work in cooperation with Clemson University/Carolina Clear in order to efficiently reach as many citizens as

economically possible through public education and outreach efforts. Charleston County will conduct additional public education and outreach efforts beyond those organized by Clemson University/ Carolina Clear.

Table 6: Minimum Measure #1 Permit Requirements

4.2.1.1.1 The Pollutant(s) of Concern (POC) within Charleston County's Watershed Area(s):
In Charleston County's watershed area, the potential pollutants of concern (POC) has been determined to be sediment, bacteria, and nutrients. A description of the pollutant of concern for the County's watershed area is included below.
4.2.1.1.2 Description of the POC(s) Listed Above:
• **Sediment:** One of the pollutants that may contribute to stormwater pollution is sediment. Sediment contains nitrogen, phosphorus, and possibly other contaminants that can be transported during a rain event into streams. The excess nitrogen, phosphorus, and other contaminants carried in the sediment may cause harm to streams and wildlife habitats. • **Bacteria**: Bacteria may be contributed to stormwater through illicit connections of sanitary sewers to stormwater sewers, sanitary sewer overflows, wildlife, improper disposal of pet waste, and leaking sanitary sewers. Elevated bacteria levels in streams may have a harmful effect on the stream habitat and could also be a public health risk. • **Nutrients:** Nutrients can enter stormwater either naturally or through human causes. Excess nutrients can increase the growth of algae that leads to algal blooms and eutrophic conditions. The major sources of nutrients in stormwater are through fertilizers, detergents, plant debris, atmospheric deposition, improperly functioning septic systems, and animal waste.
4.2.1.1.3 Programs Targeted at High Priority Community Issues with the Potential to Decrease the POC's Effect on Water Quality:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.4 The Audience(s) that is Believed to have an Influence on the POC Identified and that is Believed to have an Influence on the Goals and Objectives Identified:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.5 The Message(s) Directed at the Target Audience(s) Listed Above to Achieve the Program Goals and Objectives:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.6 Education Campaign(s) and Materials:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.7 Distribution of Campaign Materials:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.8 Quantitative and/or Qualitative Formative Assessment of Programs:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.9 Utilization of Public Input Into the Development of This Program:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.

4.2.1.1.10 Implementation of Program Goals and Objectives:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.2.1.1.11 Process for Annual Adjustment of Program Based Upon Program Assessment:
Charleston County utilizes the Clemson University/Carolina Clear to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.

4.2.1.2 Minimum Measure #1 Implementation

Evaluation of the success of this minimum measure will be through careful analysis of the measurable goals for each BMP included in this minimum measure.

In order to meet the requirements of Minimum Measure #1, Charleston County will implement the following BMPs:

- Continue Agreement with Clemson University/Carolina Clear to Implement a Public Education and Outreach Program – See Appendix G for contract.

Table 7: Best Management Practices – Minimum Measure #1

PUBLIC EDUCATION AND OUTREACH BMPS			
Agreement with Clemson University Cooperative Extension Service - Carolina Clear	**Not Started:** ☐ **In Progress :** ☒ **Completed:** ☐		
	Section: 4.2.1		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Contract with Clemson University to implement a public education/outreach program for Charleston County.	Throughout Permit Term	Annually	Charleston County Stormwater Manager and Clemson University/Carolina Clear
Measurable Goal:			
• A program that provides public education concerning water quality issues in the watershed area of Charleston County.			
Measurable Goal Update:			
• Charleston County maintains a contract with Clemson University/Carolina Clear (Appendix G) to meet the permit requirements of Minimum Measure #1.			
• Charleston County conducts supplementary public education and outreach efforts within the County.			

4.2.2 Public Involvement/Participation (Minimum Measure #2)

4.2.2.1 Permit Requirements

Charleston County will partner with Clemson University/Carolina Clear in order to efficiently reach as many citizens as economically possible through public involvement and participation efforts. Clemson University/Carolina Clear will provide the citizens of Charleston County opportunities to participate in activities and events relating to water quality preservation and

water quality education. Charleston County will conduct additional public involvement and participation opportunities beyond those organized by Clemson University/ Carolina Clear.

Table 8: Minimum Measure #2 Permit Requirements

4.2.2.1.1	Available Opportunities For Citizens To Participate In The Implementation Of Stormwater Controls:
	Opportunities for citizen participation in the implementation of stormwater controls in Charleston County are provided by Clemson University/Carolina Clear.
4.2.2.1.2	Accessing Information On This SWMP:
	Charleston County has included the SWMP on the County's Stormwater Management webpage.
4.2.2.1.3	Incorporate Written Procedures For Implementing The Public Involvement/Participation (PIP) MCM In The SWMP:
	Charleston County will continue to implement its written procedures (Contract) with Clemson University/Carolina Clear to implement a Public Involvement and Participation Program.

4.2.2.2 BMP Implementation

The Measurable goals for each BMP for the Public Participation and Involvement minimum measure will be used to evaluate the success of each BMP. The following sections describe the components of Charleston County's Public Involvement/Participation program:

In order to meet the requirements of Minimum Measure #2, Charleston County will:

- Continue Agreement with Clemson University/Carolina Clear to Implement a Public Involvement and Participation Program
- Provide Access to Information for the SWMP

The following sections describe the components of Charleston County's Public Involvement/Participation program:

Table 9: Best Management Practices – Minimum Measure #2

PUBLIC INVOLVEMENT/PARTICIPATION BMPS			
Opportunities for Citizen Participation	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.2.1.1		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Contract with Clemson University to implement a public involvement/participation program for Charleston County.	Throughout Permit Term	Annually	Charleston County Stormwater Manager and Clemson University/Carolina Clear
Measurable Goal:			
• A program that will provide the citizens of Charleston County opportunities to participate in activities and events relating to water quality preservation and water quality education.			
Measurable Goal Update:			
• Charleston County maintains a contract with Clemson University/Carolina Clear (Appendix G) to meet the permit requirements of Minimum Measure #2.			

Provide Access to Information for the SWMP	Not Started: ☐ In Progress : ☐ Completed: ☒ Section: 4.2.2.1.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Ensure the public can easily find information about the SWMP.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager and Clemson University/Carolina Clear
Measurable Goal:			
• Include SWMP on the County's webpage.			
Measurable Goal Update:			
• Charleston County has posted the SWMP to the County's Stormwater Management Program webpage: http://www.charlestoncounty.org/departments/public-works/stormwater.php.			

Written Procedures for Implementing MCM #2	Not Started: ☐ In Progress : ☒ Completed: ☐ Section: 4.2.2.1.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop written procedures for implementing the public involvement program.	Throughout Permit Term	Annually	Charleston County Stormwater Manager and Clemson University/Carolina Clear
Measurable Goal:			
• Signed contract with Clemson University/Carolina Clear.			
Measurable Goal Update:			
• Charleston County maintains a contract with Clemson University/Carolina Clear (Appendix G) to meet the permit requirements of Minimum Measure #2.			

The following was provided by the Clemson Carolina Clear Education Program through the efforts of the Ashley Cooper Stormwater Education Consortium (ACSEC). Additional information on the efforts taken by ACSEC is included in Appendix G.

Charleston County SWMP – MCMs 1 and 2 language provided by Clemson Carolina Clear – June 2014

Charleston County has selected to partner with the Clemson Carolina Clear program to implement public education/outreach and public involvement and participation measures of the NPDES SMS4 permit. This is a regional stormwater outreach and involvement effort, the Ashley Cooper Stormwater Education Consortium, that includes the following communities at the time of submission.

- Berkeley County
- Charleston County
- Dorchester County
- City of Charleston
- City of Folly Beach
- City of Goose Creek
- City of Hanahan
- City of Isle of Palms
- Town of James Island
- Town of Lincolnville
- Town of Mount Pleasant
- City of North Charleston
- Town of Sullivan's Island
- Town of Summerville

This coordinated effort will include a regional decision-making process that is consistent among all Carolina Clear-lead efforts with representatives from each MS4 participating in a prioritization strategy for effective outreach and involvement programming. This pollutant of concern analysis and prioritization process will include the following considerations, pulled together through a planning and reporting framework provided by Carolina Clear:

- An assessment of the region's TMDLs and 303(d) impaired waterbodies list.
- Public Works Departments, stormwater staff, and educational partners will evaluate common concerns and phone calls of stormwater-related issues across the region.
- Feedback from community and educational partners will also include a review of common problems potentially affecting local water resources and the audiences that may be responsible for addressing these problems.
- Telephone survey data collected in the fall of 2013 will be available in the fall/winter of 2014 to guide outreach prioritization, educational messaging and willingness to be involved. The results of this effort will be used as public input to the development of the SWMP as well as a baseline for broad program evaluation.

This process will result in a five-year outreach and involvement strategy that prioritizes resources and potential for sustainable impact across at least three pollutants of concern, behaviors to address, target audiences, motivating messages, vehicles for information delivery and short-term and long-term measures of success. This outreach plan will be a guiding document for this consortium's efforts, recognizing that new information, media opportunities, partnerships and new water quality data may affect both the strategy and means to measure program success.

4.2.3 Illicit Discharge Detection and Elimination (IDDE) (Minimum Measure #3)

4.2.3.1 Permit Requirements

Charleston County has an established IDDE program including procedures for dry-weather screening and illicit tracking activities. As needed, the dry-weather screening and illicit tracking procedures will be edited to meet the SMS4 general permit requirements. Table 10 includes SMS4 general permit requirements with descriptions of Charleston County's actions to the meet permit requirements.

Table 10: Minimum Measure #3 Permit Requirements

4.2.3.2.1 Development Of The Storm Sewer System Map:
In previous years, Charleston County has developed a storm sewer system map showing the location of known outfalls, and names and locations of all waters of the United States that receive discharges from those outfalls. The storm sewer map will be updated as needed to show new outfalls due to new developments.
4.2.3.2.2 Identification Of Priority Areas:
Based on existing outfall inventory, Charleston County will identify priority areas for more detailed screening of the SMS4 based on higher likelihood of illicit connections. The County created a map of all priority areas identified in the system. The priority area map will be updated annually to reflect changing priorities and be available for review by the permitting authority.
4.2.3.2.3.a Field Screening Procedures And Implementation:
Charleston County will conduct dry weather field screening and / or analytical monitoring, when necessary, to identify the source of illicit discharges. At a minimum, Charleston County will: Identify all field screening points within the priority areas where field screening and analytical monitoring will take place. A list of screening points will be developed. The County will also conduct field screening and analytical monitoring outside the priority areas at known non-stormwater discharges. The areas and the schedule for conducting the screening, and field screening points will be identified annually. Charleston County has developed dry weather screening procedures which: Provide a description of which screening methods will be used and a description as to why it is appropriate. Provides a description of field screening equipment with respective methodologies for use. All dry weather screening activities will be conducted after 72-hours of continuous dry conditions following at least 0.10 inch of rainfall. The elimination of all illicit discharges will be documented. Documentation procedures will be developed as described in section 4.2.3.2.5/6

4.2.3.2.3.b Field Screening Assessment:

Charleston County will assess the effectiveness of the Field Screening component of their IDDE program annually to determine if the level of effort is adequate in attaining the effective prohibition of non-stormwater discharges into the MS4. Where updates are found to be necessary, Charleston County will make such changes and include them as part of the re-notification required under Part 2.5 of the SMS4 general permit.

4.2.3.2.3.c Procedures For Notifying Another MS4 Of An Illicit Discharge:

For non-traditional MS4 permittees, if illicit connections or illicit discharges are observed related to another operator's municipal storm sewer system then Charleston County will notify the other operator as soon as practical, no later than 3 business day.

4.2.3.2.3.d Addressing A Notification Of An Illicit Discharge By Another Operator:

Charleston County will follow appropriate procedures when notified of an illicit discharge by another MS4 operator.

4.2.3.2.4/5 Tracing The Source Of An Illicit Discharge:

Charleston County has developed procedures for conducting illicit tracking and elimination procedures.

After becoming aware of an illicit discharge, Charleston County will initiate an investigation(s) to attempt to identify and locate the source of any continuous or intermittent non-stormwater discharge on as soon as practical no later than 3 business day.

Charleston County will report immediately the occurrence of any dry weather flow believed to be an immediate threat to human health of the environment to SC DHEC Emergency Response, 1-888-481-0125.

Illicit Discharges suspected of being sanitary sewage and/or significantly contaminated will be considered a high priority and will be reported to appropriate public utility owner within 24hrs.

Investigations of illicit discharges suspected of being cooling water, wash water, or natural flows may be delayed until after all discharges suspected of having the potential for adversely impact either human health or water quality have been investigated, eliminated, and/or resolved.

At a minimum, Charleston County will document the date(s) the illicit discharge was observed; the results of the investigation; any follow-up of the investigation; and the date the investigation was closed.

4.2.3.2.6 Determining The Source Of The Illicit Discharge:

Charleston County will determine and document through their investigations the source of all confirmed illicit discharges. If the source of the suspected illicit discharge is found to be a suspected non-compliance with an NPDES permit, the appropriate SCDHEC Regional Office will be notified.

a. *If an illicit discharge is found, but within six (6) months of the beginning of the investigation neither the source nor the same non-stormwater discharge has been identified/observed, then Charleston County will maintain written documentation for review by the permitting authority.*

	b. *If the observed discharge is intermittent, Charleston County will document that a minimum of three (3) separate investigations were made to observe the discharge when it was flowing. If these attempts are unsuccessful, Charleston County will maintain written documentation for review by the permitting authority. However, since this is an ongoing program, Charleston County will periodically recheck these suspected intermittent discharges.*
4.2.3.2.7	Corrective Action Plan To Eliminate Illicit Discharges:
	Once the source of the illicit discharge has been determined, Charleston County will: *a. Attempt to notify the responsible party of the problem as soon as practical no later than 3 business day.* *b. Require the responsible party to conduct all necessary corrective actions to eliminate the non-stormwater discharge within 30 days. When, and if, elimination will take longer than 30 days, Charleston County will require responsible parties to submit a plan with a schedule for elimination* *c. Conduct a follow-up investigation and field screening, consistent with Part 4.2.3.4/5 of this SWMP, to verify that the discharge has been eliminated.* *d. Document their follow-up investigations.* e. *Follow the SWMP ERP and include the resulting enforcement actions in the subsequent report.*
4.2.3.2.8	Public Reporting Mechanism:
	Charleston County has established an illicit reporting hotline for the public and staff to report illicit discharges. *The County has established and implemented citizen request response procedures in the illicit tracking procedures document created for section 4.2.3.2.4/5. The citizen response procedures in the illicit tracking procedures document will:* *a. Develop a written spill/dumping response procedure for responding to public notices of illicit discharges, the various responsible agencies and their contacts, and who would be involved in illicit discharge incidence response.* b. *Include procedures for inspections in response to complaints and follow-up inspections as needed to ensure that corrective measures have been implemented by the responsible party to achieve and maintain compliance.*
4.2.3.2.9	Employee Training:
	Charleston County implements a training program for all appropriate municipal staff, which, as part of their normal job responsibilities, may come into contact with, or otherwise observe, an illicit discharge or illicit connection to the storm sewer system. This BMP is implemented through training for Pollution Prevention in Section 4.2.6.5.

4.2.3.2 BMP Implementation

In order to meet the requirements of Minimum Measure #3, Charleston County has listed BMPs that focus on the detection and elimination of illicit discharges into the SMS4. Charleston County will locate and eliminate illicit discharges by developing BMPs in accordance with the SMS4 general permit requirements. Priority areas have been established based on the higher likelihood of illicit connections, and outfalls located within the priority areas will be visited to

check for dry weather flow. Outfalls with dry weather flow will be screened to identify potential illicit discharges. Charleston County has modified illicit tracking procedures to be in compliance with the SMS4 general permit including requirements for notifying another MS4 of an illicit discharge. Charleston County will assess the effectiveness of the Field Screening component of their IDDE program annually to determine the level of effort is adequate in attaining the effective prohibition of non-stormwater discharges into the MS4.

As required by the SMS4 general permit, the County has developed a public reporting hotline for citizens to report potential illicit discharges. Charleston County will provide IDDE training to appropriate staff as part of the pollution prevention training requirements in MCM #6. Evaluation of the success of this minimum measure will be based on the level of implementation of the BMPs included in this minimum measure. The following sections describe the components of the County's Illicit Discharge Detection and Elimination (IDDE) program.

In order to meet the requirements of Minimum Measure #3, Charleston County will:

- Update the Storm Sewer Map
- Identify Priority Areas for Illicit Discharges
- Identify Screening Points
- Conduct Field Screening (Dry Weather Screening)
- Modify Illicit Tracking Procedures
- Conduct Illicit Tracking
- Eliminate Illicit Discharges
- Document Illicit Discharge Investigations
- Assess Field Screening Procedures
- Develop Illicit Discharge Reporting Hotline
- Provide Employee Training on Illicit Discharge Identification

The following sections describe the components of Charleston County's Illicit Discharge Detection and Elimination (IDDE) program.

Table 11: Best Management Practices - Minimum Measure #3

IDDE BMPs			
Update Storm Sewer Map	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: **4.2.3.2.1**		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Update the storm sewer map as needed to show the location of all outfalls and names and locations of all waters of the United States that receive discharge from those outfalls.	Current map complete	As Needed	Charleston County Stormwater Manager
Measurable Goal:			
• Update storm sewer map as needed to show new outfalls.			
Measurable Goal Update:			
• Charleston County completed a storm sewer map prior to the permit effective date. This map is updated as needed to show new outfalls.			

Identify Priority Areas	Not Started: ☐ In Progress : ☐ Completed: ☒ Section: 4.2.3.2.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Identify illicit priority areas based on an identification of areas with a higher likelihood of illicit connections. The priority areas will be updated annually.	Deadline: December 31, 2014	Updated Annually	Charleston County Stormwater Manager
Measurable Goal:			
• Identify areas with boundaries for SMS4 Dry-Weather Screening.			
Measurable Goal Update:			
• Charleston County completed an illicit prioritization area analysis to identify illicit priority areas.			

Identify Screening Points	Not Started: ☐ In Progress : ☒ Completed: ☐ Section: 4.2.3.2.3a		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Identify all field screening points within the priority area. Include a schedule for conducting the screening.	Deadline: December 31, 2016	Updated Annually	Charleston County Stormwater Manager
Measurable Goal:			
• A list of all field screening points.			
• A schedule for conducting the field screening.			

Conduct Field Screening	Not Started: ☐ In Progress : ☒ Completed: ☐ Section: 4.2.3.2.3a		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Conduct dry weather flow screening at outfalls in the priority area and at known dry weather discharges.	Deadline: December 31, 2016	Annually	Charleston County Stormwater Manager
Measurable Goal:			
• Locate potential illicit discharges in the priority area.			

Modify Illicit Tracking Procedures	Not Started: ☐ In Progress : ☐ Completed: ☒ Section: 4.2.3.2.4/5/8		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County has established procedures for tracking illicit discharges. The illicit tracking procedures will be edited to include minimum investigation requirements in section 4.2.3.2.5. In addition, the illicit tracking procedures will include requirements for responding to public notices. (Section 4.2.3.2.8.a/b) and procedures/timeframes for notifying another MS4 of an illicit discharge.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Measurable Goal:			
• Updated IDDE procedures for SMS4 general permit requirements listed above.			
Measurable Goal Update:			
• Charleston County follows the Enforcement Response Plan (ERP), Appendix F, for illicit tracking and elimination.			

Conduct Illicit Tracking/Determine Source of Illicit Discharge	Not Started: ☐ In Progress : ☒ Completed: ☐ Section: 4.2.3.2.4/5		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will conduct illicit tracking at outfalls identified as potential illicit discharges by the field screening effort.	Confirmed illicit discharges will be tracked within a timeframe listed in section 4.2.3.2.4/5	As Needed	Charleston County Stormwater Manager
Measurable Goal:			
• Locate potential source(s) of illicit discharges identified during field screening.			
Measurable Goal Update:			
• Charleston County has inspected/tracked 1,341 potential illicit discharges since the permit effective date (including 92 in this permit cycle). This is an ongoing effort by the County.			

Eliminate Illicit Discharges	Not Started: ☐ In Progress : ☒ Completed: ☐ Section: 4.2.3.2.7		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Once the source of an illicit discharge has been determined, the County will follow procedures (a-e) of section 4.2.3.2.7 of the permit to eliminate the illicit discharge.	Confirmed illicit discharges will be eliminated within the timeframe listed in section 4.2.3.2.7.b	As Needed	Charleston County Stormwater Manager
Measurable Goal:			
• Documentation of eliminated illicit discharges.			
Measurable Goal Update:			
• Charleston County documents potential illicit discharges electronically. The County follows the procedures in Section 4.2.3.2.7 of the permit to eliminate these discharges. This is an ongoing effort by the County.			

Document Illicit Discharge Investigations	Not Started: ☐ In Progress : ☒ Completed: ☐ Section: 4.2.3.2.5/6		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Illicit tracking documentation requirements will be added to Charleston County's Standard Operating Procedures for Use in Field Investigations for Illicit Discharges document. Charleston County will document illicit discharge tracking and elimination activities to include the following information: • Date(s) the illicit discharge was observed; • Results of the illicit investigation; • Results of any follow-up investigations; • Date the investigation was closed; • Source of illicit discharge; • Documentation for unresolved illicit tracking investigations in which no source is located. (as required by section 4.2.3.2.6.a of the permit); and, • Documentation for intermittent illicit discharges (as required by section 4.2.3.2.6.b of the permit)	Documentation will begin as soon as practical but no later than 1 business day	As Needed	Charleston County Stormwater Manager

Measurable Goal:

- Document illicit tracking and elimination activities.

Measurable Goal Update:

- Charleston County documents illicit tracking and elimination activities electronically. This is an ongoing effort by the County.

Field Screening Assessment	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.3.2.3b		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Assess the effectiveness of the Field Screening program by the end of permit year 3.	Deadline: December 31, 2016	Once During Permit Term	Charleston County Stormwater Manager

Measurable Goal:

- A summary assessing the effectiveness of the Field Screening program.

Develop a Public Reporting Hotline	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.3.2.8		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will develop a Public Reporting Hotline to report illicit discharges.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager

Measurable Goal:

- A hotline for citizens to report potential illicit discharges.

Measurable Goal Update:

- Charleston County utilizes the main Stormwater Management Program phone number and email address, 843-202-7639 and stormwater@charlestoncounty.org, for public reporting of potential illicit discharges.

Employee Training	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.3.9		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will implement a training program for all appropriate municipal field staff.	Start-up deadline: January 1, 2015	Annually	Charleston County Stormwater Manager

Measurable Goal:

- Provide IDDE training to appropriate field staff. This BMP will be implemented through training for Pollution Prevention in Section 4.2.6.5.

Measurable Goal Update:

- Charleston County provides Pollution Prevention staff training multiple times per year, which includes IDDE training for appropriate field staff. This is an ongoing effort by the County.

4.2.4 Construction Site Stormwater Runoff Control (Minimum Measure #4)

4.2.4.1 Permit Requirements

Charleston County will revise the construction program by developing and implementing BMPs in order to meet the SMS4 general permit requirements. The County will update appropriate SWP3 requirements and revise the corresponding SWP3 plan review procedures. Site inspection procedures will be updated to conform to the SMS4 general permit requirements, and an enforcement response plan will be developed to determine how the County will use specific type of responses to address various types of violations. In addition, the County will develop educational packets for construction operators to educate them about areas in which improvements are needed.

Table 12: Minimum Measure #4 Permit Requirements

4.2.4.4.1 Regulatory Requirement For Erosion And Sediment Controls:
Ordinance section requiring erosion and sediment controls can be found in Charleston County Stormwater Management Ordinance Section 3.1 – Regulations -subsection (7). Ordinance section for sanctions to ensure compliance can be found in Charleston County Stormwater Management Ordinance Section 6.1 Enforcement. The Charleston County Stormwater Management Ordinance can be found in Appendix D.
4.2.4.4.2 Requirements For Erosion And Sediment Controls And Soil Stabilization Practices:
Charleston County provides requirements for construction site operators to implement appropriate BMPs such as Erosion and Sediment Controls and Soil Stabilization practices in Section 3.6 - Erosion Prevention and Sediment Control Standards of the Permitting Standards and Procedures Manual.
4.2.4.4.3 Requirements For Pollution Prevention Measures:
Charleston County directs construction operators to use the Charleston County Manual and/or SCDHEC/CGP Plan Review Checklist. This Plan Review Checklist includes pollution prevention requirements for SWP3 submittals. The internal Plan Review Checklist included in Appendix E of the Design Manual will be edited as needed to improve plan review of BMP utilization as pollution prevention measures.
4.2.4.4.4 Requirements For Stormwater Pollution Prevention Plans (SWP3):
Section 3.1 subsection (5) of Charleston County's Stormwater Management Ordinance requires a SWP3 for all new and re-development projects requiring SCDHEC NPDES permitting.
4.2.4.4.5 Review Of SWP3:
Charleston County's existing plan review procedures meet the SMS4 general permit requirements for items (a-e.) Charleston County will develop procedures for SWP3 review for discharges to impaired waters. a. Section 2.2.2 of the Permitting Standards and Procedures Manual makes a clear statement that construction cannot commence until the Site Construction Permit is issued. b. Charleston County ensures SWP3 submittals meet the requirements of NPDES General Permit for Stormwater Discharges from Construction Activities, SCR100000 by directing construction operators

to the SCDHEC/CGP Plan Review Checklist.

c. Charleston County directs construction operators to use the Charleston County Manual and/or the SCDHEC/CGP Plan Review Checklist. The SCDHEC/CGP Plan Review Checklist includes a project narrative section.

d. Charleston County will use qualified individuals, knowledgeable in the technical review of SWP3 to conduct reviews.

e. Charleston County documents the review of each SWP3 plan using an internal plan review checklist.

f. Charleston County will develop procedures for SWP3 review, including the review of pre-construction site plans, for construction activity that discharge pollutant(s) of concern to TMDL waters and to waters on the 303(d) List of Impaired Waters, the SWP3 must identify potential water quality impacts the permitted discharges may have. The SWP3 will limit sediment discharges to the MEP, will protect water quality. Procedures for SWP3 review will:

i. Incorporate consideration of potential water quality impacts,

ii. Include the review of construction site plans,

iii. For construction projects that disturb less than 25 acres, carefully evaluate all selected BMPs and their ability to control the pollutant(s) of concern.

iv. For construction projects that disturb 25 acres or more, require a written quantitative and qualitative assessment showing that the selected BMP will control the discharge of the pollutant, or pollutants, of concern from construction and post construction within a TMDL watershed, or to a water on the 303(d) List of Impaired Waters, and,

v. Require that SWP3 prepared by construction activity applicants for SMS4 review and approval must demonstrate that stormwater discharges will neither cause nor contribute to a violation of water quality standards.

4.2.4.6 Site Inspections:

a. Charleston County maintains an inventory of all active construction projects. The inventory is continuously updated as new projects are permitted and projects are completed. The inventory will be edited to contain relevant contact information for each project (e.g., name, address, phone, etc.), the size of the project and area of disturbance. Charleston County will make the inventory available to SC DHEC upon request. As part of this inventory,

i. Charleston County tracks the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required, and,

ii. Documents inspections and enforcement activities for each site in the inventory.

b. Charleston County has implemented procedures for inspecting construction projects in accordance with the frequency listed in the SMS4 general permit.

c. Charleston County adequately inspects all phases of construction. At a minimum, inspections occur following installation of initial BMPs, during active construction, and after final site stabilization.

d. Charleston County has trained and qualified inspectors. Charleston County will also continue to follow, and revise as necessary, written procedures outlining the inspection and enforcement procedures.

Inspections of construction sites will, at a minimum:

i. Check for coverage under SCR100000 by requesting a copy of any application or Notice of Intent (NOI), the stamped approved stormwater pollution prevention plan or other relevant application form during initial inspections.

ii. Review the applicable stormwater pollution prevention plan and conduct a thorough site inspection to determine if control measures have been selected, installed, implemented, and maintained according to the plan.

iii. Assess compliance with Charleston County's ordinances and permits related to stormwater runoff, including the implementation and maintenance of designated minimum control measures.

iv. Assess the effectiveness of control measures.

v. Visually observe and record non-stormwater discharges, potential illicit connections, and potential discharge of pollutants in stormwater runoff.

vi. *Provide a written or electronic inspection report generated from findings in the field.*

4.2.4.7 Enforcement Response Plan (ERP):

Charleston County developed an Enforcement Response Plan (ERP). The ERP contains descriptions of how Charleston County will use specific types of responses to address various types of violations. The ERP includes, but is not limited to:

a. Types of response:
i. Verbal warnings;
ii. Written notices; and,
iii. Escalated enforcement measures such as citations, fines, stop work orders, etc.

b. Specific strategies for escalating enforcement response, where necessary, to address persistent, repeat or escalating violations.

c. *Ensure ERP is reasonably effective in reducing pollutant discharges to the MEP and to protect water quality.*

4.2.4.8 MS4 Staff Training:

Charleston County ensures that all staff, whose primary job duties are related to implementing the construction stormwater program, including permitting, plan review, construction site inspections, and enforcement, is trained to conduct these activities.

4.2.4.9 Construction Site Operator And Public Involvement:

4.2.4.9.a Construction Operator Education:

Charleston County provides the "Field Manual on Sediment and Errosion Control, Best Management Practices for Contractors and Inspectors" by Jerald S. Fifield, Ph.D., CPESC to construction operators to educate contractors on erosion prevention and sediment control issues that need improvements. The informational packets are distributed during the pre-construction conference.

4.2.4.9.b Public Involvement:

Charleston County will consider public responses for program modifications.

4.2.4.2 BMP Implementation

In order to meet the requirements of Minimum Measure #4, Charleston County has listed BMPs that focus on the reduction of pollutants in stormwater runoff to the SMS4 from construction activities that result from a land disturbance greater than or equal to one acre. Charleston County will continue existing BMPs that provide assistance and ensure compliance through routine inspections. Evaluation of the success of this minimum measure will be through careful analysis of the Measurable goals for each BMP included in this minimum measure. Measurable goals for each BMP were selected by formulating attainable goals for the various BMP implementation steps or tasks. In order to meet the requirements of Minimum Measure #4, Charleston County will:

- Update Internal Checklist for Pollution Prevention BMP Requirements
- Develop SWP3 Review Procedures for Discharges to Impaired Waters
- Develop and Maintain a Construction Site and Site Inspection Inventory
- Modify Site Inspection Procedures
- Develop Section of ERP for Construction Activities
- Construction Operator Training/Education

The following sections describe the components of Charleston County's construction site stormwater runoff control program:

Table 13: Best Management Practices - Minimum Measure #4

CONSTRUCTION RUNOFF BMPs			
Update Internal Checklist to Include Pollution Prevention Requirements	**Not Started: ☐ In Progress : ☐ Completed: ☒**		
	Section: 4.2.4.4.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Update the internal Plan Review Checklist to include pollution prevention measures.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Measurable Goal:			
• Add Pollution Prevention requirements to the internal Plan Review Checklist.			
Measurable Goal Update:			
• Charleston County updated their internal Plan Review Checklist to ensure that appropriate BMPs are implemented on any site greater than half an acre.			
Develop SWP3 Review Procedures for Discharges to Impaired Waters	**Not Started: ☐ In Progress : ☐ Completed: ☒**		
	Section: 4.2.4.4.5.f		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will develop procedures outlined in section 4.2.4.5.f for SWP3 review for construction activity that discharge pollutant(s) of concern to TMDL waters and to waters on the 303(d) List of Impaired Waters.	Deadline: December 31, 2015	Once During Permit Term	Charleston County Stormwater Manager
Measurable Goal:			
• Develop plan review procedures for construction discharges to impaired waters.			
Measurable Goal Update:			

- Charleston County plan review procedures ensure that all construction sites take measures to prevent the discharge of pollutants of concern.

Modify and Maintain Construction Site and Site Inspection Inventory	**Not Started:** ☐ **In Progress :** ☒ **Completed:** ☐ **Section: 4.2.4.6**		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will maintain an inventory of all active construction projects. The inventory will be edited to include information for: ➢ Relevant contact information; ➢ The size of the project; ➢ Area of disturbance; ➢ Number of inspections by Charleston County for each construction site; and, ➢ Inspection results and enforcement actions	Deadline: December 31, 2014	Inventory will be updated as needed	Charleston County Stormwater Manager

Measurable Goal:

- Develop and maintain a database that provides general site information and ensures appropriate site inspections are conducted.

Measurable Goal Update:

- Charleston County utilizes ENERGov, a tool to electronically track construction sites, inspections, and other parameters. This tool allows Charleston County to maintain an inventory of all active construction sites.

Modify Site Inspection Procedures	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒ **Section: 4.2.4.6**		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will modify site inspection procedures to be in compliance with SMS4 general permit section 4.2.4.6(b-d).	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager

Measurable Goal:

- Develop/Edit site inspection procedures that include the items listed in section 4.2.4.6(b-d).

Measurable Goal Update:

- Charleston County site inspection procedures have been reviewed and are in compliance with permit section 4.2.4.6(b-d).

ERP for Construction Activities	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒ **Section: 4.2.4.7**		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop Enforcement Response Plan (ERP) for permit violations, SWP3 violations, and EPSC BMP installation, operation, and maintenance violations.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager

Measurable Goal:

- Develop an ERP for construction activities. (Sub-task of SWMP section 4.1.5)

Measurable Goal Update:

• Charleston County developed an ERP in December 2014, see Appendix F. This ERP meets permit requirements for construction activities.			
Construction Operator Training/Education	**Not Started:☐ In Progress :☒ Completed:☐**		
	Section: 4.2.4.9		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Charleston County will develop informational packets targeted to reach construction operators.	Throughout Permit Term Beginning in Year 2	Annually	Charleston County Stormwater Manager
Measurable Goal:			
• Develop and distribute information packets for construction operators.			
Measurable Goal Update:			
• Charleston County provides the "Field Manual on Sediment and Erosion Control, Best Management Practices for Contractors and Inspectors" by Jerald S. Fifield, Ph.D., CPESC to contractors as necessary.			

4.2.5 Post-Construction Stormwater Management for New Development and Redevelopment (Minimum Measure #5)

4.2.5.1 Permit Requirements

The post construction stormwater management program is designed to give Charleston County the authority to require structural and non-structural stormwater quality BMPs on sites being developed. Charleston County currently provides design requirements to control stormwater discharges from new development and redeveloped sites and has established performance standards for addressing the first inch of runoff. Charleston County will improve the post construction program by developing additional site performance standards and ensuring post construction BMPs are inspected and maintained appropriately.

Table 14: Minimum Measure #5 Permit Requirements

4.2.5.1.	Post-Construction Stormwater Management Program:
	Charleston County has an established program to control stormwater discharges from new development and redeveloped sites that disturb at least one acre. Section 3.5.3 or the Permitting Standards and Procedures Manual states: All sites which disturb one (1) acre or greater shall include best management practices (BMPs) to address water quality, along with an Operation and Maintenance Agreement that guarantees maintenance of all BMPs in perpetuity.
4.2.5.2	Site Performance Standards:
	Charleston County has established post construction site performance standards to address the first inch of runoff. Site performance standards for addressing the first inch of runoff are located in the Permitting Standards and Procedures Manual in Section 3.4. Charleston County will develop additional site performance standards during the permit term. The appropriate documents will be updated to include any newly established performance standards.
4.2.5.3	Site Plan Review:

	Site performance standards for requirements to address the first inch of runoff are included in the County's Permitting Standards and Procedures Manual. Plan review for site performance standards developed during the permit term will be added to the Permitting Standards and Procedures Manual.
4.2.5.4	Long-Term Maintenance of Post-Construction Stormwater Control Measures:
	All structural stormwater control measures installed and implemented to meet the site performance standards will be maintained in perpetuity. Charleston County will ensure the long-term maintenance of structural stormwater control measures installed by requiring owners to sign an Operation and Maintenance Agreement as specified in Section 3.2.6 and Appendix C or the Permitting Standards and Procedures Manual.
4.2.5.5	Inventory Of Post-Construction Stormwater Control Measures:
	Charleston County maintains an inventory of all post-construction structural stormwater control measures installed and implemented at new development and redeveloped sites, including both public and private sector sites located within the permit area. At a minimum, the inventory contains all BMP constructed since the effective date starting with the effective date of this permit.
4.2.5.6	Inspections And Enforcement:
	4.2.5.6.1 Inspection Procedures:
	To ensure that all stormwater control measures are operating correctly and are being maintained as required consistent with its applicable maintenance agreement, Charleston County will conduct inspections of each project site covered under the performance standards, at least one time during the permit term. A description of inspection procedures are within Chapter 4 of the Permitting Standards and Procedures Manual.
	4.2.5.6.2 Post-Construction Notification:
	Within 30 days of completion of construction of any project required to meet the performance standards, Charleston County conducts a post construction inspection to verify that BMPs have been installed as per approved plans.
	4.2.5.6.3 Inspection Reports:
	Charleston County will document its inspection findings in an inspection report. Charleston County will document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.

4.2.5.2 BMP Implementation

Evaluation of the success of this minimum measure will be through careful analysis of the Measurable goals for each BMP included in this minimum measure. Measurable goals for each BMP were selected by formulating attainable goals for the various BMP implementation steps or tasks. In order to meet the requirements of Minimum Measure #5, Charleston County will:

- Modify Site Performance Standards
- Maintain Post Construction BMP Inventory/Database
- Develop Post Construction BMP Inspection Program

The following sections describe the components of Charleston County's Post-Construction stormwater management program:

Table 15: Best Management Practices – Minimum Measure #5

POST CONSTRUCTION RUNOFF BMPs			
Modify Site Performance Standards	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.5.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop additional site performance standards in addition to the existing "first inch" standards.	Deadline: June 30, 2016	Once During Permit Term	Charleston County Stormwater Manager
Measurable Goal:			
• Update post-construction site performance standards.			
Measurable Goal Update:			
• Charleston County is currently updating their Permitting Standards and Procedures Manual to impose additional site performance standards.			
Maintain Post Construction BMP Inventory/Database	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.5.5		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Maintain a database for County permitted post construction BMPs. At a minimum, inventory all post construction BMPs constructed since the effective date of permit SCR030000 (January 1, 2014).	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Update County permitted post-construction BMPs.	Throughout Permit Term Beginning in Year 2	Annually	Charleston County Stormwater Manager
Measurable Goal:			
• Provide an inventory of post construction BMPs. Inventory/Database will be updated as needed to include new post construction BMPs.			
Measurable Goal Update:			
• Charleston County has a database of all County permitted post construction BMPs permitted since the permit effective date. This database is kept up to date as new BMPs are permitted. This is an ongoing effort by the County.			
Post Construction BMP Inspections Program	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.5.6		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop procedures and forms for post construction BMP installation inspections.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Conduct post construction BMP inspections on County permitted post-construction BMPs within 30 days of construction completion to ensure BMP is installed per approved plans.	Throughout Permit Term Beginning in Year 2	As Needed	Charleston County Stormwater Manager
Develop procedures and forms for post construction BMP maintenance inspections.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Conduct post construction BMP inspections on County permitted post-construction BMPS to ensure BMPs are maintained properly.	Throughout Permit Term Beginning in Year 2	Once During Permit Term	Charleston County Stormwater Manager
Document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.	Throughout Permit Term Beginning in Year 2	Annually	Charleston County Stormwater Manager

Measurable Goal:
• Develop procedures and forms for Post Construction BMP installation inspections and include procedures in this document.
• Inspect all County permitted post construction BMPs within 30 days of construction completion.
• Develop procedures and forms for Post Construction BMP maintenance inspections and include procedures in this document.
• Inspect appropriate construction sites to ensure County permitted Post Construction BMPs are maintained and operating correctly.
• Provide documentation of Post Construction BMP inspections.
Measurable Goal Update:
• Charleston County has procedures and forms in place for post construction BMP installation and maintenance inspections that meet the permit requirements. These inspections, and any findings and enforcement actions, are documented. This is an ongoing effort for the County.
• Charleston County updated their Permitting Standards and Procedures Manual in September of 2018.

4.2.6 Pollution Prevention / Good Housekeeping (Minimum Measure #6)

4.2.6.1 Permit Requirements

In order to meet the requirements of Minimum Measure #6, Charleston County will implement a range of BMPs targeted to reduce pollutants from County-Owned facilities and storm sewer systems. A Countywide inventory of major municipal facilities will be developed, and each facility will be assessed for the potential pollutant discharges. Based on the assessment, a list of high priority facilities will be developed, and annual inspections will be conducted at the high priority facilities. Charleston County will prioritize their owned and /or operated stormwater management systems and implement a maintenance schedule. All County-Owned structural control (stormwater BMPs) will be inspected and maintained. In addition, the County will develop a set of pollution prevention measures for operation and maintenance activities. Charleston County will provide training to appropriate employees to ensure pollution prevention and good housekeeping activities are practiced throughout the County's separate departments.

Table 16: Minimum Measure #6 Permit Requirement

4.2.6.1	Development Of A Municipal Facility And Stormwater Control Inventory:
	Charleston County maintains an inventory of significant County-owned and stormwater controls that are not covered under a separate general or individual NPDES permit (i.e. industrial, solid waste, etc.). *Charleston County also maintains a list of industrial facilities owned or operated by the County that are subject to SCDHEC NPDES General Permit for Stormwater Discharges associated with Industrial Activity (SCR000000) or individual NPDES permits for discharges of stormwater associated with industrial activity that ultimately discharge to the County's SMS4. The SCDHEC permit number or a copy of the Industrial NOI form for each facility will be included.*
4.2.6.2	Municipally-Owned Or Operated Facility Assessment:

	4.2.6.2.1 Comprehensive Assessment Of Pollutant Discharge Potential:
	Charleston County has developed a comprehensive assessment of all County-owned or operated facilities identified in Part 4.2.6.1. This assessment will be included it in the permit reapplication for their potential to discharge pollutants in stormwater.
	4.2.6.2.2 Identification Of High Priority Facilities:
	Charleston County has identified "high-priority" facilities that have a high potential to generate stormwater pollutants.
	4.2.6.2.3 Documentation Of Comprehensive Assessment Results:
	Charleston County documents the results of assessments and maintains copies of all site evaluation checklists used to conduct the comprehensive assessment. The documentation includes the results of Charleston County's initial assessment, any identified deficiencies and corrective actions taken.
4.2.6.3	Annual Comprehensive Inspections Of High Priority Facilities:
	Starting no later than 24 months from the effective date of coverage and at least once per year thereafter, a comprehensive inspection of "high priority" facilities (Part 4.2.6.2.2), including all stormwater controls, must be performed by Charleston County. Specific attention will be given to waste storage areas, dumpsters, vehicle and equipment maintenance/fueling areas, material handling areas, and similar potential pollutant-generating areas. The yearly inspection results will be documented and records will be maintained by Charleston County. The inspection report will also include any identified deficiencies and the corrective actions taken to fix the deficiencies.
4.2.6.4	Storm Sewer System Maintenance Activities – MS4 Maintenance:
	4.2.6.4.1 Assessment/Prioritization Of MS4 Stormwater Management Systems/Structures:
	Charleston County will prioritize their owned and /or operated stormwater management systems / structures and implement a maintenance schedule.
	4.2.6.4.2 Municipal Activities And Operation::
	Charleston County will develop a set of pollution prevention measures that, when applied during municipal O&M activities, will reduce the discharge of pollutants in stormwater. Municipal operation and maintenance activities to be considered include but are not limited to; pavement and rights-of-way maintenance, bridge maintenance, cold weather operations, and municipally sponsored events.
	4.2.6.4.3 Maintenance Of Municipally-Owned And/Or Maintained Structural Stormwater Controls:
	Charleston County will inspect, and maintain, wherever and whenever necessary, all County-owned or maintained structural stormwater controls. Charleston County will also maintain all municipally owned green infrastructure practices through regularly scheduled maintenance activities.
4.2.6.5	Employee Training And Education Requirements:

	Charleston County will develop an annual employee training program for appropriate employees involved in implementing pollution prevention and good housekeeping practices. *This annual training will include a general stormwater education component, any new technologies, operations, or responsibilities that arise during the year, and the SMS4 general permit requirements that apply to the staff being trained.* *A description of how the program will be maintained for review by the permitting authority.* *Charleston County will also identify and track all personnel requiring training and records must be maintained.* *Training will begin within the first year from the effective date of permit authorization.*
4.2.6.6	Requirements For Contractor Oversight:
	Contractors hired by Charleston County to perform municipal maintenance activities will be contractually required to comply with all of Charleston County's stormwater control measures, good housekeeping practices, and facility-specific stormwater management procedures. *Charleston County will provide oversight of contractor activities to ensure that contractors are using appropriate control measures and procedures.*

4.2.6.2 BMP Implementation

Evaluation of the success of this minimum measure will be through careful analysis of the measurable goals for each BMP included in this minimum measure. In order to meet the requirements of Minimum Measure #6, Charleston County will:

- Develop a Municipal Facility Inventory
- Conduct Assessment of Non-Permitted Municipal Facility & Identify High Priority Facilities
- Conduct High Priority Facility Inspections
- Prioritize SMS4 Stormwater Management Systems/Structures
- Develop and Implement Pollution Prevention Measures for Operation and Maintenance Activities
- Inspect and Maintain County-Owned Structural Controls (Stormwater BMPs)
- Conduct Pollution Prevention and Good House Keeping Employee Training

The following sections describe the components of Charleston County's pollution prevention/good housekeeping for municipal operations program:

Table 17: Best Management Practices – Minimum Measure #6

POLLUTION PREVENTION / GOOD HOUSEKEEPING BMPS			
Municipal Facility Inventory	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.6.1		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop an inventory of all County-owned facilities and stormwater controls that are not covered under a separate NPDES permit. In addition, include a list of all municipally owned facilities that are covered under a separate NPDES permit.	Deadline: December 31, 2014	Once during the permit term	Charleston County Stormwater Manager
Measurable Goal:			
• An inventory of non-permitted municipal facilities.			
• A list of all municipally owned facilities that are covered under a separate NPDES permit.			
Measurable Goal Update:			
• Charleston County maintains a list of all County-owned facilities that are not covered under a separate NPDES permit.			
• Charleston County also maintains a list of County-owned facilities with their own NPDES permit.			
Assessment of Non-Permitted Municipal Facilities	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.6.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Conduct a GIS analysis and County review to determine potential high priority facilities.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Create a site evaluation checklist that will be used to conduct the comprehensive assessment of potential high priority facilities.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Conduct facility site inspections with evaluation checklist at each facility identified as a potential high priority facility.	Deadline: December 31, 2015	Once During Permit Term	Charleston County Stormwater Manager
Document results of facility evaluations.	Deadline: December 31, 2015	Once During Permit Term	Charleston County Stormwater Manager
Based on the results of site inspections, identify high priority facilities.	Deadline: December 31, 2015	Once During Permit Term	Charleston County Stormwater Manager
Measurable Goal:			
• A site evaluation checklist for facility assessment.			
• Conduct inspections at municipal facilities and complete site evaluation checklist.			
• Documentation of site evaluation checklists.			
• A list of high priority facilities.			
Measurable Goal Update:			
• Charleston County has completed an analysis to identify potential high priority facilities.			
• Charleston County has conducted inspections at these potential facilities, identified the high priority facilities, and documented the results.			

Conduct High Priority Facility Inspections	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.6.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Create inspection report template with sections for identified deficiencies and corrective action taken for each site inspection.	Deadline: December 31, 2015	Once During Permit Term	Charleston County Stormwater Manager
Conduct facility site inspections including evaluations of potential "pollutant generating" areas.	Throughout Permit Term Beginning in Year 3 (January 1, 2016)	Annual	Charleston County Stormwater Manager
Document inspection reports.	Deadline: January 1, 2017	Annual	Charleston County Stormwater Manager
Measurable Goal:			
• A high priority facility inspection report form.			
• Conduct inspections and determine potential "pollutant generating" areas at high priority facilities.			
• Documentation of facility inspection report forms.			
Measurable Goal Update:			
• Charleston County has developed a high priority facility inspection report form.			
• Charleston County began annual facility site inspections at high priority facilities in Permit Year 3.			

Prioritize MS4 Stormwater Management Systems/Structures.	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.6.4.1		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Prioritize stormwater management systems / structures.	Deadline: June 1, 2016	Once During Permit Term	Charleston County Stormwater Manager
Implement a maintenance schedule for stormwater management systems/structures.	Deadline: December 31, 2016	Once During Permit Term	Charleston County Stormwater Manager
Measurable Goal:			
• A schedule to maintain the stormwater management system.			
Measurable Goal Update:			
• The stormwater system and structures are maintained on a regular basis.			

Develop and Implement Pollution Prevention Measures for Operation and Maintenance Activities	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.6.4.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop a written set of pollution prevention measures for municipal operation and maintenance activities.	Deadline: December 31, 2015	Once During Permit Term	Charleston County Stormwater Manager
Implement pollution prevention measures for municipal operation and maintenance activities.	Deadline: January 1, 2016	Throughout permit term	Charleston County Stormwater Manager
Measurable Goal:			
• Regular inspections for operation and maintenance activities for Charleston County owned properties.			
Measurable Goal Update:			
• Charleston County regularly inspects Count owned properties.			

Inspect and Maintain County-Owned Structural Controls (Stormwater BMPs)	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.6.4.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Create a structural control inspection and maintenance form.	Deadline: December 31, 2014	Once During Permit Term	Charleston County Stormwater Manager
Conduct inspections for County-Owned structural controls.	Throughout Permit Term Beginning in Year 2	Annually	Charleston County Stormwater Manager
Perform necessary maintenance for County-Owned structural controls.	Throughout Permit Term As Needed	Annually	Charleston County Stormwater Manager
Measurable Goal:			
• A structural control inspection and maintenance form.			
• Conduct inspections for County-Owned structural controls.			
• Conduct maintenance for County-Owned structural controls.			
• Documentation of completed inspection and maintenance forms.			
Measurable Goal Update:			
• Charleston County has developed a structural control inspection and maintenance form.			
• Charleston County inspects and performs maintenance as necessary for County-owned structural controls. This is an ongoing effort by the County.			

Conduct Pollution Prevention and Good House Keeping Employee Training	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.6.5		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Develop an annual employee training program for appropriate employees involved in implementing pollution prevention and good housekeeping practices. Include training for IDDE.	Deadline: December 31, 2016	Once During Permit Term	Charleston County Stormwater Manager
Create a list of employees that have been identified for pollution prevention training.	Deadline: December 31, 2014	Annually	Charleston County Stormwater Manager
Conduct pollution prevention and good housekeeping training.	Start-up deadline: January 1, 2015	Annually	Charleston County Stormwater Manager
Measurable Goal:			
• A pollution prevention employee training plan/program.			
• A list of employees participating in the training program.			
Measurable Goal Update:			
• Charleston County conducts training at least annually with field crews that includes pollution prevention and good housekeeping elements.			

4.5 Reviewing and Updating Stormwater Management Plans

Table 18: Reviewing and Updating SWMP

SWMP REQUIREMENTS			
Update Stormwater Management Plan	**Not Started: ☐ In Progress : ☒ Completed: ☐**		
	Section: 4.5.1 & 4.5.2		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Review and revise the SWMP document to keep it up to date during the term of the permit.	Deadline: December 31, 2020	Annually	Charleston County Stormwater Manager
Stormwater Management Plan Updates Required by SCDHEC	**Not Started: ☐ In Progress : ☒ Completed: ☐**		
	Section: 4.5.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
SCDHEC requested changes to the SWMP.	Deadline: December 31, 2020	As Required	Charleston County Stormwater Manager

This SWMP is a living document and will be updated and revised throughout the permit term. In accordance with Section 4.5.2 of the general SMS4 general permit, additions (but not subtracting or replacing components) to the SWMP will be made at any time with a written notification made to SCDHEC.

Any changes intended to replace an ineffective or unfeasible BMP with an alternate BMP will be requested and submitted in written form to SCDHEC at any time. Unless denied by SCDHEC, changes proposed in accordance with the criteria below will be deemed approved and may be implemented 60 days from submittal of the request. If request is denied, SCDHEC will send Charleston County a written response giving a reason for the decision. The modification requests must include the following:

- *An analysis of why the BMP is ineffective or infeasible (including cost prohibitive);*
- *Expectations on the effectiveness of the replacement BMP; and,*
- *An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.*

Additionally, SCDHEC may request Charleston County to make changes to the SWMP at any time to:

- *Address documented impacts on receiving water quality caused, or contributed to, by discharges from the SMS4;*
- *Include more stringent requirements necessary to comply with new Federal statutory or regulatory requirements; or,*
- *Include such other conditions deemed necessary by the Department to comply with the goals and requirements of the Clean Water Act.*

- *Changes requested by SCDHEC must be made in writing, set forth the time schedule for the County to develop the changes, and offer the County the opportunity to propose alternative plan changes to meet the objective of the requested modification. All changes required by SCDHEC will be made in accordance with South Carolina Water Pollution Control Permits Regulation 61-9 124.5, 122.62, or as appropriate 122.63.*

5.3 Reporting

Table 19: Reporting

REPORTING			
1st Report	**Not Started: ☐ In Progress : ☐ Completed: ☒**		
	Section: 5.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Complete and Submit 1st Report (covering years 1 and 2).	Deadline: April 1, 2016	Once	Charleston County Stormwater Manager
2nd Report	**Not Started: ☐ In Progress : ☐ Completed: ☒**		
	Section: 5.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Complete and Submit 2nd Report (covering years 3 and 4).	Deadline: July 4, 2018	Once	Charleston County Stormwater Manager
3rd Report	**Not Started: ☐ In Progress : ☐ Completed: ☒**		
	Section: 5.3		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Complete and Submit 3rd Report (covering years 5 and 6).	Deadline: April 1, 2020	Once	Charleston County Stormwater Manager
4th Report	**Not Started: ☐ In Progress : ☐ Completed: ☒**		
	Section: 5.3		
Milestone(s)	Schedule/Deadline	Frequency	Responsible Party
Complete and Submit Report (covering year 7).	Deadline: December 31, 2021	Once	Charleston County Stormwater Manager

Unless DHEC requires more frequent reports, reports will be submitted based on the following schedule:

1. *The first report covering years 1 and 2 must be submitted to the Department twenty-seven (27) Months after the effective date of the permit.*

2. *The following report, covering years 3 and 4 shall be submitted 180 days before the permit expiration date as part of the re-notification.*

3. *While, and if the expired permit is continued, reports are due every year on the anniversary date of the expired permit.*

All reports shall be sent to the address below unless the Department instructs permittees to submit via alternate mechanisms (i.e. electronic mechanisms):

SCDHEC Bureau of Water
Water Pollution Compliance & Enforcement
2600 Bull Street
Columbia, SC 29201-1708

All reports will include:

- *The status of the County's compliance with permit conditions, an assessment of the appropriateness of the identified BMP under Part 4, progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and the measurable goals for each of the minimum control measures;*

- *Results of information collected and analyzed, if any, during the reporting period, including monitoring data used to assess the success of the plan at reducing the discharge of pollutants to the MEP;*

- *A summary of the stormwater activities the County plans to undertake during the next reporting cycle (including an implementation schedule);*

- *Proposed changes to the County's SWMP, including changes to any BMP or any identified measurable goals that apply to the plan elements; and,*

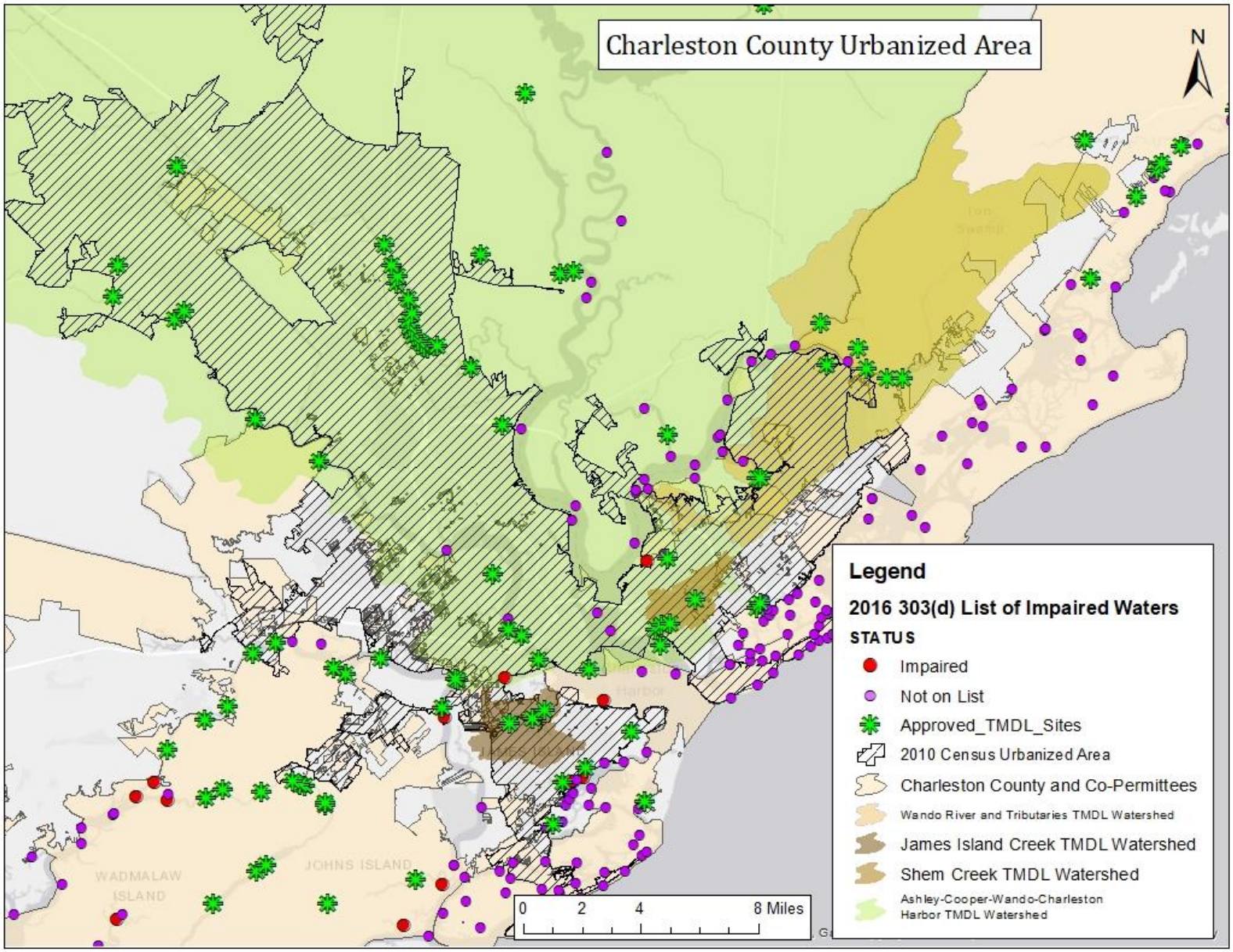
- *Notice that the County is relying on another entity to satisfy some of the County's permit obligations (if applicable).*

- *Information requested in the SMS4 general permit including, but not limited to: sections 1.4.7, 3.1.1.1, 3.2.1.1, 3.2.1.2.2, 3.3.6, 4.1.6 and in the additional conditions applicable to NPDES MS4 permits contained in Appendix B of the SMS4 general permit.*

SWMP Appendix A
Charleston County SWMP Updates

Date	Updates or Revisions
SWMP 2021 Updates	TMDL monitoring results for Shem Creek, James Island Creek, and Wando River.
	Inspection records for facilities, construction, post-construction, and IDDE
Date	**Planned Tasks for Upcoming Years**
2022	Establish quarterly dry weather screening program with internal staff
	Establish better relationships with facility staff for outreach and education
	Provide advanced training opportunities for SW inspectors
2023	Update design, inspection, and maintenance standards
	Update Enforcement Response Plan
2024	Investigate additional parameters and indicators for TMDL monitoring
	Engage engineers, contractors, and citizens for better site plan and BMP designs
	Pursue LID practice mandates to assist in water quality control

SWMP Appendix B
Charleston County
Urbanized Area


Charleston County Urbanized Area
N
Legend
2016 303(d) List of Impaired Waters
STATUS
Impaired
Not on List
Approved_TMDL_Sites
2010 Census Urbanized Area
Charleston County and Co-Permittees
Wando River and Tributaries TMDL Watershed
James Island Creek TMDL Watershed
Shem Creek TMDL Watershed
Ashley-Cooper-Wando-Charleston Harbor TMDL Watershed
0 2 4 8 Miles
JOHNS ISLAND
WADMALAW ISLAND

SWMP Appendix C

TMDL Monitoring Plan with Results and Assessment Plans

Wando River TMDL Implementation Plan

Charleston County

November 2020

1 Introduction

Charleston County (County) has implemented a water quality monitoring program designed to assess bacteria concentrations in the Wando River and ensure compliance with the Phase II National Pollutant Discharge and Elimination System (NPDES) General Permit for its Small Municipal Separate Storm Sewer System (MS4). In accordance with Section 3.3 of the General Permit, TMDL Implementation and Analysis, the report contained herein provides a description of the County's monitoring program, including relevant background information and an explanation of program methods, and a summary and assessment of the data collected through September 2020. This Wando River TMDL Implementation Plan also includes a prioritization, description, and schedule for implementing Best Management Practices (BMPs) to achieve progress towards addressing the Wando River Total Maximum Daily Load (TMDL) for fecal coliform bacteria.

1.1 Background

On January 1st, 2014, the Phase II National Pollutant Discharge and Elimination System (NPDES) General Permit for Small Municipal Separate Storm Sewer Systems (MS4s) was issued by the South Carolina Department of Health and Environmental Control (SCDHEC) (Permit No. SCR030000). Charleston County (County), as a Phase II regulated small MS4 community, is required to comply with this permit, which includes provisions to create and implement a TMDL Monitoring Plan and subsequent TMDL Implementation Plan to assess water quality from the MS4 area discharging to a TMDL watershed. The Wando River TMDL for fecal coliform became effective in November 2016, with Charleston County identified as a contributing MS4 community.

To maintain compliance with the General Permit, Charleston County was required to submit a TMDL Monitoring Plan to SCDHEC within 12 months of the TMDL effective date (November 2017) and begin monitoring activities within 18 months of the TMDL effective date (May 2018). The County developed and submitted a TMDL Monitoring Plan that identified two locations for in-stream monitoring efforts in the Wando River: the crossing of Guerins Bridge Road over the Wando River in Awendaw, SC and the Wando Marina adjacent to the SC-41 bridge. The drainage areas to these locations are representative of the County's MS4 area contributions to the Wando River watershed. The County initiated monitoring activities in May 2018, collected the first seasonal wet weather grab sample in June 2018 and has since performed a combination of seasonal and monthly grab sampling to measure fecal coliform concentrations at both locations during wet and dry weather conditions. Based upon data collection at these locations outlined in the monitoring plan, the General Permit requires a TMDL Implementation Plan for the Wando River TMDL to be submitted by November 2020, 48 months after the effective date of the TMDL.

The location of the County's two grab sampling sites in relation to the Wando River TMDL watershed area is shown in Figure 1, along with Charleston County's MS4 area. Figure 1 also shows the location of the Town of Mount Pleasant's continuous monitoring station and grab sampling site on Rathall Creek. The Town has shared data collected and grab sample results from this site with the County to supplement the County's monitoring efforts, included in this Implementation Plan.

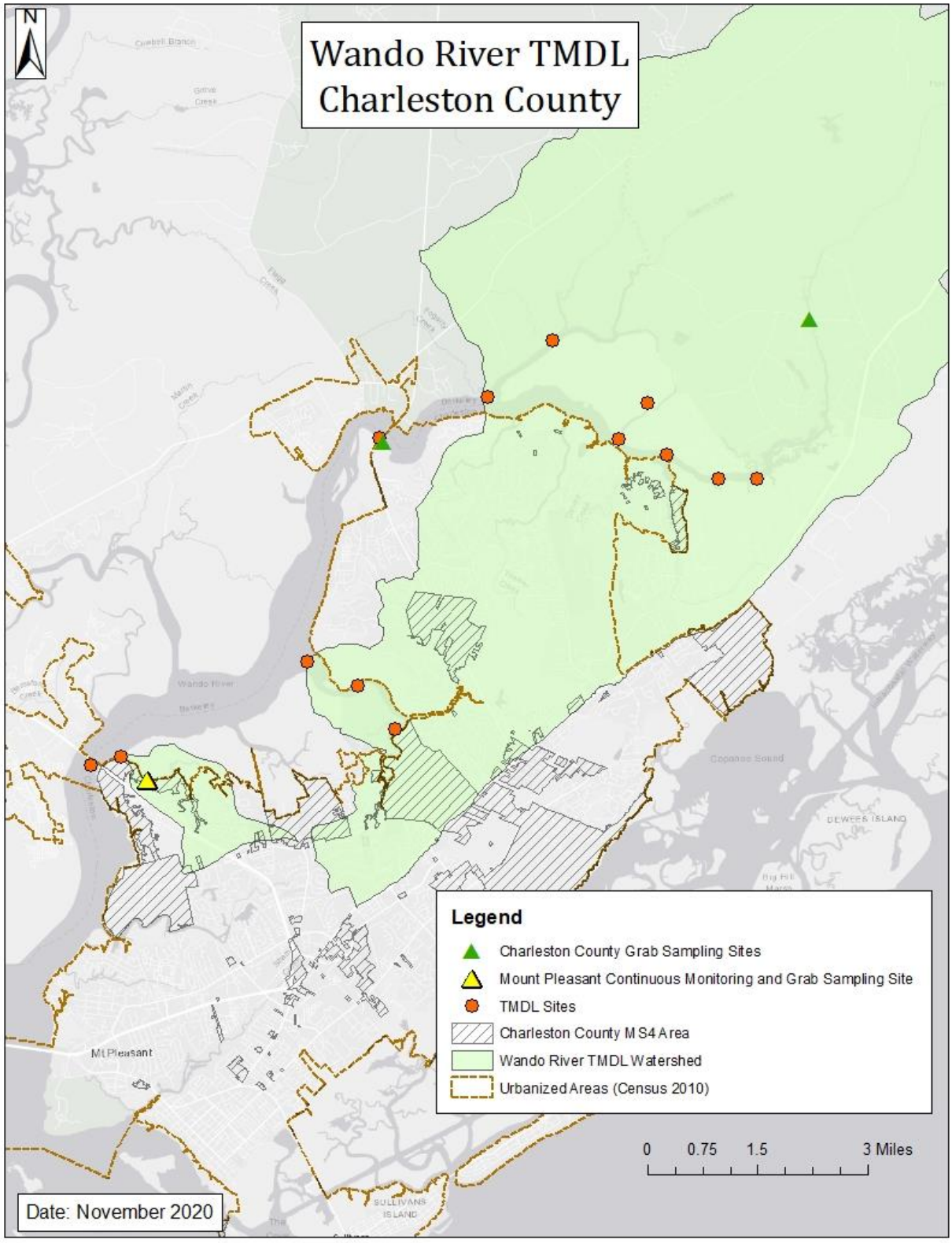


Figure 1: Map of the Wando River TMDL Watershed and Grab Sampling Sites

2 Assessment of the Monitoring Data

This section addresses the General Permit requirement stated in section 3.3.3.1, "*Assessment of the monitoring data. Where long-term data is available, this assessment should include an analysis of the data to show trends.*"

2.1 Sources of Data

The following data sources were considered to assess water quality in the Wando River with respect to fecal coliform bacteria. Each data source is discussed in detail in its corresponding Attachment.

- Charleston County Wando River Monitoring Memo (Attachment 1)
- Town of Mount Pleasant Rathall Creek (Wando River Tributary) Monitoring Data (Attachment 2)

2.1.1 Charleston County Wando River Monitoring

The County has conducted strategic grab sampling in the Wando River starting in May 2018 and has performed periodic data assessment and reporting through internal memos. These memos detail the methods of data collection, assessment of data, and observations made from the data. The most recent memo, which includes grab sample data and analysis for samples collected through September of 2020, is included as Attachment 1 to this Implementation Plan.

2.1.2 Town of Mount Pleasant Rathall Creek Monitoring

The County reached an agreement with the Town of Mount Pleasant that the two communities will share grab sampling data related to the Wando River TMDL. The Town of Mount Pleasant collected grab samples during wet and dry weather conditions at a monitoring location on Rathall Creek. This data is included as Attachment 2.

2.2 Data Assessment Summary

The data collection efforts indicate that stormwater tends to be correlated with short-term increases in fecal coliform concentrations, more so in the upper reaches of receiving waterbodies. This is demonstrated by grab sample results at the Charleston County Guerins Bridge and Town of Mount Pleasant Rathall Creek sampling locations. However, this effect on water quality is short lived due to mortality of fecal coliform bacteria in saltwater environments and assimilation/dilution in the Wando River. The Wando River appears to exhibit overall healthy behavior in terms of fecal coliform concentrations downstream of the County's MS4 area, as indicated by in-river grab sampling at the Charleston County Wando Marina sampling location. A more detailed assessment of the monitoring efforts is included in Attachment 1 and Attachment 2.

3 Prioritization of Areas and Rationale

This section addresses the General Permit requirement stated in section 3.3.3.2, "*Prioritization of areas targeted for BMP Implementation and underlying rationale.*"

Bacteria is naturally occurring and prevalent in any watershed, with natural/background sources as well as human-influenced sources. The County intends to target human-influenced sources relating to dog, bird, and human waste to reduce the human-influenced bacteria load in the Wando River. Because the bacteria sources are associated with stormwater runoff and overland flow, the County intends to implement BMPs across the entire County MS4 area within the Wando River watershed, with a focus on different sources of bacteria. Natural areas and background sources of pollution from wildlife will not be targets of County BMP implementation.

3.1 Dog-Related Bacteria Sources

To address potential fecal coliform bacteria associated with dog waste, the priority areas are residential areas, parks, and other public lands that are within the County's MS4 area and within the Wando River watershed. These areas may be frequented by dog owners and have the potential to be influenced by County efforts. Impacting dog owner waste collection habits through education and availability of bags and stations for waste pick-up in these areas has the potential to reduce fecal coliform bacteria loads associated with dog waste.

3.2 Human-Related Bacteria Sources

To address potential fecal coliform bacteria associated with human waste, the priority areas are septic systems and boating waste management practices that exist or take place within the County's MS4 area and within the Wando River watershed. These potential sources of pollution may be influenced by County efforts to reduce fecal coliform bacteria loads associated with human waste.

The County has limited influence over privately owned sewer systems. However, the County intends to support overall sanitary sewer system condition by promoting educational efforts targeted at preventing citizens from disposing of fats, oils, and greases in sanitary sewer systems.

3.3 Bird-Related Bacteria Sources

To address potential fecal coliform bacteria associated with bird waste, the priority areas are man-made permanent stormwater ponds that are within the County's MS4 area and within the Wando River watershed. These areas may be frequented by geese or other birds and have the potential to be influenced by County efforts. Effective management of these ponds to discourage both permanent and migratory birds has the potential to reduce fecal coliform bacteria loads associated with bird waste.

The County recognizes the many native bird populations that live and nest within the Wando River watershed that likely contribute to the fecal coliform bacteria load in the Wando River. However, it would be unethical, infeasible, and ineffective to try to remove or deter birds from living in their natural habitats.

4 BMP Implementation

This section addresses the General Permit requirement stated in section 3.3.3.3, "*Structural and nonstructural BMPs to address the WLA. Permittees should include a brief explanation of why the BMP are selected,"* and the General Permit requirement stated in section 3.3.4, "*Schedule for completing BMP implementation as soon as practicable.*"

4.1 BMP Implementation Plan

Both structural and non-structural BMPs were evaluated for their potential to reduce bacteria levels coming from the County's MS4 area in the Wando River watershed. The Wando River appears to exhibit healthy behavior in terms of fecal coliform concentrations downstream of the County's MS4 area. Continuing the County's efforts of good stewardship in the watershed, the County will make all feasible efforts to reduce bacteria concentrations in the Wando River to the maximum extent practicable. The County will implement the BMPs listed in the table below in response to the findings from the Wando River TMDL monitoring efforts; some of these efforts are ongoing efforts in the County. Should there be no measured in-stream water quality improvement through ongoing monitoring efforts, this plan will be revisited and adjusted as the County learns more about the watershed and ways to decrease the human-influenced contribution of bacteria.

Category	BMP	Description
Pet Waste	Pet waste education campaign	Brochures/handouts at animal shelters and pet stores. Ashley Cooper Stormwater Education Consortium (ACSEC) can assist with this effort.
	Install pet waste stations	Encourage HOAs and apartment complexes to install pet waste stations in common areas. Evaluate incentives for existing communities to install pet waste stations. Install stations at County parks and/or properties determined to be high priority by the County.
Stormwater Program	Continue and expand IDDE Program	Continue illicit discharge detection and elimination (IDDE) program. Follow the Enforcement Response Plan (ERP) for quick tracking and elimination of the illicit. Continue to monitor the "Stormwater Hotline" to receive and investigate public concerns brought to the County's attention. Increase area coverage and frequency as staff resources permit.
	Determine sources of bacteria through microbial source tracking (MST) and targeted sampling	Determine the sources of the bacteria to develop a more targeted approach to treatment. Microbial source tracking (MST) can help determine the source (human, dog, bird, etc) and targeted watershed sampling can help determine the main areas of contribution.
	Retrofit one structural BMP on a stormwater pond	Evaluate opportunities to retrofit an existing pond to remove bacteria; this may include filter medias, in-pipe physical removal systems, or conversion of dry ponds to wet ponds or wetlands. Efforts should begin with an inventory and evaluation of potential retrofits.

Category	BMP	Description
Sanitary Sewer Improvements	Fats, Oils, and Grease (FOG) educational program	Participate in education campaign to discourage the disposal of fats, oils, and greases in the sanitary sewer system to prevent clogged pipes and resulting overflows. Encourage regular schedules for maintenance of grease traps and storage at restaurants. Work with ACSEC on this effort.
Land Use Management	Riparian buffer zones	Encourage riparian buffers to be maintained in areas of new development to protect surface waters. Encourage re-establishment of riparian buffers in developed areas. Work with the County Planning Department.
Watercraft Management	Pump out education program	Create educational materials and provide pump out demonstrations to teach boat owners how to pump out waste. Work with ACSEC on this effort
Septic Programs	Public education	Provide owners with education materials about inspections and maintenance, pump out programs, and how to connect to public sewer. Work with ACSEC and local sewer authorities on this effort.
	Septic tank management	Identify active and abandoned septic tanks. Determine their condition and take steps (education, regulatory) to repair or replace failing systems.
	Pump out program	Explore possible options for implementing a pump out program for septic tank owners (cost sharing, incentives, etc.
Wildlife Management	Microbial Source Tracking to identify wildlife sources contributing to fecal bacteria	Determine natural sources of bacteria in the watershed (waterfowl, wildlife) and convey information to regulatory agencies.
	Discourage bird feeding by public	Identify areas to post “do not feed birds” signs at ponds or public water access. Include educational information. Educate HOAs on the issue and explore the feasibility of providing them with signage.
	Pond buffers or setbacks	Evaluate opportunities to retrofit existing wet ponds to install buffers and setbacks and use plantings around ponds to discourage birds from using the ponds and contributing to the pollutant contributions. Encourage these in wet ponds of new developments. Consider modifying County regulations to require buffers.
Public Education	Public service announcements (PSAs)	Continue to educate the public with messages on water quality through a variety of sources. Include a wide range of information and using different platforms. Document the successes and target future education efforts.
	Pamphlets	
	Websites	
	Social media	
	Public events/ festivals	
	Continued participation in Ashley Cooper Stormwater Education Consortium	

Structural BMPs were considered but will not be implemented at this time outside of a potential stormwater pond retrofit project, should an appropriate opportunity be identified. Potential sources of fecal coliform, as described in Section 3, are more effectively managed through non-structural education, regulatory, and management efforts than structural BMPs. Moreover, the benefits of structural BMPs to reduce bacterial loadings in receiving waters are minimal, and these practices have a high cost to design, construct, and maintain. There is evidence of the effectiveness of structural BMPs at reducing fecal coliform bacteria loads under certain conditions, but the ability of bacteria to reproduce and increase exponentially downstream of the treated runoff reduces the efficacy when evaluated at an in-stream monitoring station. Thus, the County has determined that the BMPs identified in this Implementation Plan are the most effective way to meet the goals of the Wando River TMDL and to protect and improve the in-stream water quality in the river.

4.2 BMP Implementation Schedule and Evaluation

The schedule for BMP implementation shall be an iterative process of implementing, assessing, and re-evaluating BMPs. To evaluate the effectiveness of the implemented BMPs, monitoring will continue in accordance with the TMDL Monitoring Plan for fecal coliform, the pollutant of concern in the Wando River watershed. Progress on the schedule for implementing the BMPs, and an analysis of the collected data, will be included in every NPDES General Permit Annual Report.

This Implementation Plan will be revised based on the evaluated data collected on the implemented BMPs throughout the permit term. The schedule and plans listed in this document will be included as part of the permit re-application process. If necessary, BMPs will be adjusted and additional control measures will be implemented in order to achieve progress towards addressing the TMDL.

Attachment 1:

Charleston County Wando River Monitoring Memo

WOOLPERT
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Memo

To: Charleston County

From: Woolpert, Inc.

Date: May 28, 2021

Subject: Wando River Grab Sampling Results Memo – DRAFT
Winter 2021 – data through March 2021

The Wando River TMDL for fecal coliform bacteria became effective in November 2016, and to maintain compliance with their NPDES SMS4 General Permit, Charleston County was required to submit a TMDL Monitoring Plan to SCDHEC within 12 months of the TMDL effective date (November 2017) and begin monitoring activities within 18 months of the TMDL effective date (May 2018). In accordance with the submitted TMDL Monitoring Plan, the County initiated monitoring activities in May 2018, with the first seasonal wet weather grab sample collected in June 2018, and it has performed a combination of seasonal and monthly grab sampling since that time. The County's sampling efforts have targeted both wet and dry conditions to assess bacteria concentrations in the Wando River both in response to storm events and during base flow conditions. In September 2020, Woolpert was tasked with performing both seasonal wet weather and monthly dry weather grab sampling in the Wando River to gather data about both fecal coliform and Enterococcus bacteria concentrations in the watershed. This memo is a cumulative document, with new data added to the existing dataset as samples are collected, and it summarizes and discusses data collected through March 2021. All sample results (May 2018 through March 2021) and notes about associated weather and tidal conditions are included in Appendix A.

Each grab sampling effort has involved taking samples at two strategic locations in the watershed. The upstream site (Guerins Bridge) is located at the bridge where Guerins Bridge Rd crosses the Wando River in Awendaw, SC. The contributing drainage area to this location is primarily rural and forested in the Francis Marion National Forest, representing the natural (non-human) sources of bacteria in the water. The downstream site (Wando Marina) is located at the Wando River Marina, adjacent to the SC-41 bridge that crosses the Wando River in Mount Pleasant, SC. The contributing drainage area to this location includes human influence from more suburban, urban, and developed areas. Samples were analyzed by Trident Laboratory in Ladson, SC, an EPA-approved laboratory, for fecal coliform bacteria using the Colilert-18 method and results were reported as the Most Probable Number of bacteria per 100 milliliter sample (MPN/100ml). Summary statistics for fecal coliform grab sampling results to date (through March 2021) are shown in Table 1 for each sampling location and weather condition.

Table 1: Summary Statistics for Grab Sample Fecal Coliform Results – By Location and Weather Condition

Sampling Location	Weather Condition	Summary Statistic (units of MPN/100ml)				# Samples
		Mean	Median	Maximum	Minimum	
Guerins Bridge	Dry	130	102	488	12	44
Guerins Bridge	Wet	536	163	>2420	8	32
Wando Marina	Dry	12	8	72	1	44
Wando Marina	Wet	40	20	228	2	32

Enterococcus samples were taken in tandem with fecal coliform samples starting in September 2020. Enterococcus samples were analyzed by Trident Laboratory in Ladson, SC, an EPA-approved laboratory, using the SM-9230D method and results were reported as the Most Probable Number of bacteria per 100 milliliter sample (MPN/100ml). Summary statistics for the grab sampling results to date (through March 2021) are shown in Table 2 for each sampling location and weather condition. As of this memo, only limited sampling has taken place for Enterococcus, so the summary statistics in Table 2 are not representative of the water quality throughout the year and interpretation and discussion of the data will be limited until the Enterococcus sample size has increased.

Table 2: Summary Statistics for Grab Sample Enterococcus Results – By Location and Weather Condition

Sampling Location	Weather Condition	Summary Statistic (units of MPN/100ml)				# Samples
		Mean	Median	Maximum	Minimum	
Guerins Bridge	Dry	286	148	1046	15	21
Guerins Bridge	Wet	886	146	>2420	30	9
Wando Marina	Dry	24	12	84	1	21
Wando Marina	Wet	121	63	387	10	9

Due to the many factors that influence bacteria concentrations (e.g. potential bacteria sources, season, weather, rainfall intensity, antecedent rainfall, tides, timing of watershed storm response), it is important to consider individual storm results in their own context in addition to summary statistics. To facilitate this kind of assessment, figures were created to illustrate the grab sampling results at each location along with stage in the Wando River, rainfall data (for wet weather sampling), and observations about weather and tidal conditions. These figures were created for all sampling efforts and are located in Appendix B in chronological order. Available stage and rainfall data were utilized to best approximate conditions at the Wando River sampling locations. Wando River stage data was obtained from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" which is close to the SC-41 bridge and Wando Marina sampling location. For the December 2018 and April 2019 wet weather sampling efforts, rainfall data was obtained from Citizen Weather Observation Program (CWOP) weather station E7160, located in the RiverTowne neighborhood in Mount Pleasant, approximately 3.4 miles south of the SC-41 bridge and Wando Marina sampling location. For the rest of the wet weather sampling efforts, rainfall data was obtained from the Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles southwest of the SC-41 bridge, installed by Woolpert and YSI in April 2018. This gauge is preferred as Woolpert can ensure the completeness of its dataset and reliable maintenance schedule compared to citizen-owned rain gauges.

Overall Trends

The summary statistics as well as individual storm results were reviewed and compared to attempt to observe trends and/or correlations between bacteria concentration sampling results and a variety of potential associated factors. It is important to note that with this limited data set, the following discussion is not asserting statistical significance, but rather seeking to explore possible relationships in an effort to start to understand the complex natural aquatic system of the Wando River. The summary statistics in Table 1 indicate two overall trends with respect to fecal coliform concentrations: higher concentrations at Guerins Bridge than at Wando Marina and higher concentrations in wet conditions than in dry conditions. When comparing individual storm results in Appendix A (list form) and Appendix B (graphical form), it does appear that bacteria concentrations tend to be higher at Guerins Bridge than at Wando Marina. However, a comparison of results for individual wet weather versus dry weather sampling efforts does not provide a clear trend; there is variation among both the wet weather events and dry weather events (e.g. some dry weather samples are slightly higher than some wet weather samples, contrary to the overall trend seen with summary statistics). This variation may be driven by some or all of the factors influencing bacteria concentrations mentioned previously. The limited dataset of grab sample results provides a glimpse of the water quality conditions that may also contribute to these variations. Though the dataset is limited, the following sections provide a discussion of specific sampling events and how they may or may not show potential trends for wet and dry weather conditions.

Wet Weather Sampling

The goal of wet weather sampling is to quantify the bacteria levels present in stormwater runoff by collecting grab samples during or soon after storm events. In tidal systems, such as the Wando River, it can be difficult to differentiate between stormwater runoff and tidal flow using only stage and rainfall data. For purposes of discussion, fecal coliform bacteria concentrations will be discussed as orders of magnitude. From the available grab sampling data, wet weather results at Wando Marina have been observed to vary by two orders of magnitude, typically in the "ones" (0-9 MPN/100ml) and "tens" (10-99 MPN/100ml) with four observations in the "hundreds" (10^2). Wet weather results at Guerins Bridge have been observed to vary by three orders of magnitude, sometimes as low as the "ones" and sometimes as high as the "thousands" (10^3).

Reviewing the entire dataset, wet weather results tended to correlate with higher fecal coliform bacteria concentrations than dry weather results at both sites, with the exception of smaller storm events that took place after generally dry antecedent rainfall conditions. The extent of these dry conditions is difficult to quantify precisely in a complex and dynamic watershed. However, it was observed that wet weather sampling efforts in April 2019, October 2019, and March 2020 that exhibited lower than average bacteria concentrations also correlated with dry antecedent rainfall conditions, as described below. For comparison, take note of the summary statistics for wet weather conditions shown in Table 1.

- The April 2019 event (*4/2/2019*) had a rainfall total of 0.63 inches with samples collected during a high/rising tide. A review of continuous rainfall data indicated that the most recent rainfall event total of over 1-inch prior to the April event occurred four months prior on 12/14/2018. It was also observed that only 1.56" of total rainfall (numerous small events between 0.01" and 0.35") occurred in February and March 2019. This indicates a very dry overall antecedent rainfall condition prior to the April storm, which correlated with low bacteria levels (3-5 MPN/100ml at Wando Marina; 16-33 MPN/100ml at Guerins Bridge).
- The October 2019 event (*10/16/2019*) had a rainfall total of 1.36" with samples collected during a high/falling tide. The continuous rainfall data indicated that the most recent rainfall event total over 1-inch was the rainfall associated with Hurricane Dorian, 7.19" of total rainfall on 9/5/2019, six weeks before the sampled event. During that six-week period between Dorian and the October event, only 0.56" of rainfall occurred. This also indicates an overall dry antecedent rainfall condition and correlated with low bacteria levels (2-5 MPN/100ml at Wando Marina; 8-95 MPN/100ml at Guerins Bridge).
- The March 2020 event (*03/24/2020*) had a rainfall total of 0.52" with samples collected during a high/falling tide. The continuous rainfall data indicated that the previous rainfall events were 0.2" on 3/22/2020 and 1.57" on 3/5/2020, representative of generally dry conditions in the watershed leading up to the March event which correlated with low bacteria levels (≤10 MPN/100ml at Wando Marina, 10-31 MPN/100ml at Guerins Bridge).

There does not seem to be an apparent trend between high fecal coliform bacteria concentrations and specific tidal conditions. The following storm events provided some of the higher bacteria concentrations observed under a variety of tidal conditions. The majority of these observations of higher concentrations were only at Guerins Bridge Road (GB Rd below).

- December 2018 (3.38"): 10^2 and 10^3 concentrations observed during rising and high tide at GB Rd, 10^2 concentrations observed at high tide at Wando Marina.
- July 2019 (1.14"): 10^2 and 10^3 concentrations observed during low and rising tide at GB Rd.
- August 2019 (1.28"): 10^2 concentration observed at low tide at GB Rd.
- April 2020 (1.48"): 10^2 concentrations observed at falling and low tide at GB Rd.
- September 2020 (1.48"): 10^2 concentration observed at falling tide at GB Rd.
- November 2020 (1.77"): 10^3 concentrations observed at falling, low, and rising tide at GB Rd; 10^2 concentrations observed during falling and rising tides at Wando Marina.
- January 2021 (0.93"): 10^2 and 10^3 concentrations observed at falling, low, and rising tide at GB Rd. 10^2 concentration observed at low tide at Wando Marina.

The instances of "higher" concentrations listed above occurred during both warmer and cooler months, suggesting that wet weather bacteria concentrations do not strictly correlate with temperature or time of year. Other factors such as

changes in the watershed, rainfall amount, storm characteristics, and antecedent moisture conditions in the watershed may be more correlative with bacteria concentration. Additional sampling efforts will provide a larger dataset for evaluation of potential trends.

Dry Weather Sampling

Dry weather sampling intends to provide some background, baseline bacteria levels in the Wando River to represent conditions not influenced by stormwater runoff. These levels could be attributed to wildlife in or near the water, historic deposits, non-stormwater human contributions, or aquatic life. For sampling to be considered "dry weather," at least 72 hours must have passed since the last instance of greater than or equal to 0.1" of rainfall.

Dry weather fecal coliform bacteria results at Wando Marina have been observed to be consistently low, typically less than the SCDHEC single sample threshold of 43 MPN/100ml, with the exception of three observations that occurred in September 2019 (72 MPN/100ml), September 2020 (50 MPN/100ml), and November 2020 (70 MPN/100ml). It is noteworthy that the September 2019 sampling occurred 11 days after Hurricane Dorian brought 7.19" of rainfall, creating unusually wet antecedent conditions. The other two observations also occurred during "dry" periods but in months that had several inches of rainfall earlier in the month. Although these three observations stand out because they are higher than the consistently low results from the other Wando Marina dry weather samples, they are still lower than the average concentrations from Guerins Bridge.

Dry weather fecal coliform results at Guerins Bridge have been observed to vary by an order of magnitude, sometimes in the "tens" and other times in the "hundreds." The difference in conditions between those levels may be driven by season, tide, wildlife activity, or other factors. From the data collected thus far, there may be correlation between antecedent rainfall conditions previous to the required 72 hours of dry conditions and the dry weather results at Guerins Bridge.

- It was discussed in the wet weather sampling section that February and March of 2019 were very dry months. These months also had dry weather sampling efforts with some of the lower dry weather results (all samples in the "tens" order of magnitude) at Guerins Bridge. For comparison within similar season/temperature conditions, the January 2019 sampling had somewhat higher results (2 of 3 samples had bacteria concentrations greater than 100 MPN/100ml) and wetter antecedent conditions (1.23" of rainfall in the 10-day period prior to the sampling event) compared to February and March.
- May and June of 2019 provide another point of dry weather comparison from adjacent months. June (5.56" total rainfall) was a wetter month than May (0.71" total rainfall) and the dry weather results at Guerins Bridge were higher in June than in May ("hundreds" vs. "tens" order of magnitude in June vs. May for all samples).
- The September 2019 (9/16/2019) dry weather sampling resulted in the two highest single dry weather observations at Guerins Bridge (488 and 291 MPN/100 ml). As mentioned previously in the Wando Marina discussion, significant rainfall from Hurricane Dorian occurred on 9/5/2019, 11 days before the sampling effort which made for overall wet antecedent conditions in the watershed. A comparison can be made to the dry weather sampling results from September 2018 (126 and 260 MPN/100ml) and September 2020 (180, 120, and 40 MPN/100ml) which both produced mostly results in the "hundreds" order of magnitude at Guerins Bridge, though the actual values were all smaller than in September 2019.

Dry weather observations in Fall (October, November, December) 2020 were all of the "hundreds" magnitude, with the exception of one sample. These monthly dry weather efforts are the best demonstration of Fall seasonal dry conditions in the sampled dataset, with samples in November 2019 being the only other Fall dry weather sampling effort. November 2019 samples were lower than in Fall 2020, all of the "tens" order of magnitude.

Fecal coliform dry weather results in Winter 2019 and Winter 2021 (no dry weather samples collected during Winter 2020) were consistently low, suggesting a seasonal influence on dry weather bacteria concentrations. The winter months tend to be cooler and drier than the rest of the year, which may contribute to lower bacteria concentrations. The current monthly dry weather sampling and seasonal wet weather sampling schedule will provide additional data that may reveal other seasonal patterns or indicate other factors that may be correlative with bacteria levels. Further seasonal analysis will be considered in the next memo after another season of monthly dry weather sampling has occurred.

As noted earlier, the trends and comparisons discussed in this memo are observations based on the limited dataset. This data is intended to provide the County with a preliminary understanding of the Wando River watershed and potential impacts of stormwater runoff on bacteria concentrations. The County intends to continue both wet weather and dry weather grab sampling to supplement these initial observations and continue to collect information about the dynamics of the Wando River.

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Appendix A: Grab Sampling Results and Associated Field Conditions

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
6/8/2018	12:15	Guerins Bridge	194	N/A	Rising	Wet	Steady Rain Total Rainfall = 0.85" Avg Temp = 79°F
6/8/2018	12:45	Wando Marina	4	N/A	Rising	Wet	
6/8/2018	2:10	Guerins Bridge	219	N/A	Rising	Wet	
6/8/2018	2:35	Wando Marina	43	N/A	Rising	Wet	
9/21/2018	11:25	Wando Marina	5	N/A	Falling	Dry	Sunny 3 Days Since Rain Avg Temp = 84°F
9/21/2018	12:01	Guerins Bridge	126	N/A	Falling	Dry	
9/21/2018	1:28	Wando Marina	13	N/A	Rising	Dry	
9/21/2018	1:59	Guerins Bridge	260	N/A	Rising	Dry	
12/14/2018	10:18	Wando Marina	50	N/A	Rising	Wet	Light to Heavy Rain Total Rainfall = 3.38" Avg Temp = 63°F
12/14/2018	10:43	Guerins Bridge	754	N/A	Rising	Wet	
12/14/2018	11:25	Wando Marina	30	N/A	Rising	Wet	
12/14/2018	11:45	Guerins Bridge	1054	N/A	Rising	Wet	
12/14/2018	12:45	Wando Marina	228	N/A	Rising	Wet	
12/14/2018	1:08	Guerins Bridge	908	N/A	High	Wet	
1/29/2019	10:41	Wando Marina	6	N/A	Low/Rising	Dry	Cloudy 5 Days Since Rain Avg Temp = 58°F
1/29/2019	11:23	Guerins Bridge	70	N/A	Low/Rising	Dry	
1/29/2019	12:37	Wando Marina	5	N/A	Mid/Rising	Dry	
1/29/2019	1:01	Guerins Bridge	131	N/A	Mid/Rising	Dry	
1/29/2019	2:05	Wando Marina	4	N/A	Almost High/Rising	Dry	
1/29/2019	2:27	Guerins Bridge	144	N/A	Almost High/Rising	Dry	
2/28/2019	8:13	Guerins Bridge	69	N/A	Mid to Low/Falling	Dry	Clear 8 Days Since Rain Avg Temp = 68°F
2/28/2019	8:36	Wando Marina	4	N/A	Mid to Low/Falling	Dry	
2/28/2019	10:28	Guerins Bridge	54	N/A	Very Low/Trickling Out	Dry	
2/28/2019	10:57	Wando Marina	7	N/A	Very Low/Rising	Dry	
2/28/2019	12:15	Guerins Bridge	36	N/A	Mid to Low/Rising	Dry	
2/28/2019	12:43	Wando Marina	5	N/A	Mid/Rising	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
3/29/2019	9:55	Wando Marina	8	N/A	Low/Falling	Dry	Sunny 24 Days Since Rain Avg Temp = 70 °F
3/29/2019	10:22	Guerins Bridge	23	N/A	Low/Falling	Dry	
3/29/2019	11:44	Wando Marina	4	N/A	Low/Rising	Dry	
3/29/2019	12:11	Guerins Bridge	20	N/A	Low/Rising	Dry	
3/29/2019	1:40	Wando Marina	1	N/A	Mid/Rising	Dry	
3/29/2019	2:02	Guerins Bridge	37	N/A	Mid/Rising	Dry	
4/2/2019	7:16	Wando Marina	3	N/A	High/Rising	Wet	Light to Steady Rain High Winds Total Rainfall = 0.63" Avg Temp = 47°F
4/2/2019	7:52	Guerins Bridge	33	N/A	High/Rising	Wet	
4/2/2019	8:59	Wando Marina	3	N/A	High/Falling	Wet	
4/2/2019	9:23	Guerins Bridge	21	N/A	High/Falling	Wet	
4/2/2019	10:43	Wando Marina	5	N/A	High/Falling	Wet	
4/2/2019	11:05	Guerins Bridge	16	N/A	High/Falling	Wet	
5/22/2019	9:41	Wando Marina	3	N/A	Mid/Rising	Dry	Clear to Pt. Cloudy 8 Days Since Rainfall Avg Temp = 84°F
5/22/2019	10:02	Guerins Bridge	17	N/A	Mid/Rising	Dry	
5/22/2019	11:26	Wando Marina	5	N/A	High/Rising	Dry	
5/22/2019	11:49	Guerins Bridge	12	N/A	High/Rising	Dry	
5/22/2019	13:30	Wando Marina	11	N/A	High/Falling	Dry	
5/22/2019	13:54	Guerins Bridge	26	N/A	High/Falling	Dry	
6/27/2019	9:30	Wando Marina	3	N/A	Low/Slack	Dry	Clear 6 Days Since Rain Avg Temp = 91°F
6/27/2019	10:55	Guerins Bridge	118	N/A	Low/Rising	Dry	
6/27/2019	11:15	Wando Marina	5	N/A	Low/Rising	Dry	
6/27/2019	11:51	Guerins Bridge	204	N/A	Low/Rising	Dry	
6/27/2019	12:37	Wando Marina	5	N/A	Low to Mid/Rising	Dry	
6/27/2019	1:00	Guerins Bridge	261	N/A	Low to Mid/Rising	Dry	
7/24/2019	8:05	Wando Marina	64	N/A	Low	Wet	Cloudy Total Rainfall = 1.14" Avg Temp = 72°F
7/24/2019	8:35	Guerins Bridge	1553	N/A	Low/Rising	Wet	
7/24/2019	9:51	Wando Marina	15	N/A	Mid/Rising	Wet	
7/24/2019	10:13	Guerins Bridge	1553	N/A	Mid/Rising	Wet	
7/24/2019	11:34	Wando Marina	42	N/A	Mid/Rising	Wet	
7/24/2019	11:58	Guerins Bridge	649	N/A	High/Rising	Wet	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
8/28/2019	11:07	Wando Marina	10	N/A	Mid/Falling	Wet	Pt. Cloudy to Rain Total Rainfall = 1.28" Avg Temp = 81°F
8/28/2019	11:36	Guerins Bridge	< 10	N/A	Mid/Falling	Wet	
8/28/2019	12:04	Wando Marina	98	N/A	Mid/Falling	Wet	
8/28/2019	12:28	Guerins Bridge	98	N/A	Low/Falling	Wet	
8/28/2019	12:53	Wando Marina	52	N/A	Low/Falling	Wet	
8/28/2019	13:18	Guerins Bridge	313	N/A	Low	Wet	
9/16/2019	9:46	Wando Marina	23	N/A	High/Rising	Dry	Sunny 11 Days Since Rain Avg Temp = 86°F
9/16/2019	10:18	Guerins Bridge	58	N/A	High/Rising	Dry	
9/16/2019	11:45	Wando Marina	72	N/A	High/Falling	Dry	
9/16/2019	12:07	Guerins Bridge	291	N/A	High/Falling	Dry	
9/16/2019	13:46	Wando Marina	22	N/A	Mid/Falling	Dry	
9/16/2019	14:06	Guerins Bridge	488	N/A	Mid/Falling	Dry	
10/16/2019	10:16	Wando Marina	5	N/A	High/Rising	Wet	Cloudy Total Rainfall = 1.36" Avg Temp = 76°F
10/16/2019	10:39	Guerins Bridge	39	N/A	High/Rising	Wet	
10/16/2019	12:10	Wando Marina	2	N/A	High/Falling	Wet	
10/16/2019	12:29	Guerins Bridge	8	N/A	High/Falling	Wet	
10/16/2019	14:10	Wando Marina	3	N/A	Mid/Falling	Wet	
10/16/2019	14:28	Guerins Bridge	94	N/A	Mid/Falling	Wet	
11/22/2019	8:55	Wando Marina	<10	N/A	Mid/Falling	Dry	Clear 6 Days Since Rain Avg Temp = 63°F
11/22/2019	9:26	Guerins Bridge	52	N/A	Mid/Falling	Dry	
11/22/2019	9:53	Wando Marina	<10	N/A	Low/Falling	Dry	
11/22/2019	10:20	Guerins Bridge	20	N/A	Low/Falling	Dry	
11/22/2019	10:50	Wando Marina	<10	N/A	Low	Dry	
11/22/2019	11:17	Guerins Bridge	74	N/A	Low/Rising	Dry	
3/24/2020	10:00	Wando Marina	10	N/A	High/Slack	Wet	Cloudy to Rain Total Rainfall = 0.52" Avg Temp = 68°F
3/24/2020	10:29	Guerins Bridge	31	N/A	High/Rising	Wet	
3/24/2020	12:01	Wando Marina	10	N/A	Mid/Falling	Wet	
3/24/2020	12:24	Guerins Bridge	20	N/A	Mid/Falling	Wet	
3/24/2020	13:57	Wando Marina	<10	N/A	Low/Falling	Wet	
3/24/2020	14:27	Guerins Bridge	10	N/A	Low/Falling	Wet	

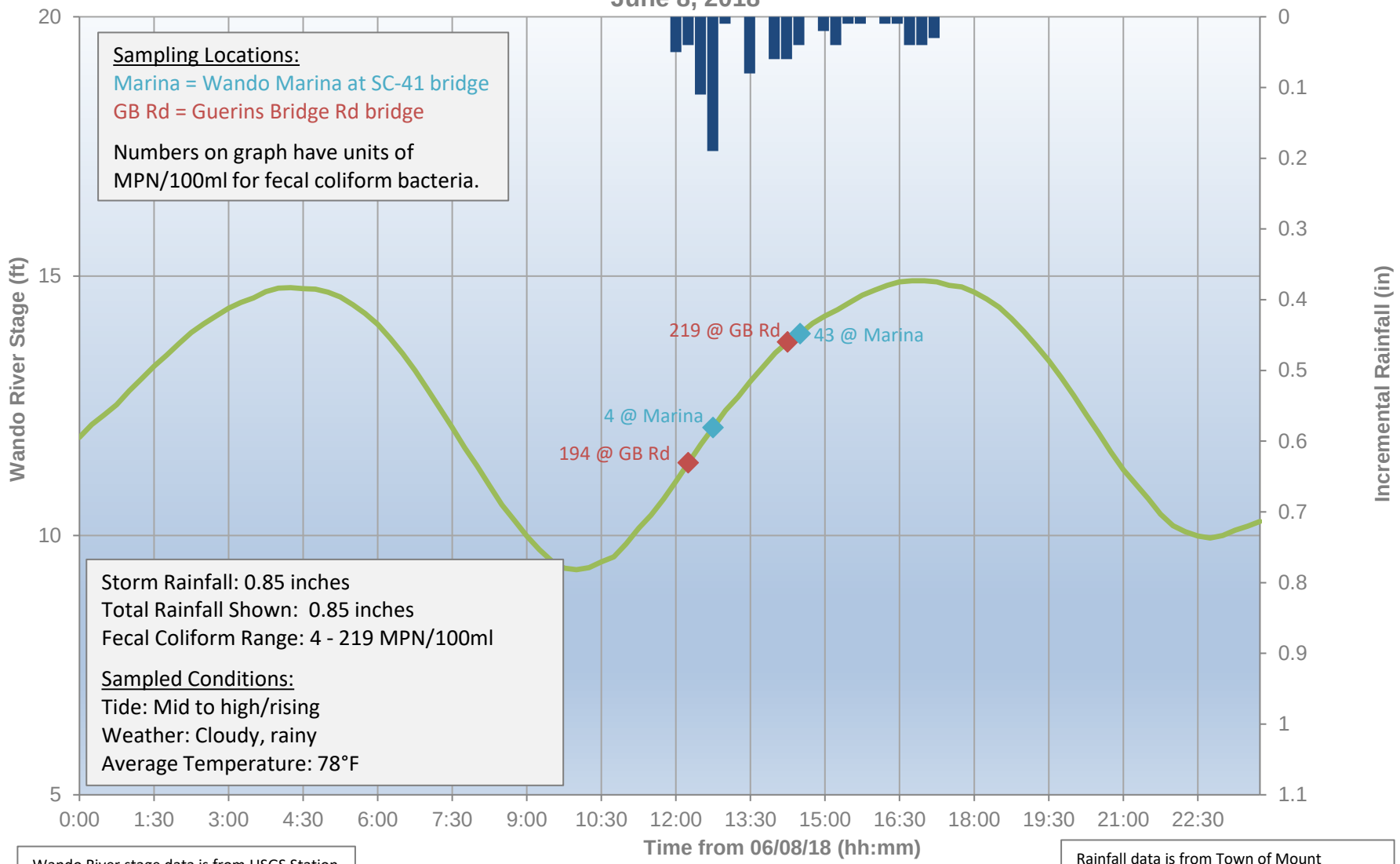
Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
4/20/2020	9:38	Wando Marina	<10	N/A	Mid/Falling	Wet	Pt. Cloudy to Rain Total Rainfall = 1.48" Avg Temp = 75°F
4/20/2020	10:11	Guerins Bridge	41	N/A	Mid/Falling	Wet	
4/20/2020	11:36	Wando Marina	20	N/A	Low/Falling	Wet	
4/20/2020	11:59	Guerins Bridge	132	N/A	Low/Falling	Wet	
4/20/2020	13:46	Wando Marina	20	N/A	Low/Slack	Wet	
4/20/2020	14:08	Guerins Bridge	404	N/A	Low/Rising	Wet	
9/17/2020	9:08	Wando Marina	90	135	High/Rising	Wet	Pt. Cloudy to Rain High Winds Total Rainfall = 1.48" Avg Temp = 82°F
9/17/2020	10:02	Guerins Bridge	40	228	High/Rising	Wet	
9/17/2020	11:04	Wando Marina	20	63	High/Falling	Wet	
9/17/2020	11:36	Guerins Bridge	30	144	High/Rising	Wet	
9/17/2020	13:05	Wando Marina	30	41	Mid/Falling	Wet	
9/17/2020	13:38	Guerins Bridge	110	146	High/Falling	Wet	
9/22/2020	9:25	Wando Marina	<10	20	Low/Rising	Dry	Sunny and Breezy 4 Days Since Rain Avg Temp = 66°F
9/22/2020	9:59	Guerins Bridge	180	288	Low/Rising	Dry	
9/22/2020	11:28	Wando Marina	50	<10	Mid/Rising	Dry	
9/22/2020	12:00	Guerins Bridge	120	148	Mid/Rising	Dry	
9/22/2020	13:28	Wando Marina	10	<10	High/Rising	Dry	
9/22/2020	14:02	Guerins Bridge	40	20	High/Rising	Dry	
10/28/2020	9:25	Guerins Bridge	36	48	High/Falling	Dry	Pt. Cloudy 3 Days Since Rain Avg Temp = 78°F
10/28/2020	10:00	Wando Marina	9	46	High/Falling	Dry	
10/28/2020	10:55	Guerins Bridge	108	49	Mid/Falling	Dry	
10/28/2020	11:45	Wando Marina	15	32	Mid/Falling	Dry	
10/28/2020	12:35	Guerins Bridge	172	179	Low/Falling	Dry	
10/28/2020	13:20	Wando Marina	23	53	Low/Slack	Dry	
11/12/2020	9:29	Wando Marina	28	142	Mid/Falling	Wet	Cloudy to Rain Total Rainfall = 1.77" Avg Temp = 75°F
11/12/2020	10:00	Guerins Bridge	1300	2420	Mid/Falling	Wet	
11/12/2020	11:36	Wando Marina	115	387	Low/Falling	Wet	
11/12/2020	12:11	Guerins Bridge	>2420	>2420	Low/Falling	Wet	
11/12/2020	13:26	Wando Marina	105	285	Low/Rising	Wet	
11/12/2020	13:55	Guerins Bridge	>2420	>2420	Low/Rising	Wet	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
11/23/2020	9:41	Wando Marina	70	52	Low/Rising	Dry	Sunny 11 Days Since Rain Avg Temp = 68°F
11/23/2020	10:11	Guerins Bridge	308	903	Low/Rising	Dry	
11/23/2020	11:24	Wando Marina	11	84	Mid/Rising	Dry	
11/23/2020	11:51	Guerins Bridge	291	903	Mid/Rising	Dry	
11/23/2020	13:27	Wando Marina	8	57	High/Rising	Dry	
11/23/2020	13:56	Guerins Bridge	172	770	High/Rising	Dry	
12/10/2020	9:52	Wando Marina	3	14	Low/Falling	Dry	Sunny 10 Days Since Rain Avg Temp = 60°F
12/10/2020	10:29	Guerins Bridge	261	1046	Low/Falling	Dry	
12/10/2020	11:39	Wando Marina	8	10	Low/Rising	Dry	
12/10/2020	12:10	Guerins Bridge	261	649	Low/Rising	Dry	
12/10/2020	13:32	Wando Marina	4	33	Mid/Rising	Dry	
12/10/2020	13:58	Guerins Bridge	326	172	Mid/Rising	Dry	
1/8/2021	8:38	Wando Marina	20	10	Low/Falling	Wet	Cloudy Total Rainfall = 0.92" Avg Temp = 46°F
1/8/2021	9:12	Guerins Bridge	380	30	Low/Falling	Wet	
1/8/2021	10:35	Wando Marina	120	17	Low	Wet	
1/8/2021	11:00	Guerins Bridge	1400	82	Low	Wet	
1/8/2021	12:30	Wando Marina	10	11	Low/Rising	Wet	
1/8/2021	12:54	Guerins Bridge	910	85	Low/Rising	Wet	
1/20/2021	9:25	Wando Marina	1	3	Low/Rising	Dry	Sunny 5 Days Since Rain Avg Temp = 60°F
1/20/2021	9:54	Guerins Bridge	82	15	Low/Rising	Dry	
1/20/2021	11:31	Wando Marina	2	1	Mid/Rising	Dry	
1/20/2021	12:02	Guerins Bridge	75	76	Mid/Rising	Dry	
1/20/2021	13:30	Wando Marina	3	3	High/Rising	Dry	
1/20/2021	13:56	Guerins Bridge	64	39	High/Rising	Dry	
2/25/2021	8:44	Wando Marina	4	10	High/Falling	Dry	Sunny 6 Days Since Rain Avg Temp = 67°F
2/25/2021	9:14	Guerins Bridge	147	201	High/Falling	Dry	
2/25/2021	10:32	Wando Marina	3	9	Mid/Falling	Dry	
2/25/2021	11:04	Guerins Bridge	74	66	Mid/Falling	Dry	
2/25/2021	12:31	Wando Marina	11	16	Low/Falling	Dry	
2/25/2021	13:01	Guerins Bridge	64	68	Low/Falling	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
3/15/2021	9:20	Wando Marina	15	12	High/Rising	Dry	Sunny 12 Days Since Rain Avg Temp = 61°F
3/15/2021	9:48	Guerins Bridge	142	272	High/Rising	Dry	
3/15/2021	11:19	Wando Marina	8	12	High	Dry	
3/15/2021	11:44	Guerins Bridge	104	27	High	Dry	
3/15/2021	13:41	Wando Marina	13	8	High/Falling	Dry	
3/15/2021	14:06	Guerins Bridge	99	66	High/Falling	Dry	

Appendix B: Figures of Individual Storm Grab Sampling Results

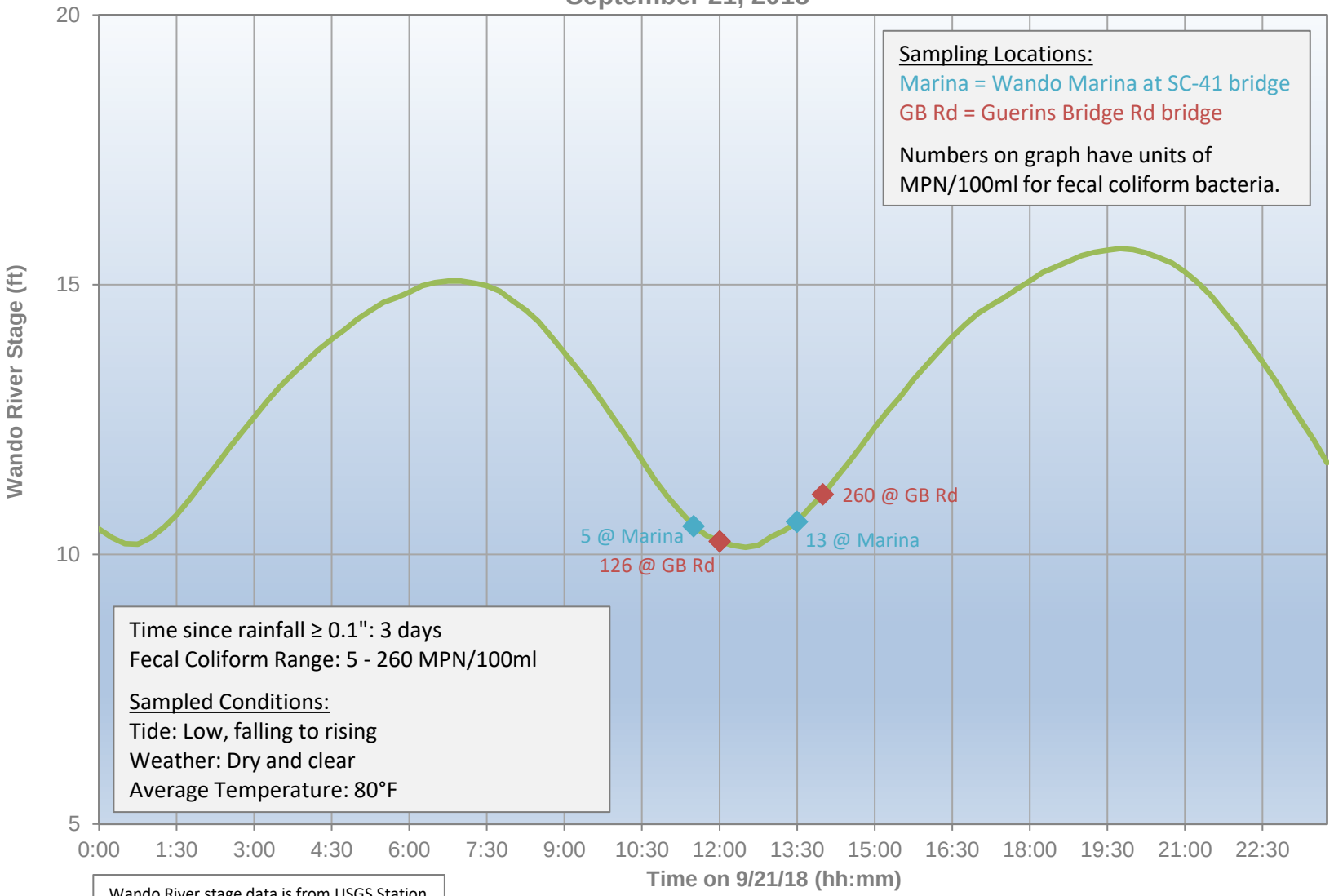
Charleston County
Wando River Wet Weather Sampling
June 8, 2018

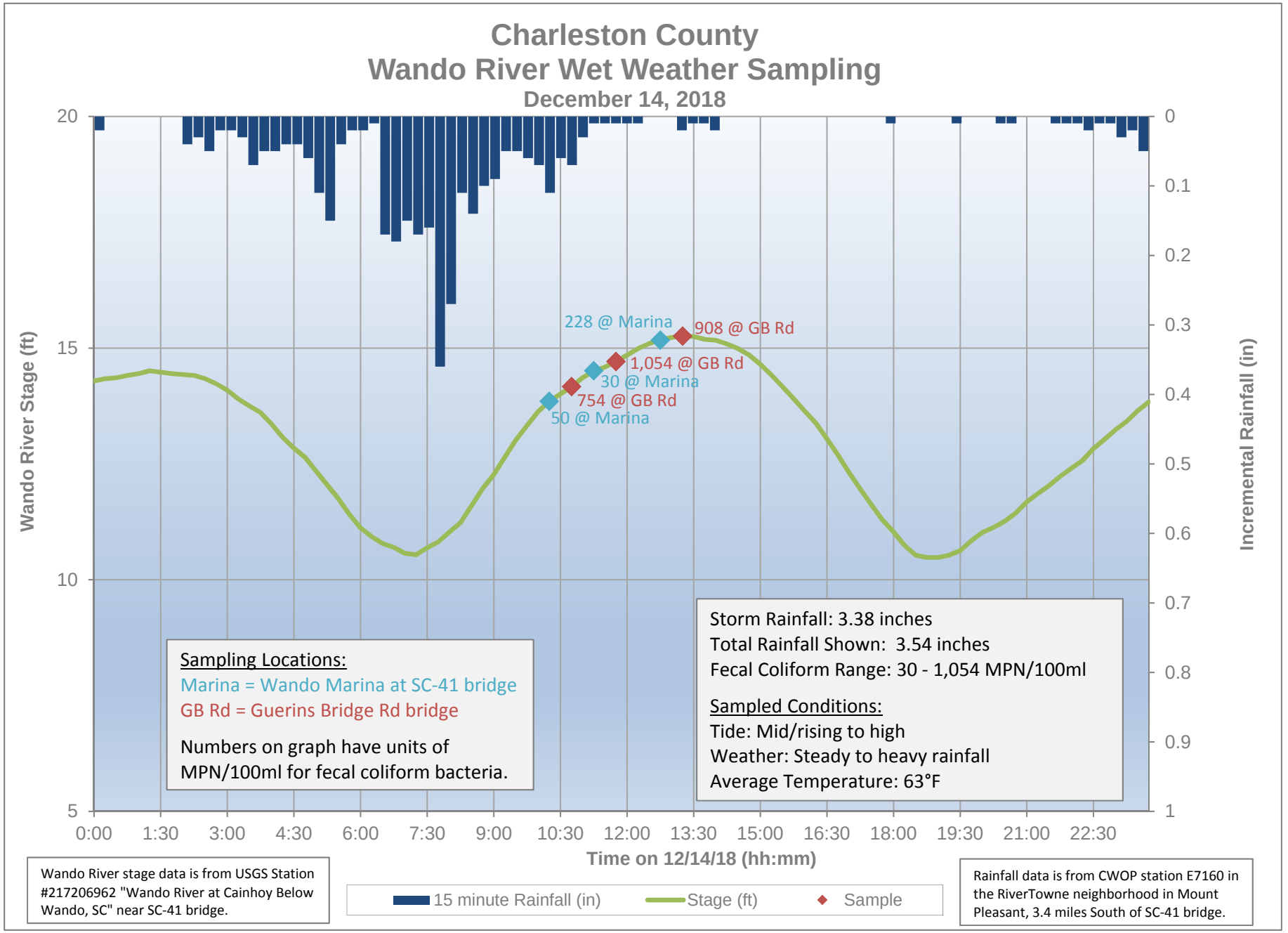


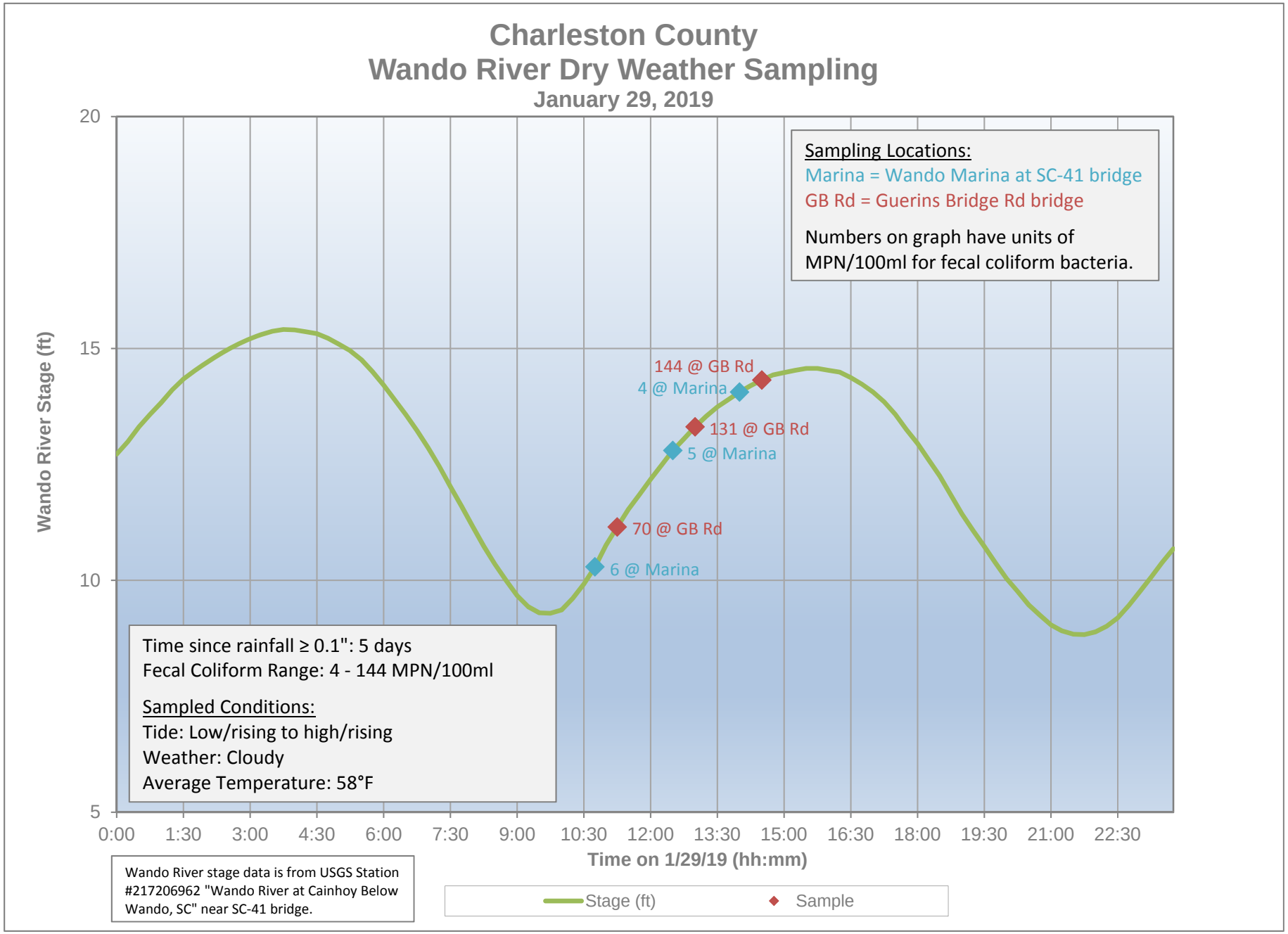
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

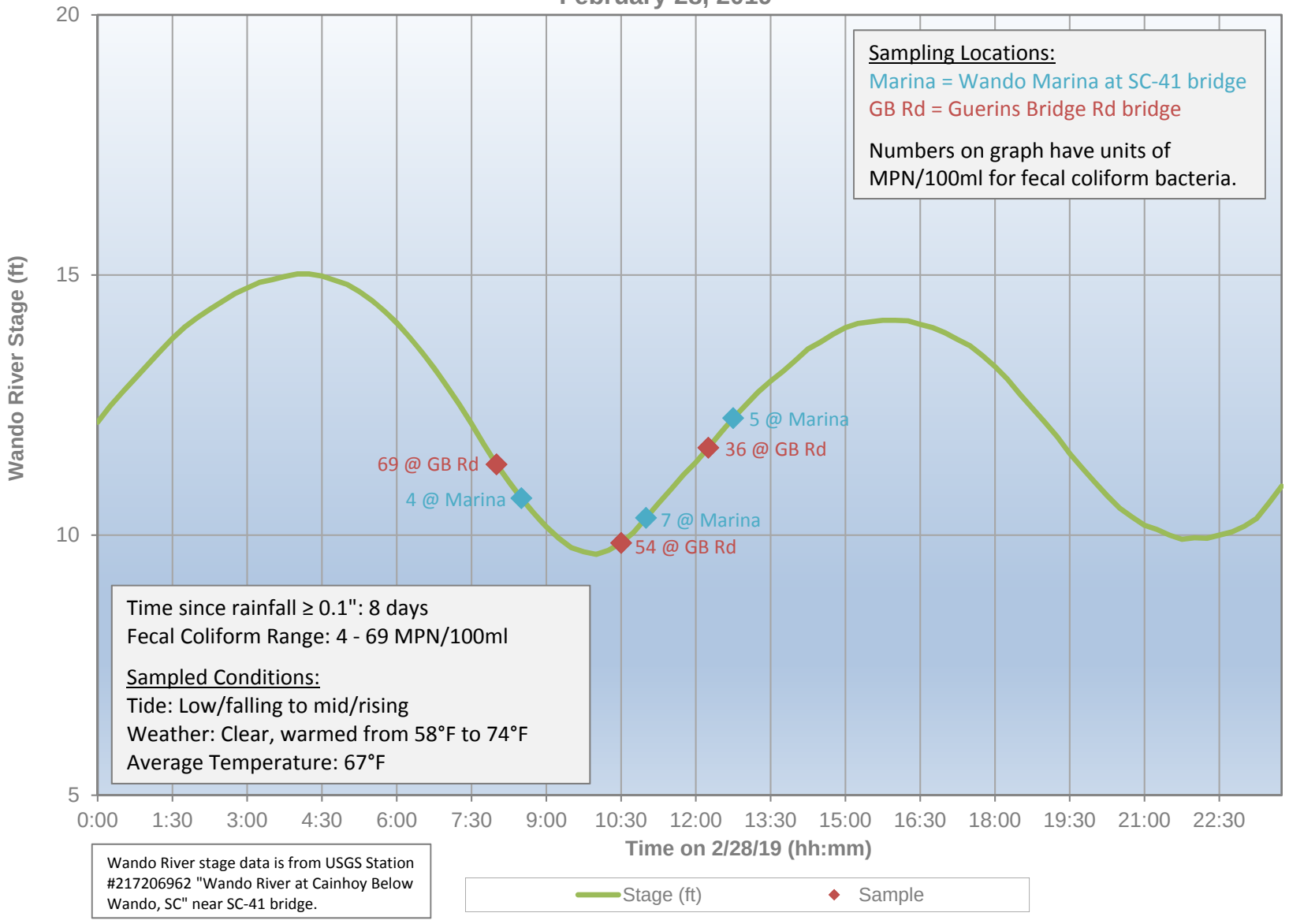
Charleston County
Wando River Dry Weather Sampling
September 21, 2018

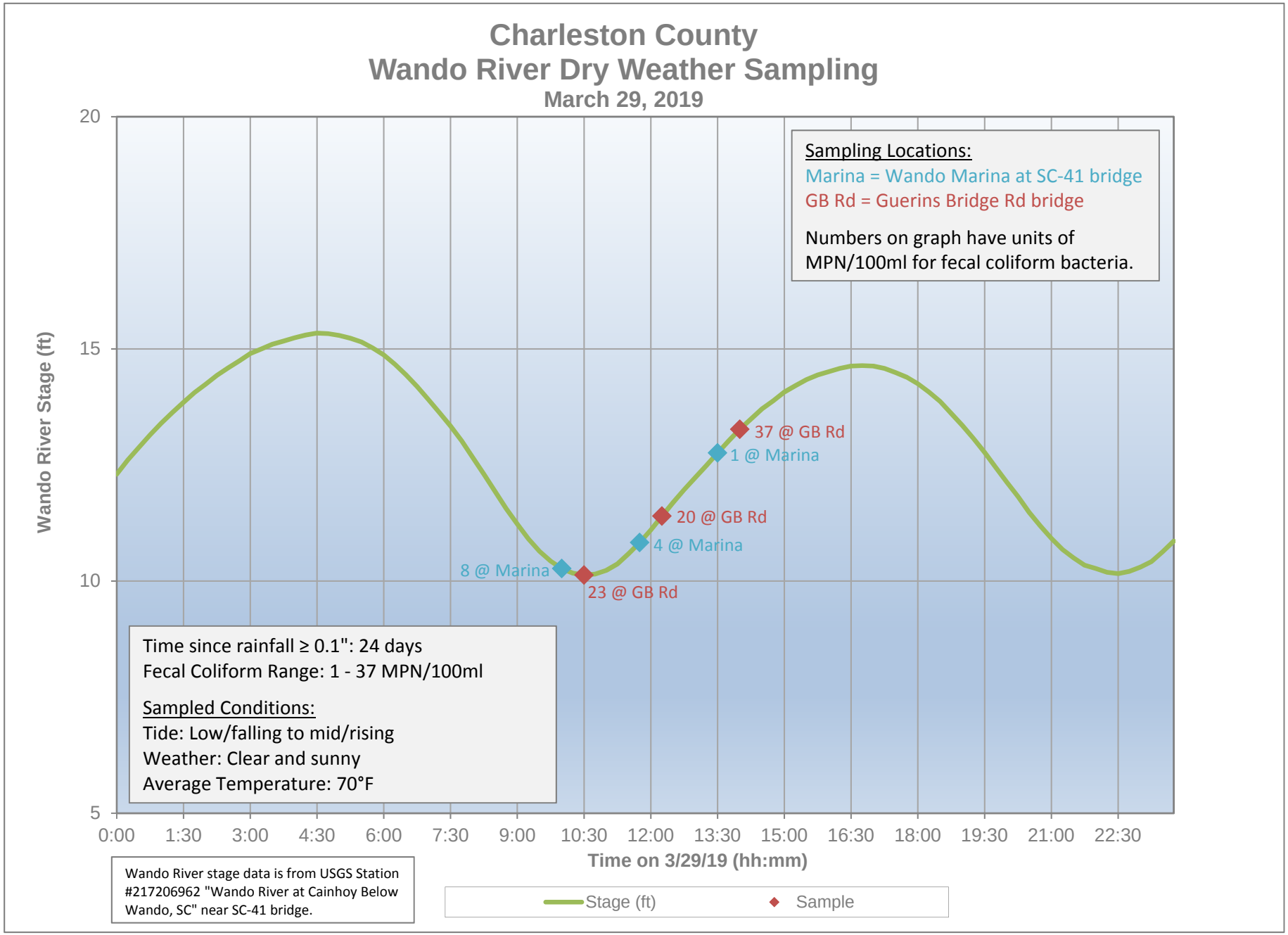


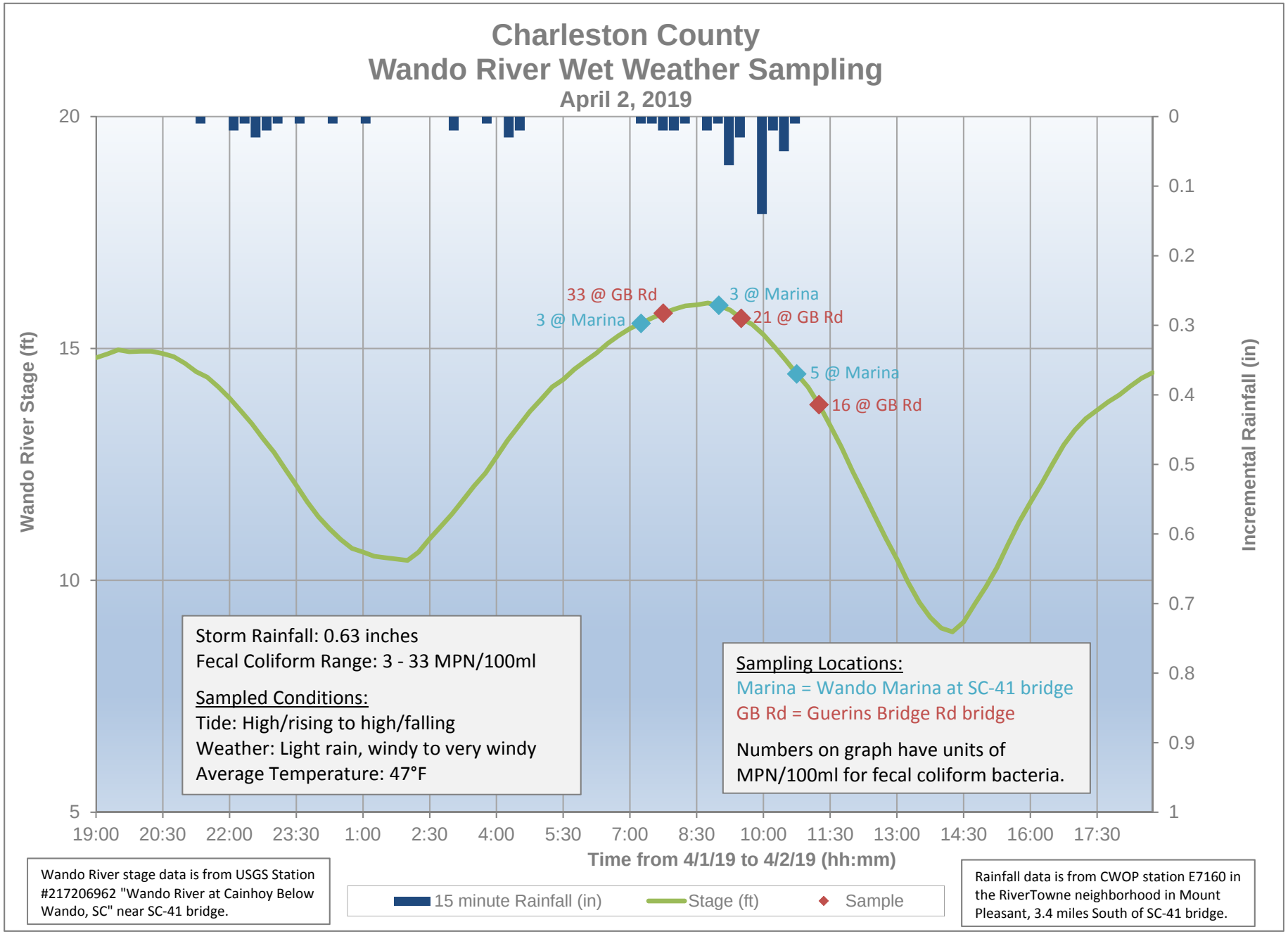

Charleston County
Wando River Wet Weather Sampling
December 14, 2018
Wando River Stage (ft)
Incremental Rainfall (in)
Time on 12/14/18 (hh:mm)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
228 @ Marina
908 @ GB Rd
1,054 @ GB Rd
30 @ Marina
754 @ GB Rd
50 @ Marina
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
Storm Rainfall: 3.38 inches
Total Rainfall Shown: 3.54 inches
Fecal Coliform Range: 30 - 1,054 MPN/100ml
Sampled Conditions:
Tide: Mid/rising to high
Weather: Steady to heavy rainfall
Average Temperature: 63°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from CWOP station E7160 in the RiverTowne neighborhood in Mount Pleasant, 3.4 miles South of SC-41 bridge.


Charleston County
Wando River Dry Weather Sampling
January 29, 2019
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 1/29/19 (hh:mm)
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
144 @ GB Rd
4 @ Marina
131 @ GB Rd
5 @ Marina
70 @ GB Rd
6 @ Marina
Time since rainfall ≥ 0.1": 5 days
Fecal Coliform Range: 4 - 144 MPN/100ml
Sampled Conditions:
Tide: Low/rising to high/rising
Weather: Cloudy
Average Temperature: 58°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

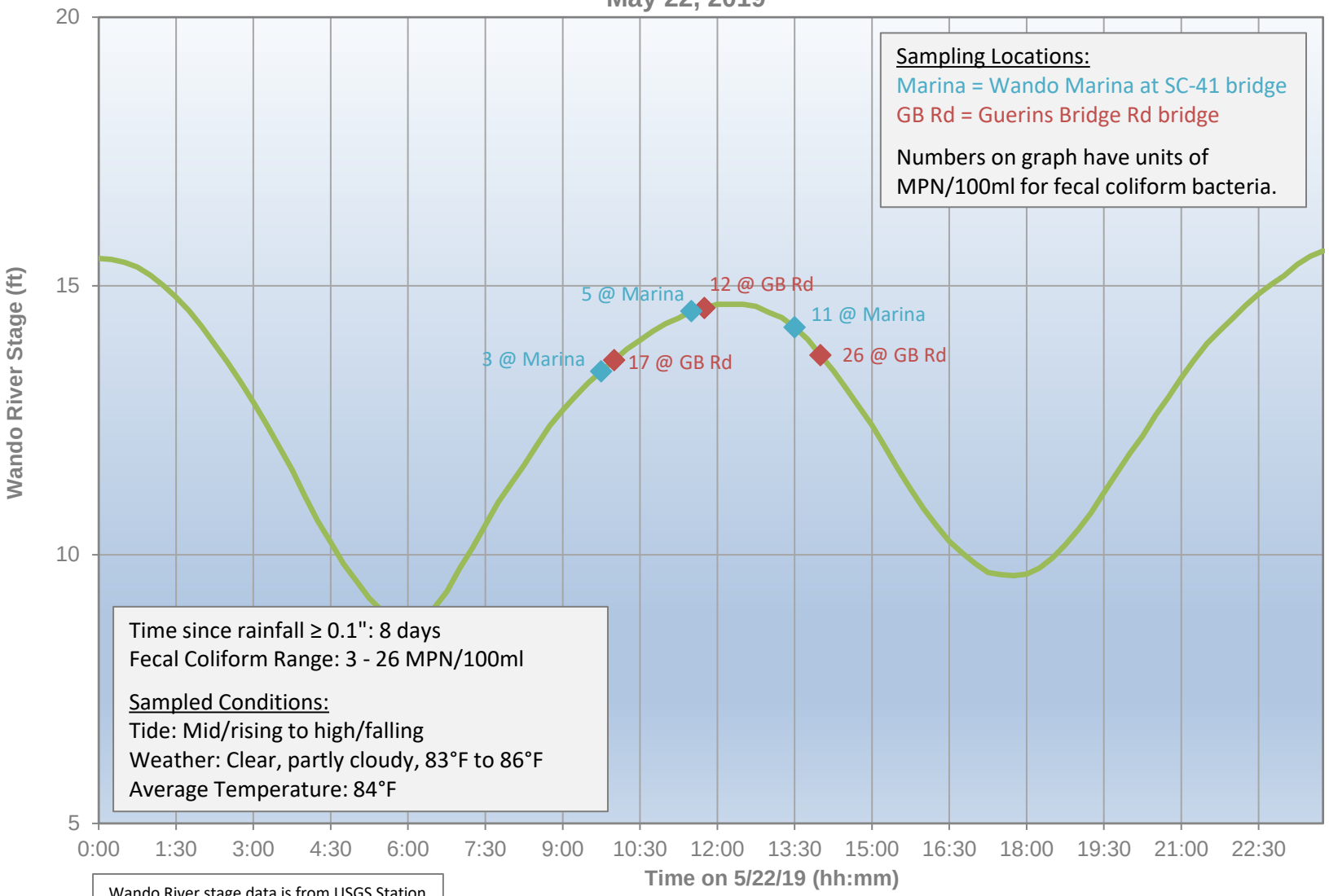
Charleston County
Wando River Dry Weather Sampling
February 28, 2019




Charleston County
Wando River Dry Weather Sampling
March 29, 2019
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 3/29/19 (hh:mm)
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
37 @ GB Rd
1 @ Marina
20 @ GB Rd
4 @ Marina
8 @ Marina
23 @ GB Rd
Time since rainfall ≥ 0.1": 24 days
Fecal Coliform Range: 1 - 37 MPN/100ml
Sampled Conditions:
Tide: Low/falling to mid/rising
Weather: Clear and sunny
Average Temperature: 70°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample


Charleston County
Wando River Wet Weather Sampling
April 2, 2019
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
33 @ GB Rd
3 @ Marina
3 @ Marina
21 @ GB Rd
5 @ Marina
16 @ GB Rd
19:00
20:30
22:00
23:30
1:00
2:30
4:00
5:30
7:00
8:30
10:00
11:30
13:00
14:30
16:00
17:30
Time from 4/1/19 to 4/2/19 (hh:mm)
Storm Rainfall: 0.63 inches
Fecal Coliform Range: 3 - 33 MPN/100ml
Sampled Conditions:
Tide: High/rising to high/falling
Weather: Light rain, windy to very windy
Average Temperature: 47°F
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from CWOP station E7160 in the RiverTowne neighborhood in Mount Pleasant, 3.4 miles South of SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
May 22, 2019



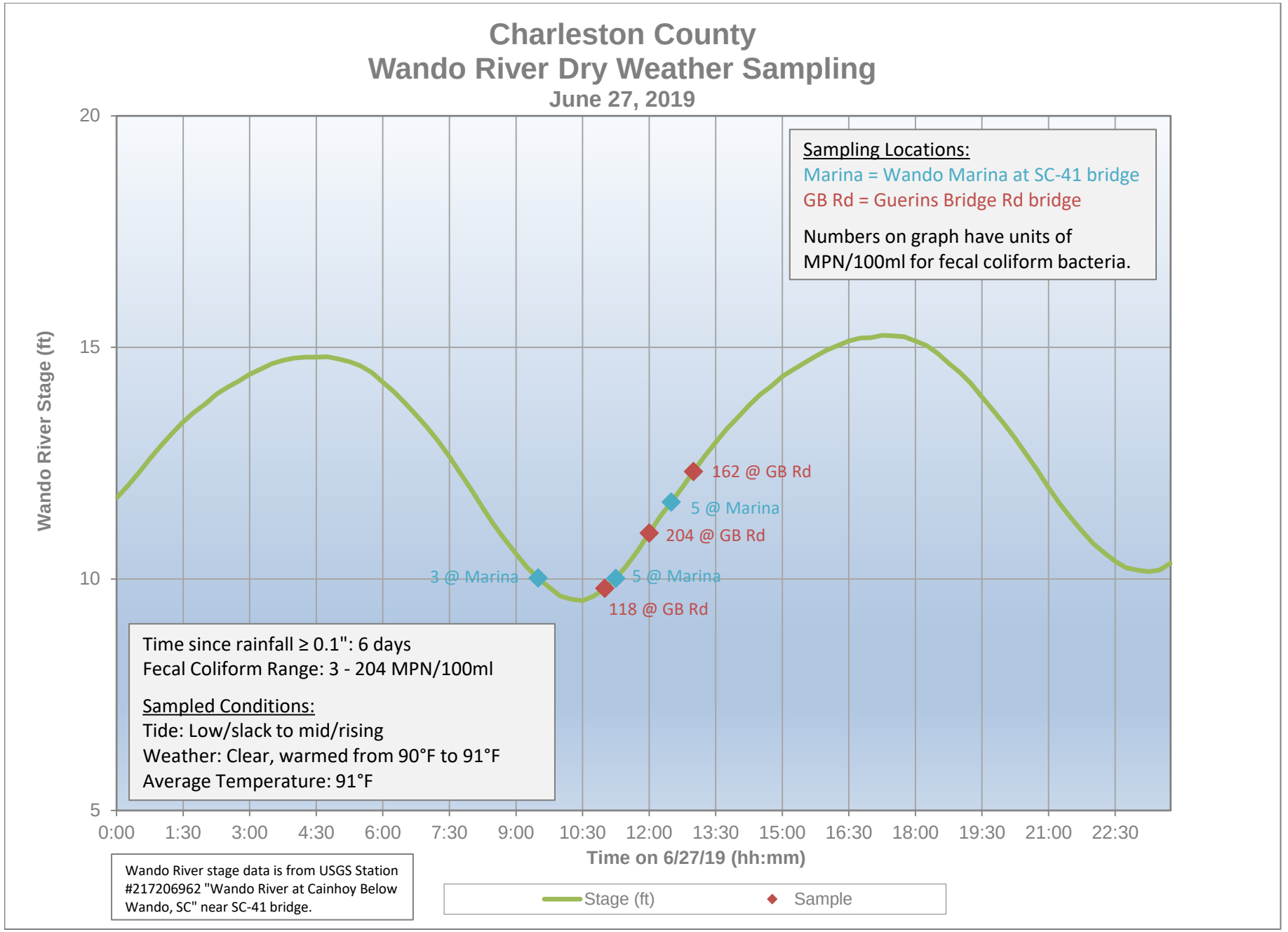
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge

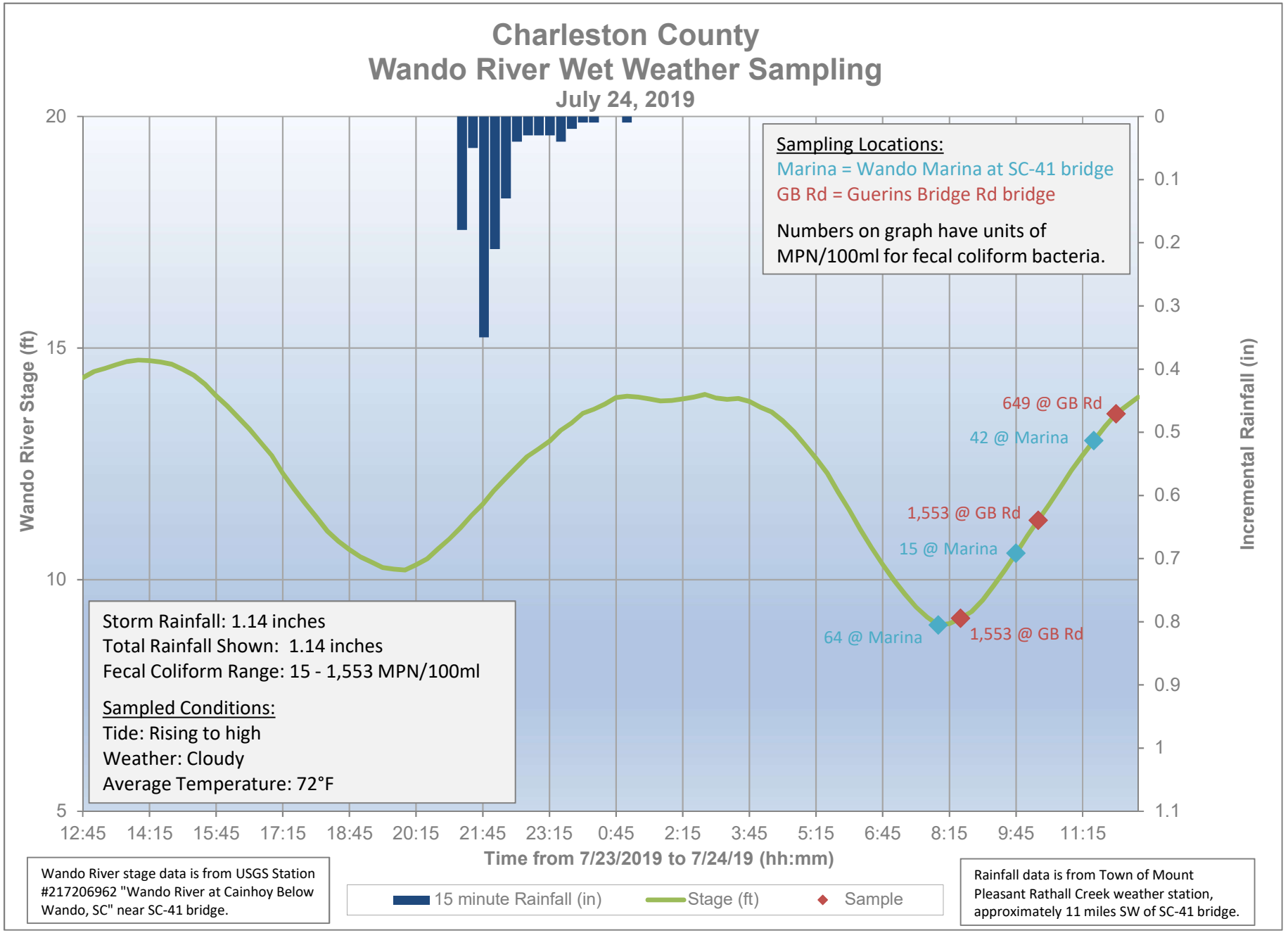
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.

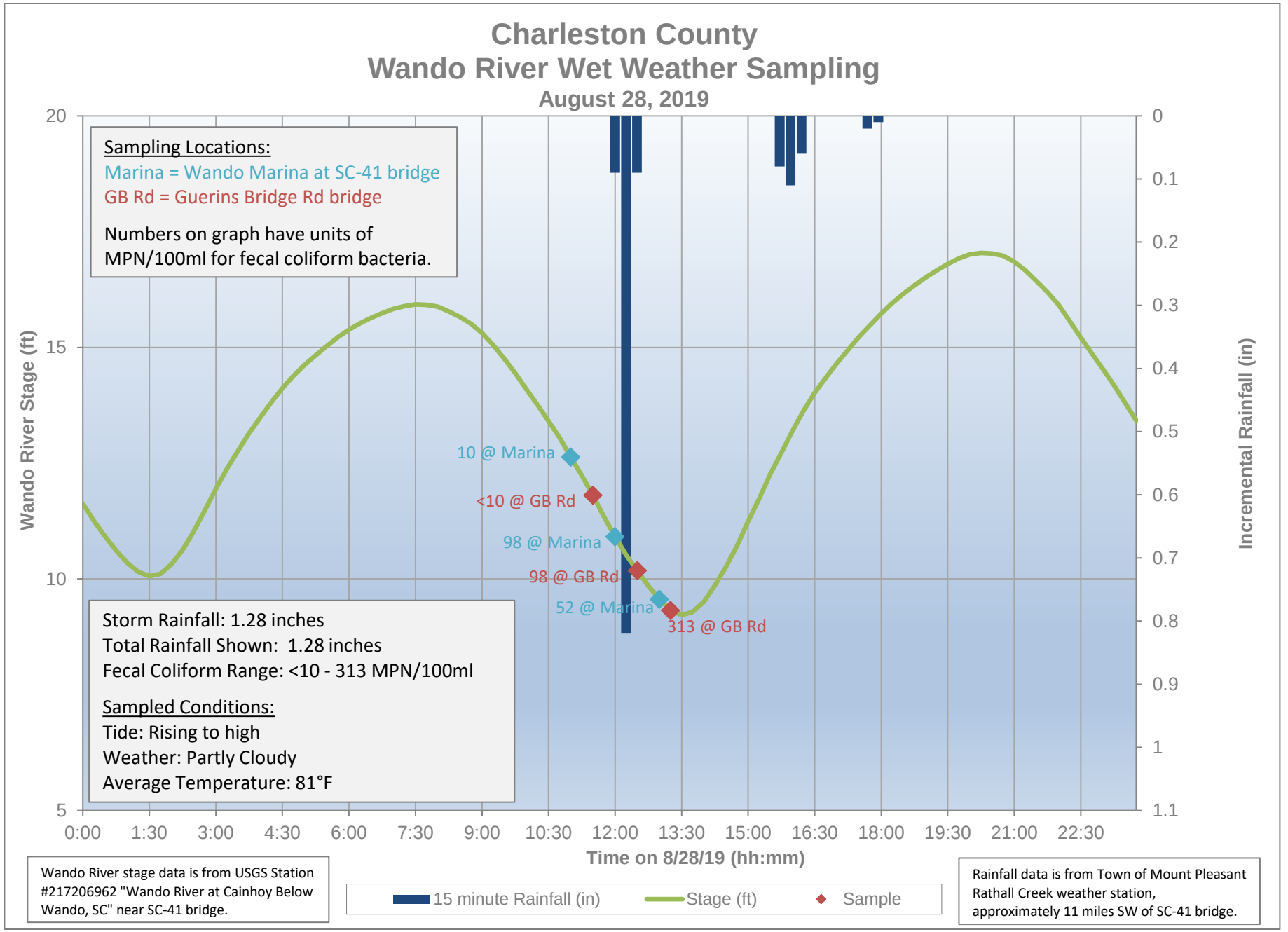
Time since rainfall ≥ 0.1": 8 days
Fecal Coliform Range: 3 - 26 MPN/100ml

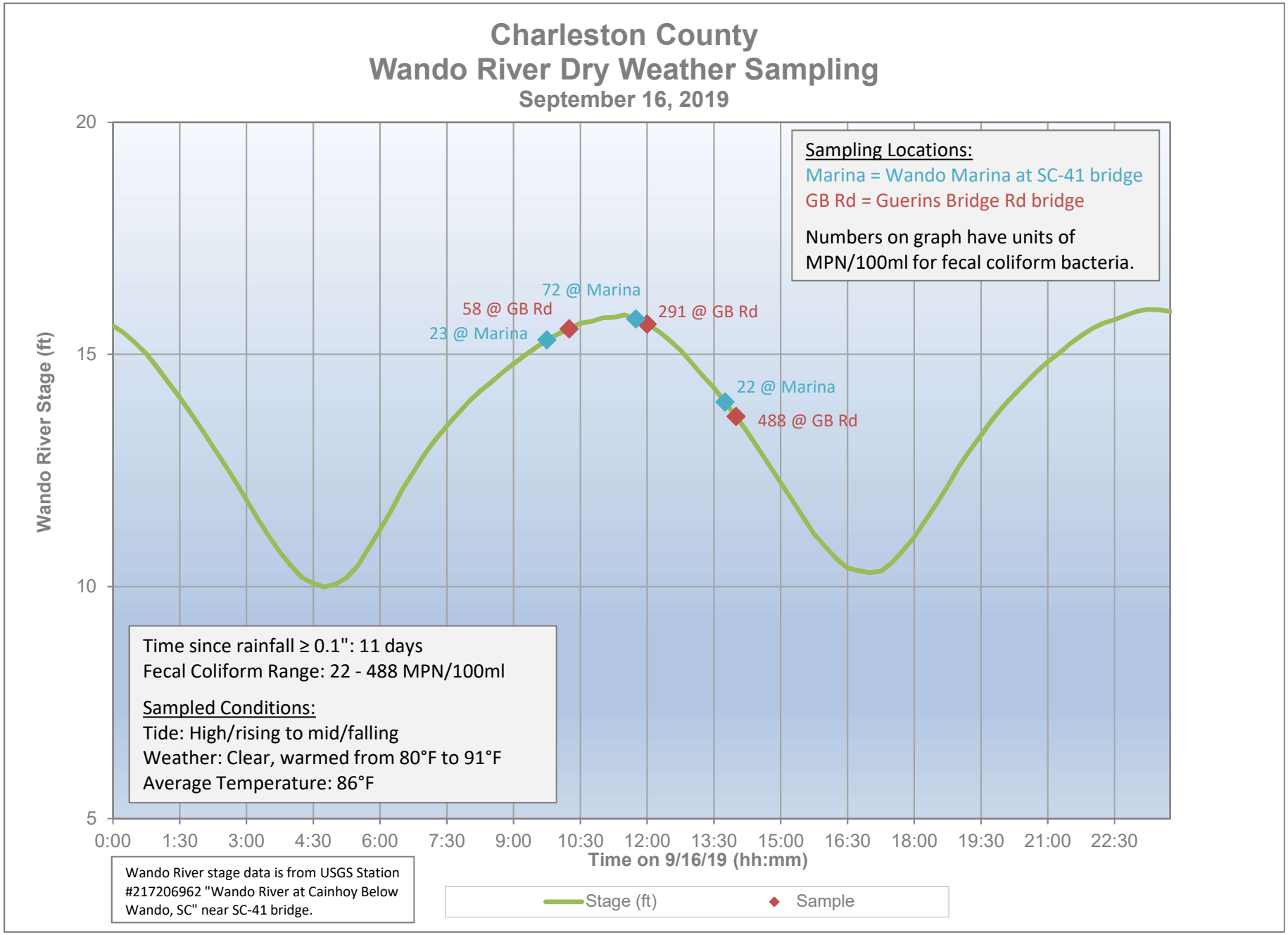
Sampled Conditions:
Tide: Mid/rising to high/falling
Weather: Clear, partly cloudy, 83°F to 86°F
Average Temperature: 84°F

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

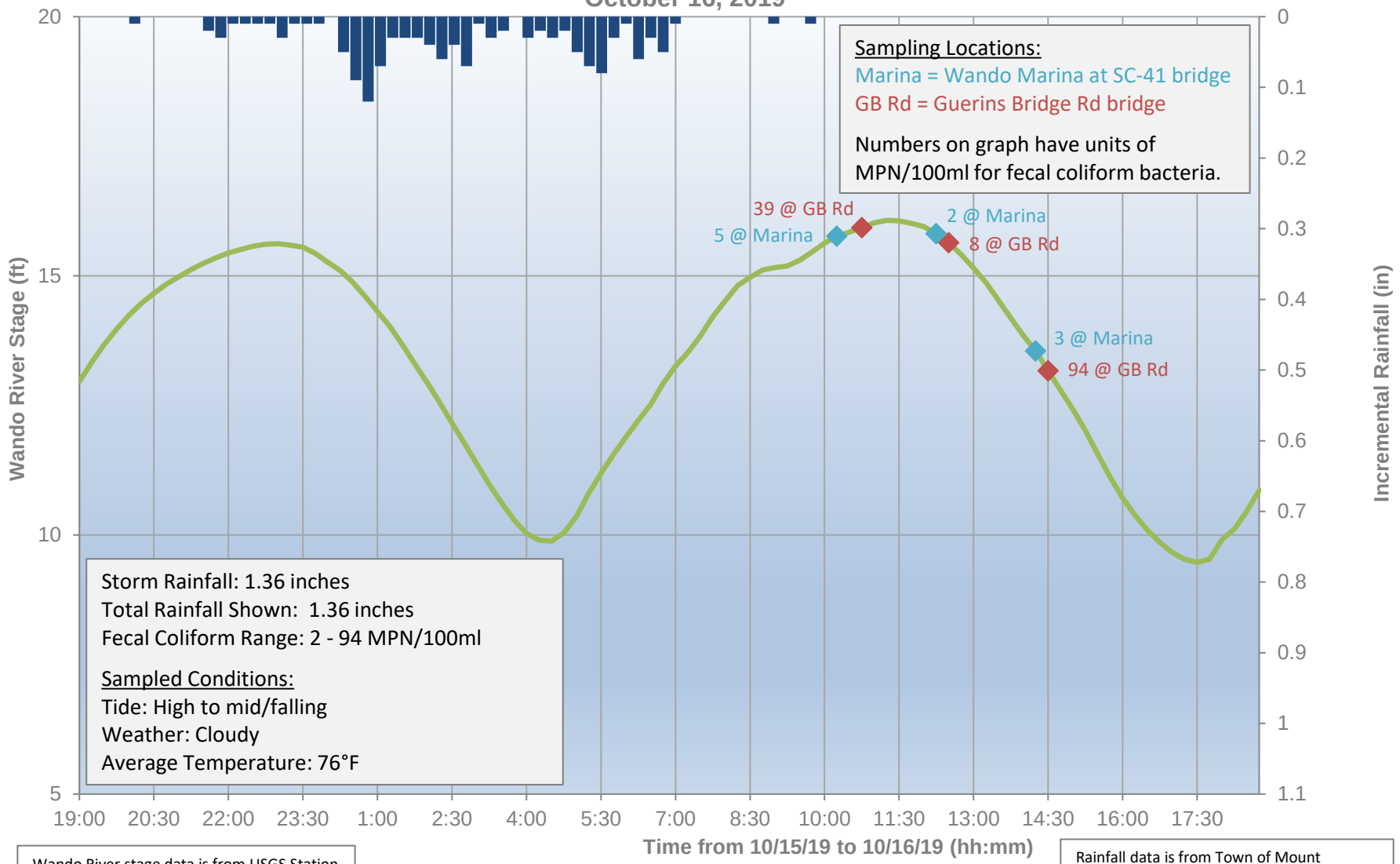

Charleston County
Wando River Dry Weather Sampling
June 27, 2019
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 6/27/19 (hh:mm)
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
3 @ Marina
5 @ Marina
118 @ GB Rd
204 @ GB Rd
5 @ Marina
162 @ GB Rd
Time since rainfall ≥ 0.1": 6 days
Fecal Coliform Range: 3 - 204 MPN/100ml
Sampled Conditions:
Tide: Low/slack to mid/rising
Weather: Clear, warmed from 90°F to 91°F
Average Temperature: 91°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample


Charleston County
Wando River Wet Weather Sampling
July 24, 2019
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
649 @ GB Rd
42 @ Marina
1,553 @ GB Rd
15 @ Marina
64 @ Marina
1,553 @ GB Rd
Storm Rainfall: 1.14 inches
Total Rainfall Shown: 1.14 inches
Fecal Coliform Range: 15 - 1,553 MPN/100ml
Sampled Conditions:
Tide: Rising to high
Weather: Cloudy
Average Temperature: 72°F
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
12:45
14:15
15:45
17:15
18:45
20:15
21:45
23:15
0:45
2:15
3:45
5:15
6:45
8:15
9:45
11:15
Time from 7/23/2019 to 7/24/19 (hh:mm)
15 minute Rainfall (in)
Stage (ft)
Sample
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.


Charleston County
Wando River Wet Weather Sampling
August 28, 2019
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
10 @ Marina
<10 @ GB Rd
98 @ Marina
98 @ GB Rd
52 @ Marina
313 @ GB Rd
Storm Rainfall: 1.28 inches
Total Rainfall Shown: 1.28 inches
Fecal Coliform Range: <10 - 313 MPN/100ml
Sampled Conditions:
Tide: Rising to high
Weather: Partly Cloudy
Average Temperature: 81°F
Wando River Stage (ft)
Incremental Rainfall (in)
Time on 8/28/19 (hh:mm)
0:00 1:30 3:00 4:30 6:00 7:30 9:00 10:30 12:00 13:30 15:00 16:30 18:00 19:30 21:00 22:30
20 15 10 5
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

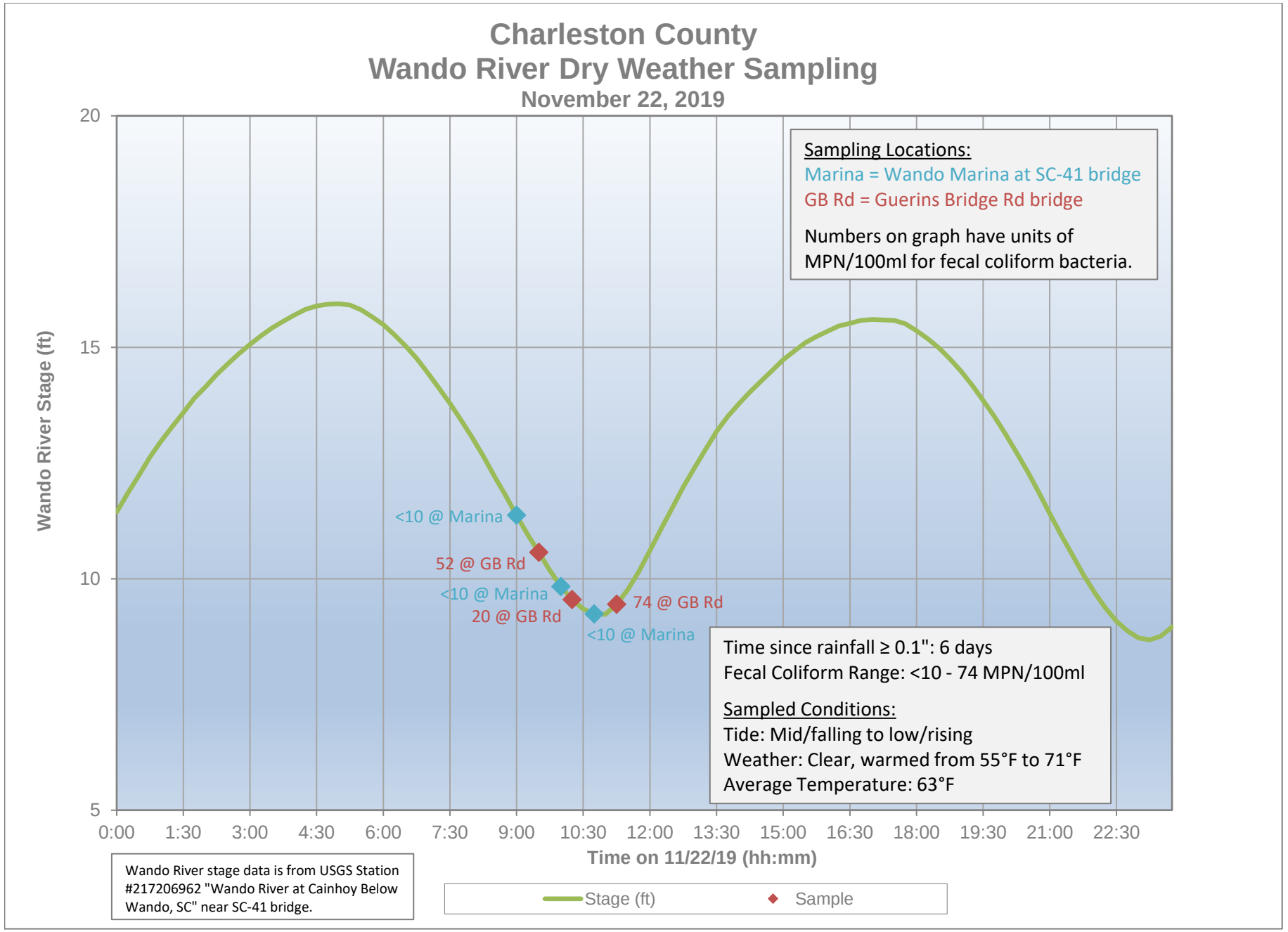

Charleston County
Wando River Dry Weather Sampling
September 16, 2019
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 9/16/19 (hh:mm)
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
72 @ Marina
58 @ GB Rd
291 @ GB Rd
23 @ Marina
22 @ Marina
488 @ GB Rd
Time since rainfall ≥ 0.1": 11 days
Fecal Coliform Range: 22 - 488 MPN/100ml
Sampled Conditions:
Tide: High/rising to mid/falling
Weather: Clear, warmed from 80°F to 91°F
Average Temperature: 86°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

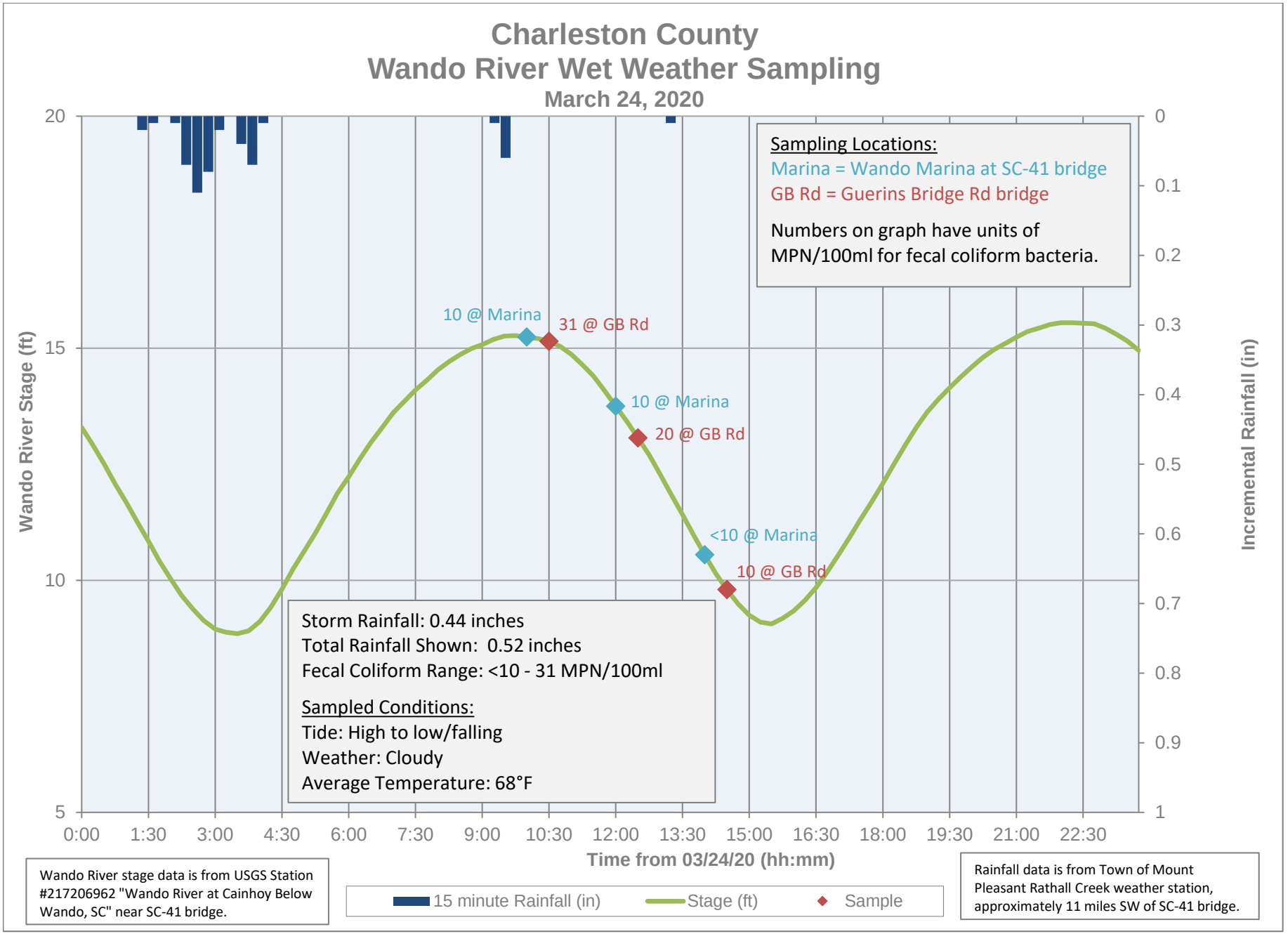
Charleston County
Wando River Wet Weather Sampling
October 16, 2019

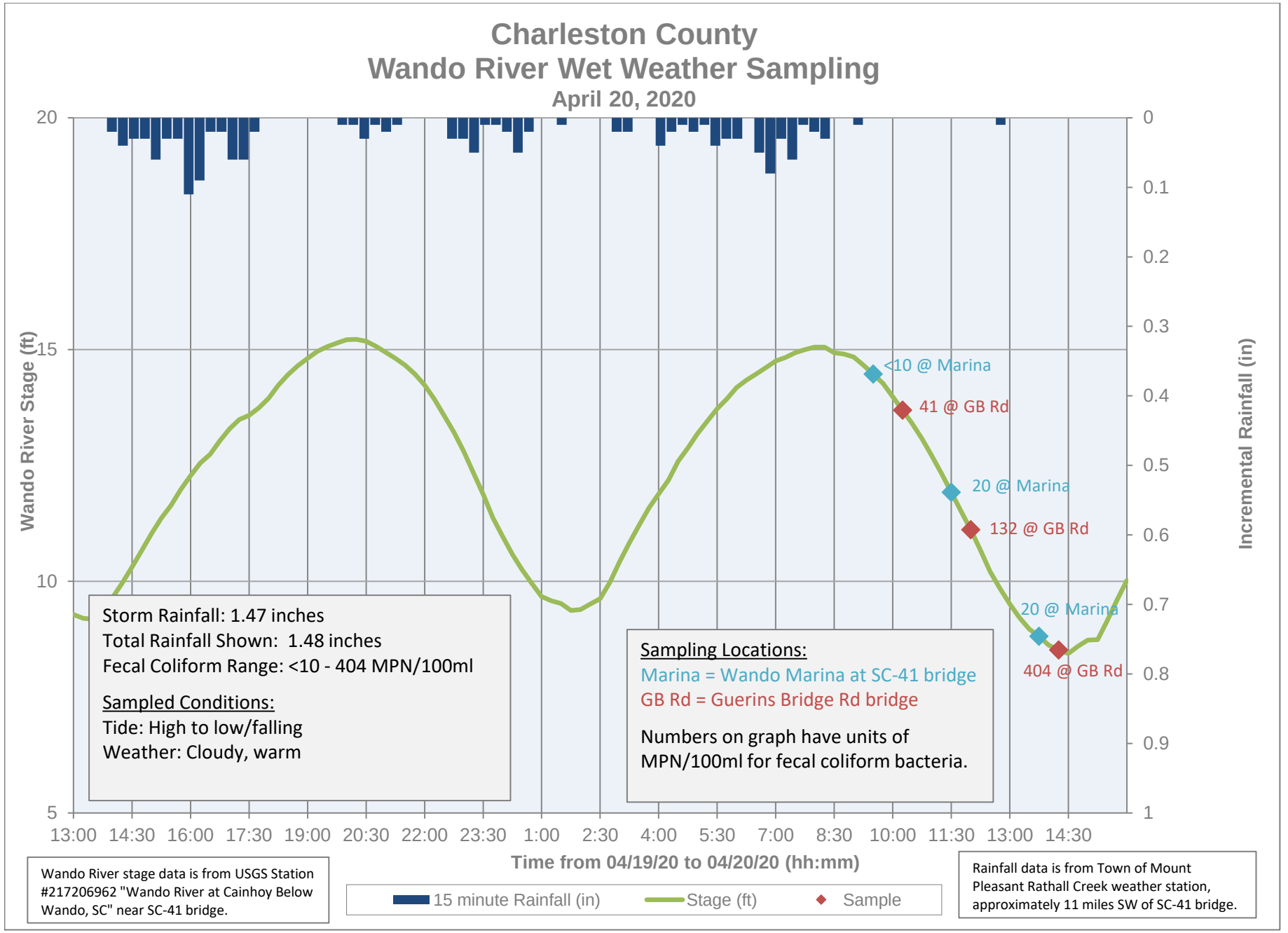


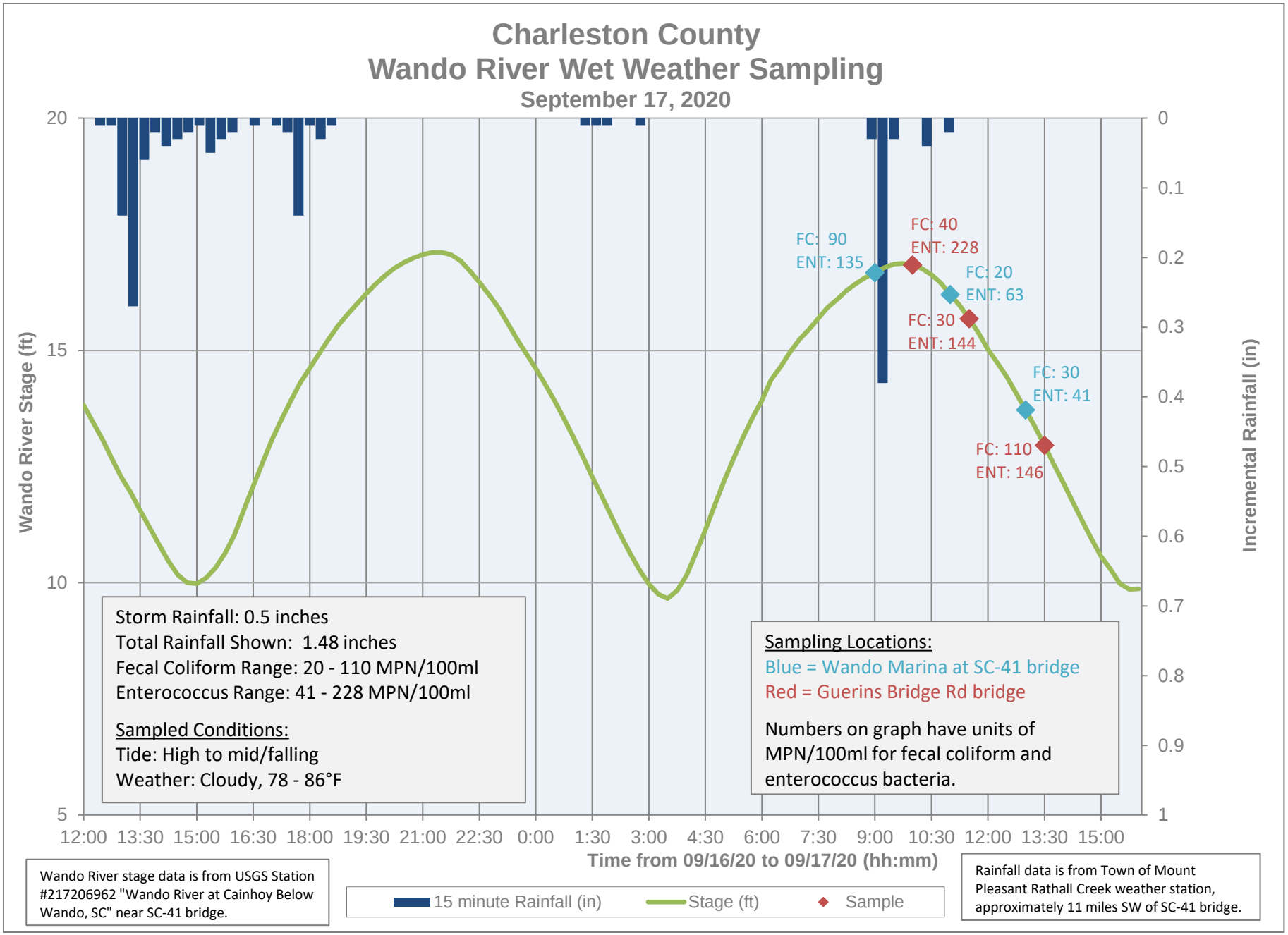
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

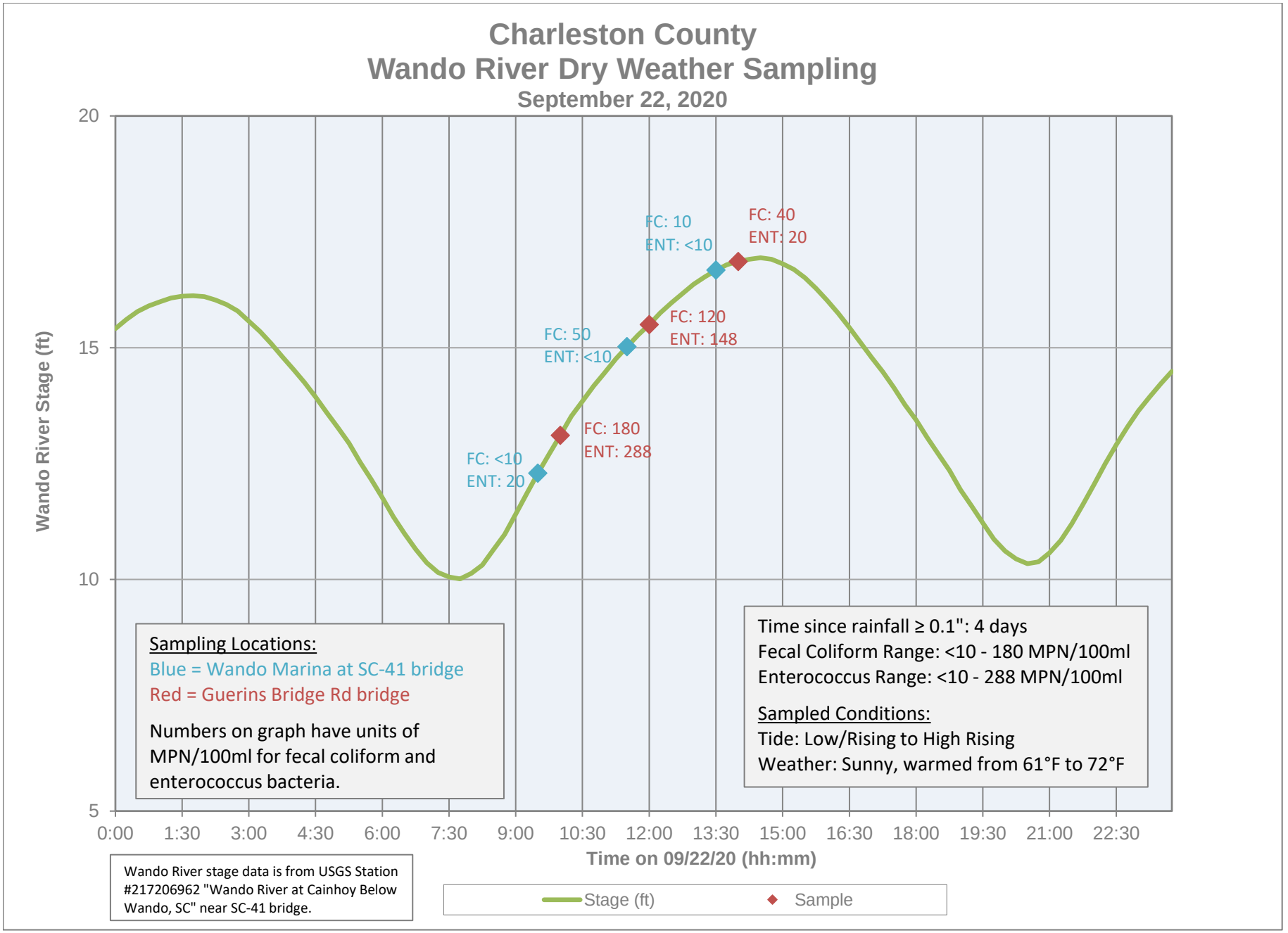
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

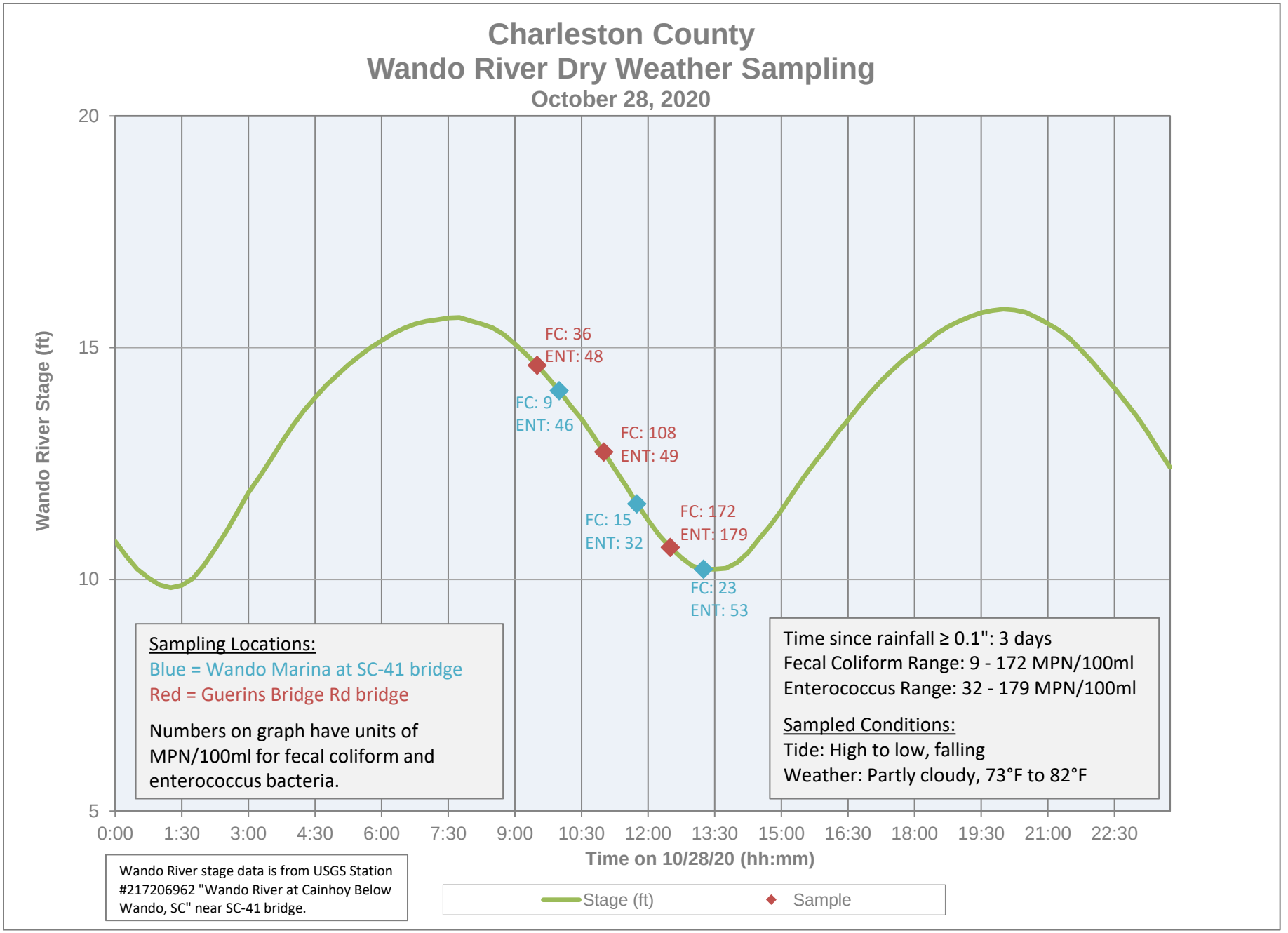

Charleston County
Wando River Dry Weather Sampling
November 22, 2019
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 11/22/19 (hh:mm)
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
<10 @ Marina
52 @ GB Rd
<10 @ Marina
20 @ GB Rd
74 @ GB Rd
<10 @ Marina
Time since rainfall ≥ 0.1": 6 days
Fecal Coliform Range: <10 - 74 MPN/100ml
Sampled Conditions:
Tide: Mid/falling to low/rising
Weather: Clear, warmed from 55°F to 71°F
Average Temperature: 63°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

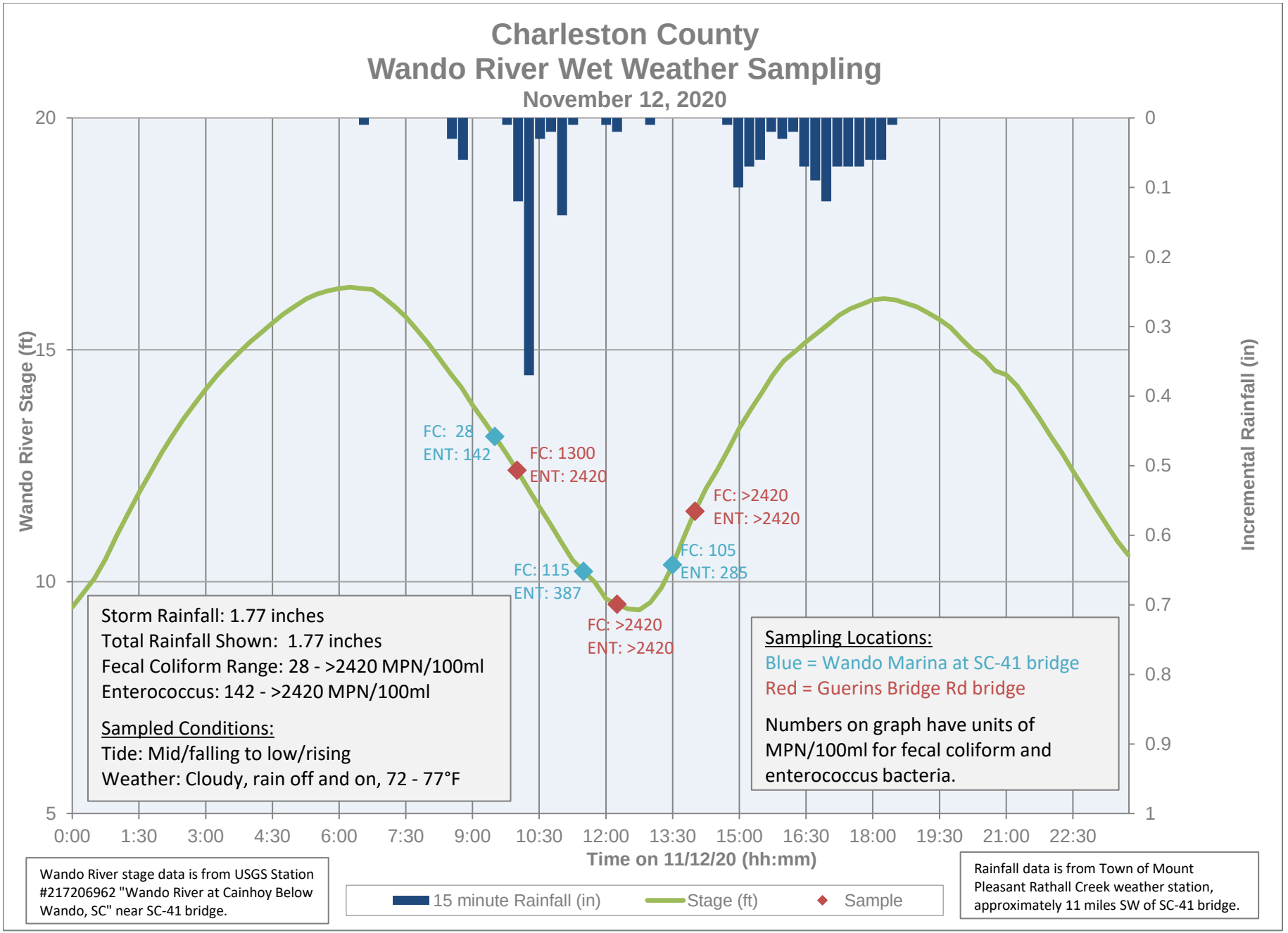

Charleston County
Wando River Wet Weather Sampling
March 24, 2020
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
10 @ Marina
31 @ GB Rd
10 @ Marina
20 @ GB Rd
<10 @ Marina
10 @ GB Rd
Storm Rainfall: 0.44 inches
Total Rainfall Shown: 0.52 inches
Fecal Coliform Range: <10 - 31 MPN/100ml
Sampled Conditions:
Tide: High to low/falling
Weather: Cloudy
Average Temperature: 68°F
Wando River Stage (ft)
Incremental Rainfall (in)
Time from 03/24/20 (hh:mm)
0:00 1:30 3:00 4:30 6:00 7:30 9:00 10:30 12:00 13:30 15:00 16:30 18:00 19:30 21:00 22:30
20 15 10 5
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 minute Rainfall (in)
Stage (ft)
Sample
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

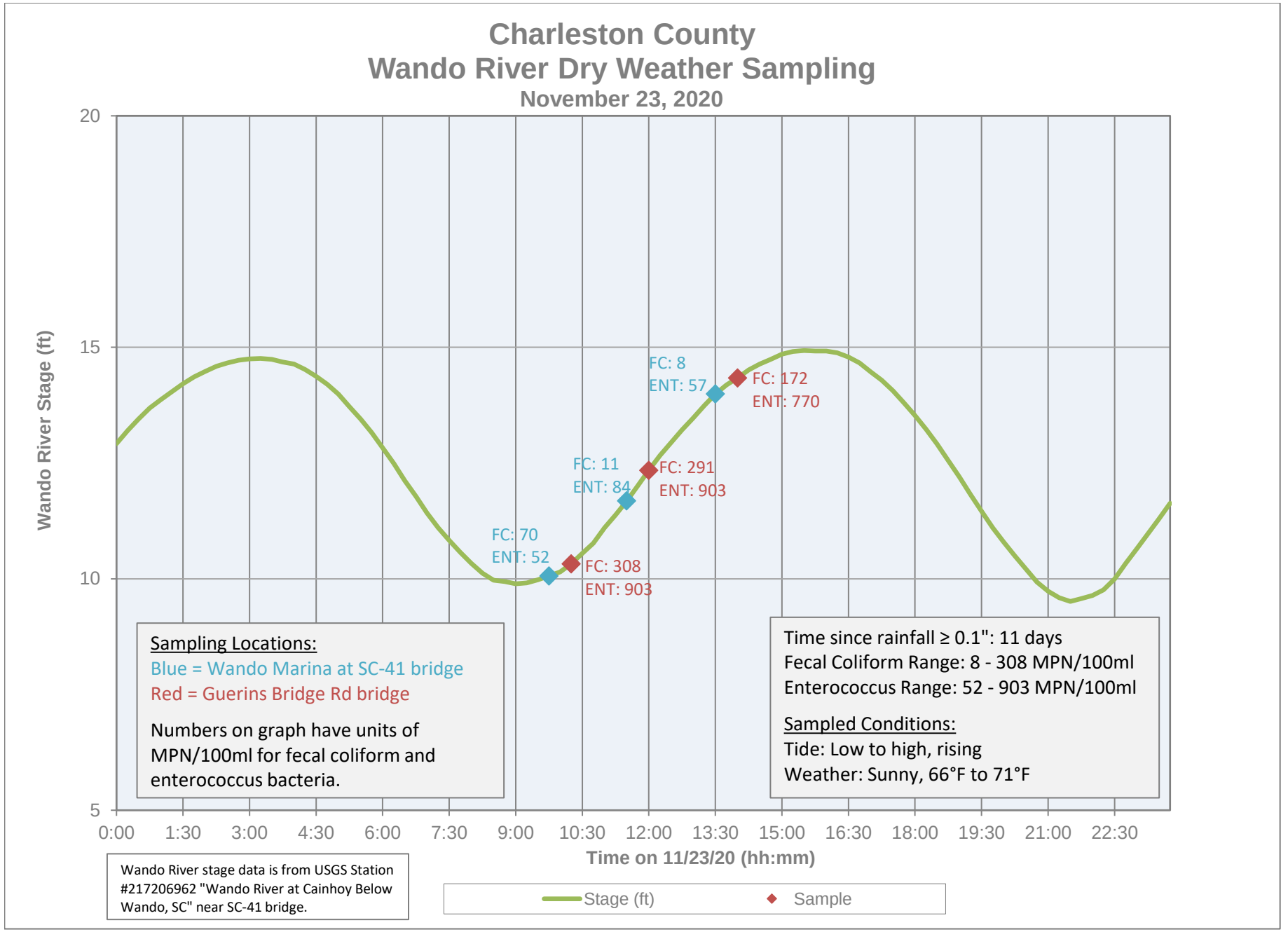

Charleston County
Wando River Wet Weather Sampling
April 20, 2020
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
13:00
14:30
16:00
17:30
19:00
20:30
22:00
23:30
1:00
2:30
4:00
5:30
7:00
8:30
10:00
11:30
13:00
14:30
<10 @ Marina
41 @ GB Rd
20 @ Marina
132 @ GB Rd
20 @ Marina
404 @ GB Rd
Storm Rainfall: 1.47 inches
Total Rainfall Shown: 1.48 inches
Fecal Coliform Range: <10 - 404 MPN/100ml
Sampled Conditions:
Tide: High to low/falling
Weather: Cloudy, warm
Sampling Locations:
Marina = Wando Marina at SC-41 bridge
GB Rd = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform bacteria.
Time from 04/19/20 to 04/20/20 (hh:mm)
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

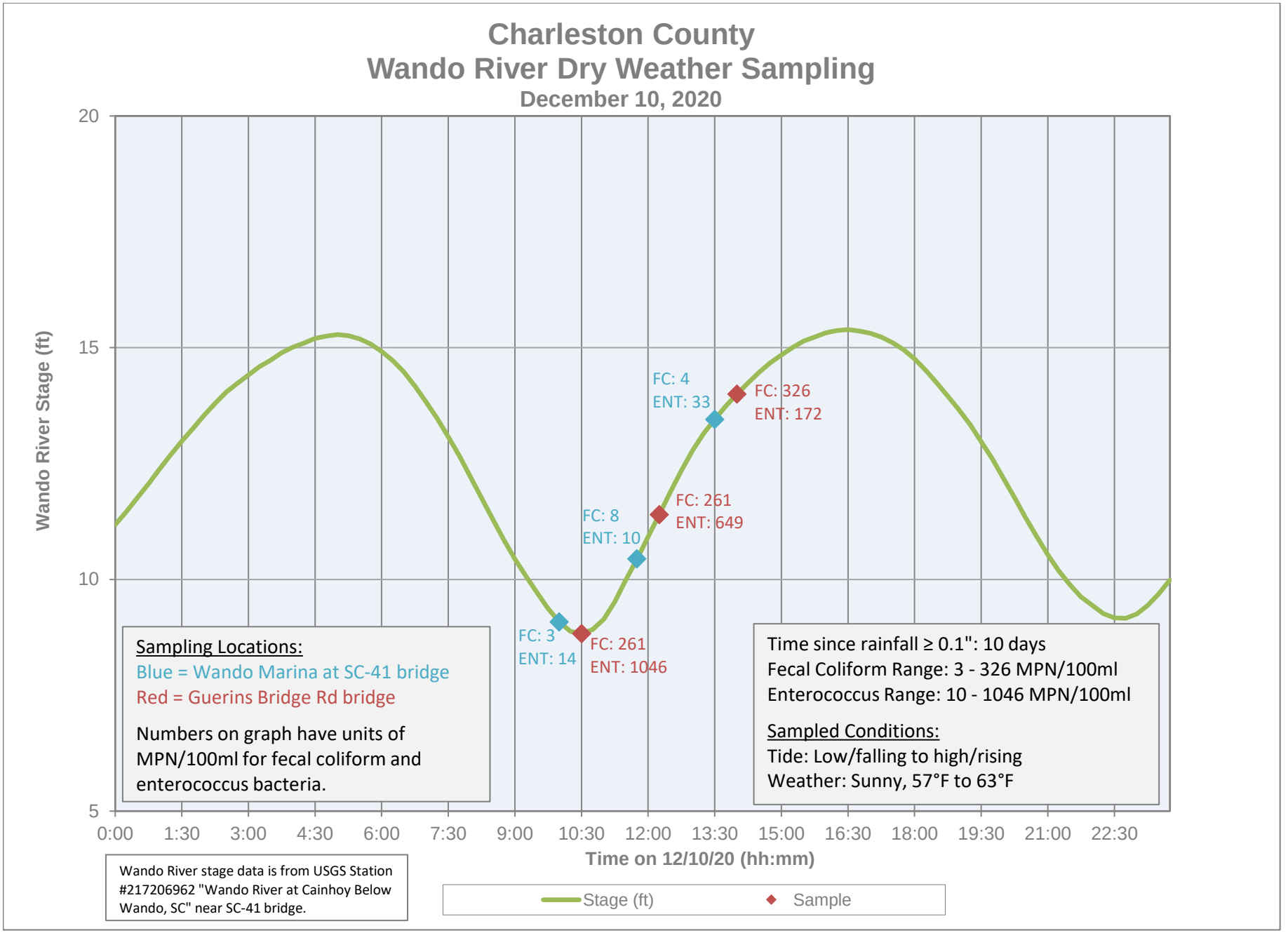

Charleston County
Wando River Wet Weather Sampling
September 17, 2020
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
12:00 13:30 15:00 16:30 18:00 19:30 21:00 22:30 0:00 1:30 3:00 4:30 6:00 7:30 9:00 10:30 12:00 13:30 15:00
Time from 09/16/20 to 09/17/20 (hh:mm)
FC: 90
ENT: 135
FC: 40
ENT: 228
FC: 20
ENT: 63
FC: 30
ENT: 144
FC: 30
ENT: 41
FC: 110
ENT: 146
Storm Rainfall: 0.5 inches
Total Rainfall Shown: 1.48 inches
Fecal Coliform Range: 20 - 110 MPN/100ml
Enterococcus Range: 41 - 228 MPN/100ml
Sampled Conditions:
Tide: High to mid/falling
Weather: Cloudy, 78 - 86°F
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

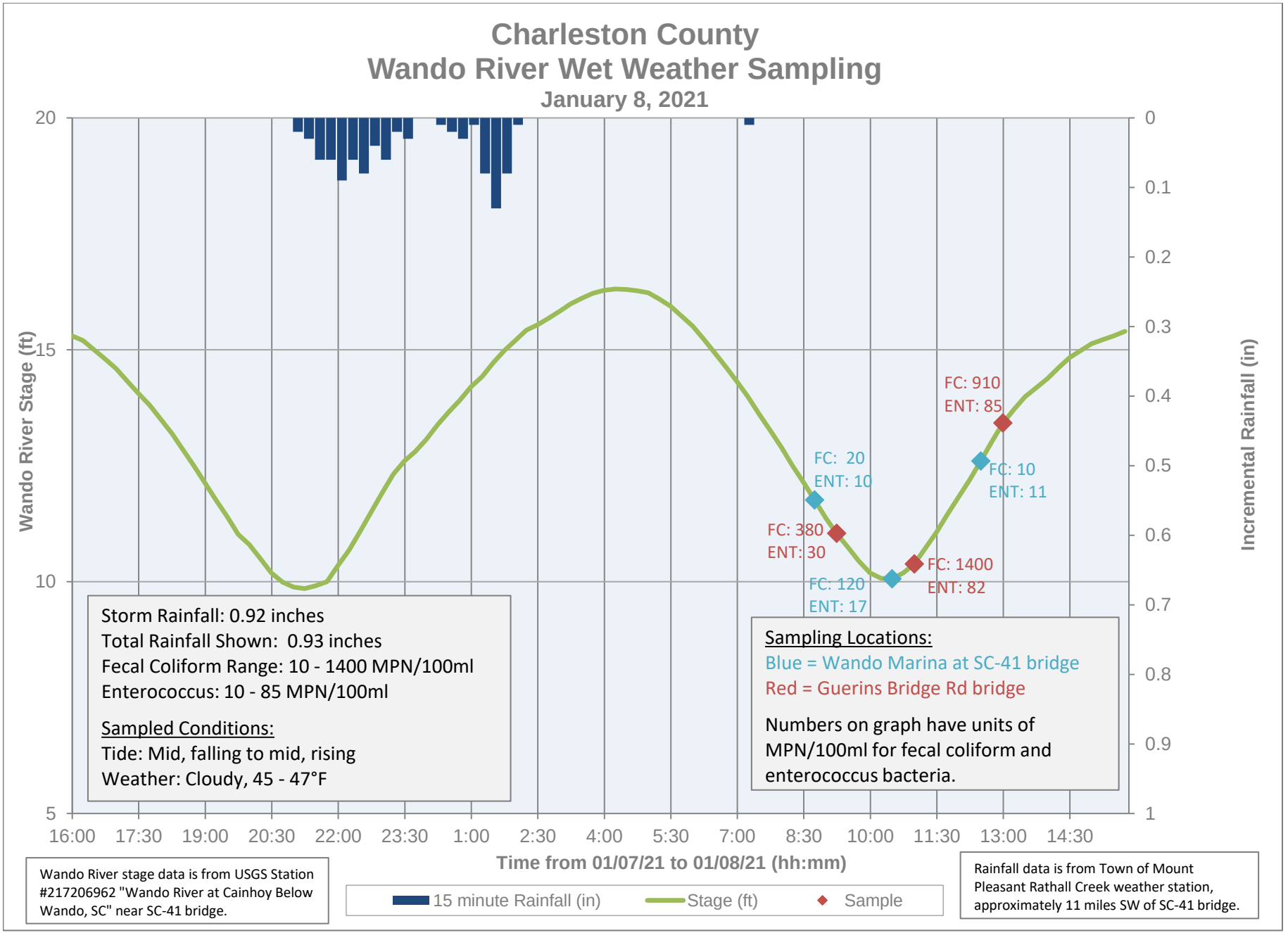

Charleston County
Wando River Dry Weather Sampling
September 22, 2020
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 09/22/20 (hh:mm)
FC: <10
ENT: 20
FC: 180
ENT: 288
FC: 50
ENT: <10
FC: 120
ENT: 148
FC: 10
ENT: <10
FC: 40
ENT: 20
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 4 days
Fecal Coliform Range: <10 - 180 MPN/100ml
Enterococcus Range: <10 - 288 MPN/100ml
Sampled Conditions:
Tide: Low/Rising to High Rising
Weather: Sunny, warmed from 61°F to 72°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample


Charleston County
Wando River Dry Weather Sampling
October 28, 2020
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 10/28/20 (hh:mm)
FC: 36
ENT: 48
FC: 9
ENT: 46
FC: 108
ENT: 49
FC: 15
ENT: 32
FC: 172
ENT: 179
FC: 23
ENT: 53
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 3 days
Fecal Coliform Range: 9 - 172 MPN/100ml
Enterococcus Range: 32 - 179 MPN/100ml
Sampled Conditions:
Tide: High to low, falling
Weather: Partly cloudy, 73°F to 82°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

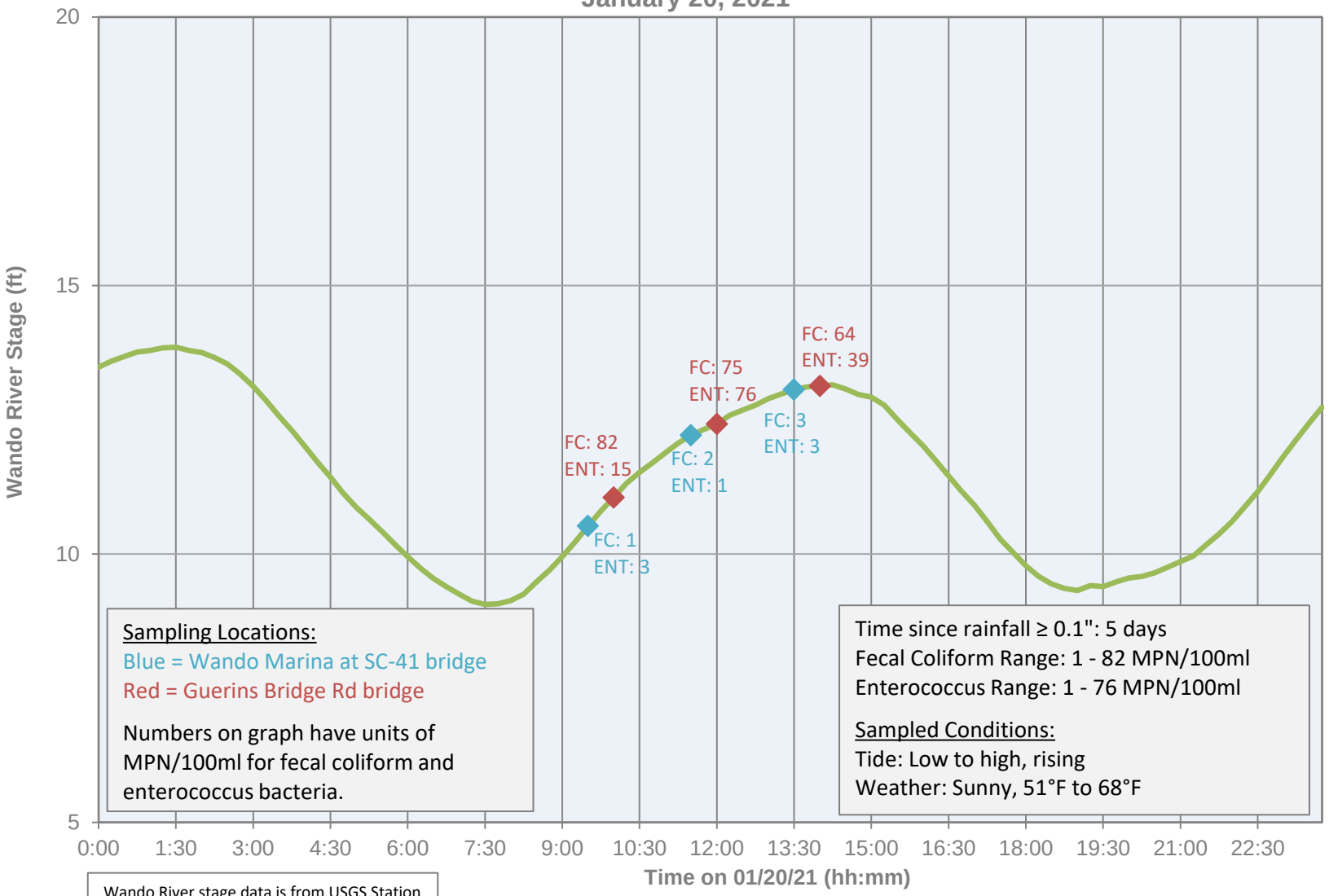

Charleston County
Wando River Wet Weather Sampling
November 12, 2020
Wando River Stage (ft)
Incremental Rainfall (in)
Time on 11/12/20 (hh:mm)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
FC: 28
ENT: 142
FC: 1300
ENT: 2420
FC: 115
ENT: 387
FC: >2420
ENT: >2420
FC: >2420
ENT: >2420
FC: 105
ENT: 285
Storm Rainfall: 1.77 inches
Total Rainfall Shown: 1.77 inches
Fecal Coliform Range: 28 - >2420 MPN/100ml
Enterococcus: 142 - >2420 MPN/100ml
Sampled Conditions:
Tide: Mid/falling to low/rising
Weather: Cloudy, rain off and on, 72 - 77°F
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.


Charleston County
Wando River Dry Weather Sampling
November 23, 2020
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 11/23/20 (hh:mm)
FC: 70
ENT: 52
FC: 308
ENT: 903
FC: 11
ENT: 84
FC: 291
ENT: 903
FC: 8
ENT: 57
FC: 172
ENT: 770
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 11 days
Fecal Coliform Range: 8 - 308 MPN/100ml
Enterococcus Range: 52 - 903 MPN/100ml
Sampled Conditions:
Tide: Low to high, rising
Weather: Sunny, 66°F to 71°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample


Charleston County
Wando River Dry Weather Sampling
December 10, 2020
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 12/10/20 (hh:mm)
FC: 3
ENT: 14
FC: 261
ENT: 1046
FC: 8
ENT: 10
FC: 261
ENT: 649
FC: 4
ENT: 33
FC: 326
ENT: 172
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 10 days
Fecal Coliform Range: 3 - 326 MPN/100ml
Enterococcus Range: 10 - 1046 MPN/100ml
Sampled Conditions:
Tide: Low/falling to high/rising
Weather: Sunny, 57°F to 63°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample


Charleston County
Wando River Wet Weather Sampling
January 8, 2021
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
16:00
17:30
19:00
20:30
22:00
23:30
1:00
2:30
4:00
5:30
7:00
8:30
10:00
11:30
13:00
14:30
Time from 01/07/21 to 01/08/21 (hh:mm)
FC: 910
ENT: 85
FC: 20
ENT: 10
FC: 10
ENT: 11
FC: 380
ENT: 30
FC: 1400
ENT: 82
FC: 120
ENT: 17
Storm Rainfall: 0.92 inches
Total Rainfall Shown: 0.93 inches
Fecal Coliform Range: 10 - 1400 MPN/100ml
Enterococcus: 10 - 85 MPN/100ml
Sampled Conditions:
Tide: Mid, falling to mid, rising
Weather: Cloudy, 45 - 47°F
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
January 20, 2021



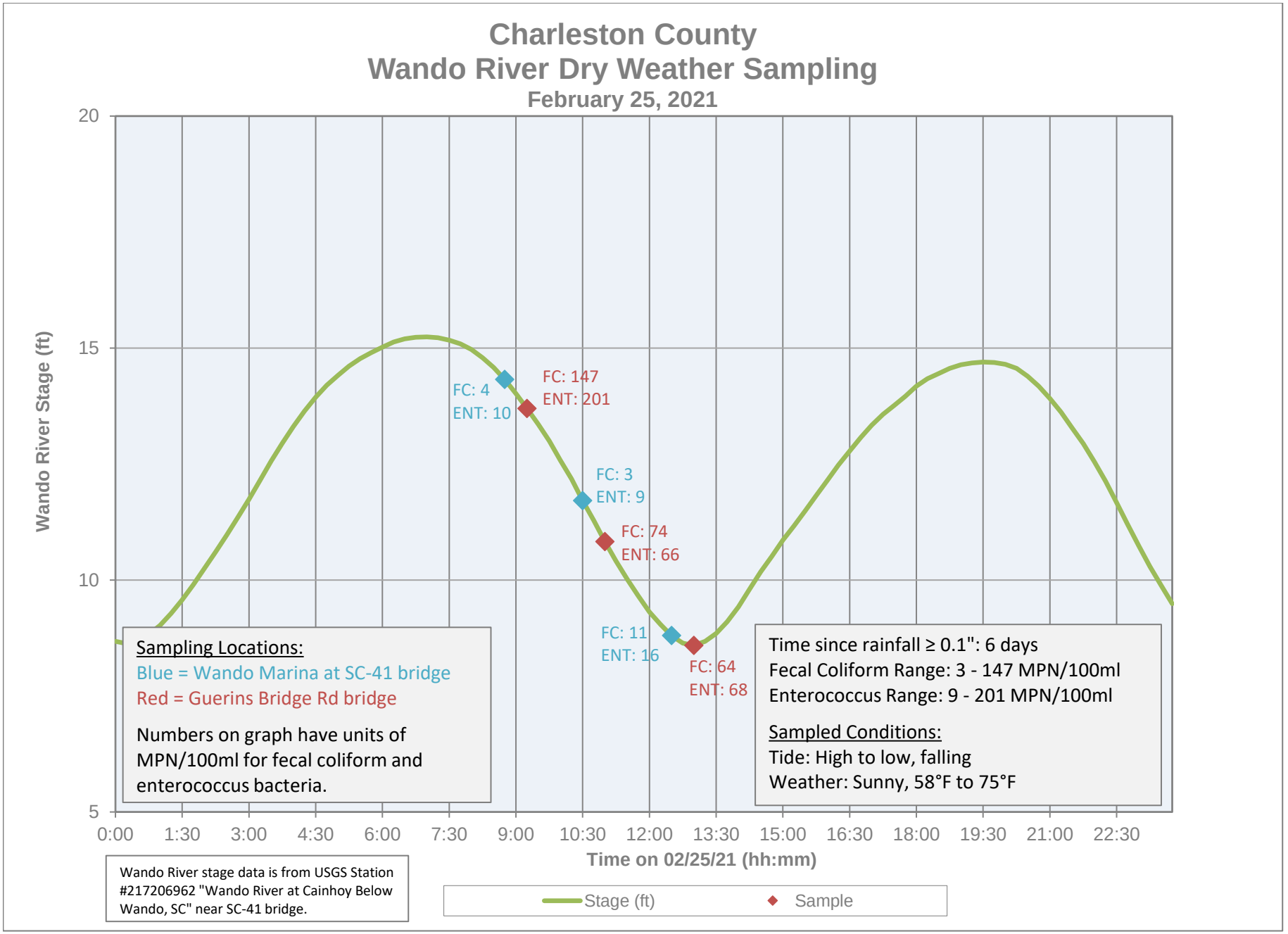
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge

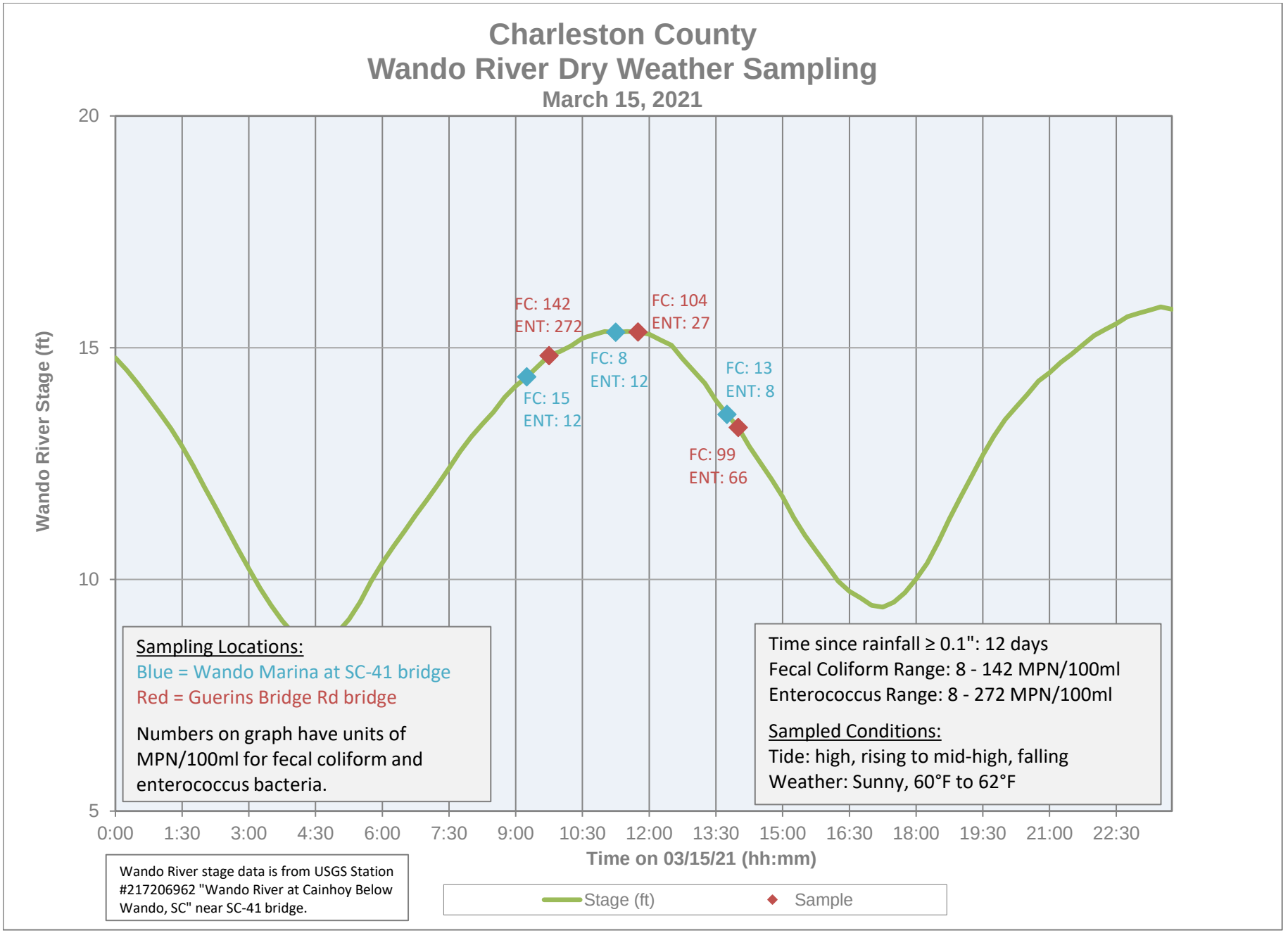
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.

Time since rainfall ≥ 0.1": 5 days
Fecal Coliform Range: 1 - 82 MPN/100ml
Enterococcus Range: 1 - 76 MPN/100ml

Sampled Conditions:
Tide: Low to high, rising
Weather: Sunny, 51°F to 68°F

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.


Charleston County
Wando River Dry Weather Sampling
February 25, 2021
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 02/25/21 (hh:mm)
FC: 4
ENT: 10
FC: 147
ENT: 201
FC: 3
ENT: 9
FC: 74
ENT: 66
FC: 11
ENT: 16
FC: 64
ENT: 68
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 6 days
Fecal Coliform Range: 3 - 147 MPN/100ml
Enterococcus Range: 9 - 201 MPN/100ml
Sampled Conditions:
Tide: High to low, falling
Weather: Sunny, 58°F to 75°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample


Charleston County
Wando River Dry Weather Sampling
March 15, 2021
Wando River Stage (ft)
20
15
10
5
FC: 142
ENT: 272
FC: 104
ENT: 27
FC: 8
ENT: 12
FC: 13
ENT: 8
FC: 15
ENT: 12
FC: 99
ENT: 66
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 12 days
Fecal Coliform Range: 8 - 142 MPN/100ml
Enterococcus Range: 8 - 272 MPN/100ml
Sampled Conditions:
Tide: high, rising to mid-high, falling
Weather: Sunny, 60°F to 62°F
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 03/15/21 (hh:mm)
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

WOOLPERT
ARCHITECTURE | ENGINEERING | GEOSPATIAL

Memo

To:	Charleston County
From:	Woolpert, Inc.
Date:	December 2, 2022
Subject:	Wando River Grab Sampling Results Memo – DRAFT 2021-2022 Annual Summary – Data through June 2022

The Wando River TMDL for fecal coliform bacteria became effective in November 2016, and to maintain compliance with their NPDES SMS4 General Permit, Charleston County was required to submit a TMDL Monitoring Plan to SCDHEC within 12 months of the TMDL effective date (November 2017) and begin monitoring activities within 18 months of the TMDL effective date (May 2018). In accordance with the submitted TMDL Monitoring Plan, the County initiated monitoring activities in May 2018, with the first seasonal wet weather grab sample collected in June 2018, and it has performed a combination of seasonal and monthly grab sampling since that time. The County's sampling efforts have targeted both wet and dry conditions to assess bacteria concentrations in the Wando River both in response to storm events and during base flow conditions. In September 2020, Woolpert was tasked with performing both seasonal wet weather and monthly dry weather grab sampling in the Wando River to gather data about both fecal coliform and Enterococcus bacteria concentrations in the watershed. In September 2021, the County directed Woolpert to include Microbial Source Tracking analysis for select samples to provide insight on sources of bacteria. This memo is a cumulative document, with new data added to the existing dataset as samples are collected, and it summarizes and discusses data collected through June 2022. All sample results (May 2018 through June 2022) and notes about associated weather and tidal conditions are included in Appendix A.

Each grab sampling effort has involved taking samples at up to three strategic locations in the watershed. The downstream-most site (Wando Marina) is located at the Wando River Marina, adjacent to the SC-41 bridge that crosses the Wando River in Mount Pleasant, SC. The surrounding drainage area includes human influence from suburban, urban, and undeveloped areas. The upstream-most site (Guerins Bridge) is located at the bridge where Guerins Bridge Rd crosses the Wando River in Awendaw, SC. The contributing drainage area to this location is primarily rural and forested in the Francis Marion National Forest, representing the natural (non-human) sources of bacteria in the water. In October 2021, an additional site (Chandler Road) was added to the sampling effort, located on a tributary of the Wando River adjacent to Chandler Road, a rural neighborhood street. This tributary flows into the Wando River near the Paradise Island Public Boat Landing, at a location between the Wando Marina and Guerins Bridge sites. The contributing drainage area to this location includes human influence from rural developed areas as well as a horse farm. Chandler Road was added in an effort to sample an area of the Wando River watershed that contains a different type of human-influenced land use, and to create opportunities to compare bacteria concentrations and sources between the three different locations.

Samples were analyzed by Trident Laboratory in Ladson, SC, an EPA-approved laboratory, for fecal coliform bacteria using the Colilert-18 method and results were reported as the Most Probable Number of bacteria per 100 milliliter sample (MPN/100ml). Summary statistics for fecal coliform grab sampling results to date (May 2018 through June 2022) are shown in Table 1 for each sampling location and weather condition.

Table 1: Summary Statistics for Grab Sample Fecal Coliform Results – By Location and Weather Condition

Sampling Location	Weather Condition	Summary Statistic (units of MPN/100ml)				# Samples
		Mean	Median	Maximum	Minimum[1]	
Wando Marina	Dry	10	10	72	<1	83
Wando Marina	Wet	80	20	1620	2	47
Guerins Bridge	Dry	129	99	517	<10	83
Guerins Bridge	Wet	889	290	15530	8	47
Chandler Road	Dry	558	220	2380	10	27
Chandler Road	Wet	6259	1210	>24200	<10	9

1. The minimum value may vary based on lab dilution; some samples were not diluted and could be measured >1 MPN/100ml and <10 MPN/100ml.

Enterococcus samples were taken in tandem with fecal coliform samples starting in September 2020. Enterococcus samples were also analyzed by Trident Laboratory, using the SM-9230D method, and results were reported as the Most Probable Number of bacteria per 100 milliliter sample (MPN/100ml). Summary statistics for the grab sampling results to date (May 2018 through June 2022) are shown in Table 2 for each sampling location and weather condition.

Table 2: Summary Statistics for Grab Sample Enterococcus Results – By Location and Weather Condition

Sampling Location	Weather Condition	Summary Statistic (units of MPN/100ml)				# Samples
		Mean	Median	Maximum	Minimum[1]	
Wando Marina	Dry	229	10	>2420	<1	60
Wando Marina	Wet	482	128	2990	10	24
Guerins Bridge	Dry	497	78	>2420	<10	60
Guerins Bridge	Wet	866	330	>2420	<10	24
Chandler Road	Dry	1008	280	3260	<10	27
Chandler Road	Wet	10000	3260	>24200	320	9

1. The minimum value may vary based on lab dilution; some samples were not diluted and could be measured >1 MPN/100ml and <10 MPN/100ml.

Due to the many factors that influence bacteria concentrations (e.g. potential bacteria sources, season, weather, rainfall intensity, antecedent rainfall, tides, timing of watershed storm response), it is important to consider individual storm results in their own context in addition to summary statistics. To facilitate this kind of assessment, figures were created to illustrate the grab sampling results at each location along with stage in the Wando River, rainfall data (for wet weather sampling), and observations about weather and tidal conditions. These figures were created for all sampling efforts and are located in Appendix B in chronological order. Available stage and rainfall data were utilized to best approximate conditions at the Wando River sampling locations. Wando River stage data was obtained from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" which is close to the SC-41 bridge and Wando Marina sampling location. For the majority of the wet weather sampling efforts, rainfall data was obtained from the Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles southwest of the SC-41 bridge, installed by Woolpert and YSI in April 2018. This gauge is preferred as Woolpert can ensure the completeness of its dataset and reliable maintenance schedule compared to citizen-owned rain gauges. Other local rainfall data sources were used for select storms when beneficial to visualize the rainfall, and are noted on those individual figures in Appendix B. For the purposes of analysis and discussion, a "storm rainfall" was established which was a running sum of rainfall until 3 consecutive hours go by with zero additional precipitation that occurred closest to the time of sampling. In some cases, if there was additional rainfall outside the "storm rainfall" that was relevant to describing the watershed conditions, analysis may refer to a "total rainfall" or "largest storm rainfall" that is larger than the "storm rainfall" that occurred closest to the time of sampling.

Overall Trends

The summary statistics as well as individual storm results were reviewed and compared to observe trends and/or correlations between bacteria concentration sampling results and a variety of potential associated factors. It is important to note that with this limited data set, the following discussion is not asserting statistical significance, but rather seeking to explore possible relationships in an effort to understand the complex natural aquatic system of the Wando River. The summary statistics in Table 1 indicated the following overall trends with respect to fecal coliform concentrations: higher concentrations at Chandler Road than Guerins Bridge, higher concentrations at Guerins Bridge than at Wando Marina, and higher concentrations in wet conditions than in dry conditions.

Enterococcus samples have been collected in addition to fecal coliform samples since September 2020. The enterococcus sampling was added to the sampling approach to serve as a comparison to fecal coliform results and further the understanding of bacteria concentrations in the Wando River. The summary statistics in Table 2 indicated enterococcus results followed the same general trends of fecal coliform results: the upstream sites (Guerins Bridge and Chandler Road) had higher results than the downstream site (Wando River), and wet weather results were higher than dry weather results. Compared to fecal coliform summary statistics, the median enterococcus value at all locations was similar and the maximum value was higher.

An analysis was performed on the tandem pairs of fecal coliform and enterococcus results to explore potential correlation between them. For the slight majority of samples, fecal coliform and enterococcus results were of the same order of magnitude. However, there were multiple exceptions to that trend and for a given tandem pair of results, either fecal coliform or enterococcus may be orders of magnitude higher than the other parameter. This variation within a given pair did not appear to be correlated with wet or dry conditions, tidal conditions, or other environmental conditions.

When comparing individual storm results in Appendix A (list form) and Appendix B (graphical form), it does appear that bacteria concentrations tend to be higher at Chandler Road and Guerins Bridge than at Wando Marina. However, a comparison of results for individual wet weather versus dry weather sampling efforts does not provide a clear trend; there is variation among both the wet weather events and dry weather events (e.g. some dry weather samples are slightly higher than some wet weather samples, contrary to the overall trend seen with summary statistics). This variation may be driven by some or all of the factors influencing bacteria concentrations mentioned previously. The limited dataset of grab sample results provides a glimpse of the water quality conditions that may also contribute to these variations. Though the dataset is limited, the following sections provide a discussion of specific sampling events and how they may or may not show potential trends for wet and dry weather conditions.

Wet Weather Sampling

The goal of wet weather sampling is to quantify the bacteria levels present in stormwater runoff by collecting grab samples during or soon after storm events. In tidal systems, such as the Wando River, it can be difficult to differentiate between stormwater runoff and tidal flow using only stage and rainfall data. For purposes of discussion, fecal coliform bacteria concentrations will be discussed as orders of magnitude: ones (0-9 MPN/1000ml); tens (10-99 MPN/100ml); hundreds (10^2); thousands (10^3); and tens of thousands (10^4). From the available grab sampling data, wet weather results at Wando Marina have been observed to typically vary by two orders of magnitude, with most observations in the ones and tens, eight observations in the hundreds, and one observation in the thousands. Wet weather results at Guerins Bridge have been observed typically to vary by four orders of magnitude, sometimes as low as the ones and sometimes as high as the thousands, with one result in the ten thousands. Wet weather results at Chandler Road vary by four orders of magnitude, with most observations in the thousands, one observation each in the tens and hundreds, and two observations in the ten thousands. Several potential correlations between bacteria concentrations and environmental factors were explored and discussed below.

Antecedent Rainfall Correlation: Reviewing the entire dataset, wet weather results tended to correlate with higher fecal coliform bacteria concentrations than dry weather results at Wando Marina and Guerins Bridge, with the exception of

smaller storm events that took place after generally dry antecedent rainfall conditions. The extent of these dry conditions is difficult to quantify precisely in a complex and dynamic watershed. However, it was observed that several wet weather sampling efforts that exhibited lower than average bacteria concentrations also correlated with dry antecedent rainfall conditions, as described below. For comparison, take note of the summary statistics for wet weather conditions shown in Table 1.

- The April 2019 event (*4/2/2019*) had a rainfall total of 0.63 inches (in) with samples collected during a high/rising tide. A review of continuous rainfall data indicated that the most recent rainfall event total of over 1.0 in prior to the April event occurred four months prior on 12/14/2018. It was also observed that only 1.56 in of total rainfall (numerous small events between 0.01 in and 0.35 in) occurred in February and March 2019. This indicates a very dry overall antecedent rainfall condition prior to the April storm, which correlated with low bacteria levels (3-5 MPN/100ml at Wando Marina; 16-33 MPN/100ml at Guerins Bridge).
- The October 2019 event (*10/16/2019*) had a rainfall total of 1.36 in with samples collected during a high/falling tide. The continuous rainfall data indicated that the most recent rainfall event total over 1.0 in was the rainfall associated with Hurricane Dorian, 7.19 in of total rainfall on 9/5/2019, six weeks before the sampled event. During that six-week period between Dorian and the October event, only 0.56 in of rainfall occurred. This also indicates an overall dry antecedent rainfall condition and correlated with low bacteria levels (2-5 MPN/100ml at Wando Marina; 8-95 MPN/100ml at Guerins Bridge).
- The March 2020 event (*3/24/2020*) had a rainfall total of 0.52 in with samples collected during a high/falling tide. The continuous rainfall data indicated that the previous rainfall events were 0.2 in on 3/22/2020 and 1.57 inches on 3/5/2020, representative of generally dry conditions in the watershed leading up to the March event which correlated with low bacteria levels (≤10 MPN/100ml at Wando Marina, 10-31 MPN/100ml at Guerins Bridge).
- The October 2021 event (*10/25/2021*) had a rainfall total of 0.73 in with samples collected across the high tide. The most recent rainfall event total of over 1.0 in prior to the October event occurred almost three weeks before on 10/6/2021, indicating generally dry antecedent conditions which correlated with low bacteria levels (<10-40 MPN/100ml at Wando Marina, <10-30 MPN/100ml at Guerins Bridge).

Tidal Correlation: There does not seem to be an apparent trend between high fecal coliform bacteria concentrations and specific tidal conditions. The following storm events provided some of the higher bacteria concentrations observed under a variety of tidal conditions. The majority of these observations of higher concentrations were at Guerins Bridge and Chandler Road.

- December 2018 (3.38 in): 10^2 and 10^3 concentrations observed during rising and high tide at Guerins Bridge, 10^2 concentrations observed at high tide at Wando Marina.
- July 2019 (1.14 inches): 10^2 and 10^3 concentrations observed during low and rising tide at Guerins Bridge.
- August 2019 (1.28 inches): 10^2 concentration observed at low tide at Guerins Bridge.
- April 2020 (1.48 inches): 10^2 concentrations observed at falling and low tide at Guerins Bridge.
- September 2020 (1.48 inches): 10^2 concentration observed at falling tide at Guerins Bridge.
- November 2020 (1.77 inches): 10^3 concentrations observed at falling, low, and rising tide at Guerins Bridge; 10^2 concentrations observed during falling and rising tides at Wando Marina.
- January 2021 (0.93 inches): 10^2 and 10^3 concentrations observed at falling, low, and rising tide at Guerins Bridge. 10^2 concentration observed at low tide at Wando Marina.
- May 2021 (1.32 inches): 10^2 concentrations observed at high and falling tide at Guerins Bridge.
- October 2021 (0.73 inches): 10^3 concentrations observed at high tide at Chandler Road.
- June 2022 (2.82 in): 10^3 and 10^4 concentrations observed at high and falling tide at Guerins Bridge and Chandler Road.

Seasonal Correlation: The instances of "higher" concentrations listed above occurred during both warmer and cooler months, suggesting that wet weather bacteria concentrations do not strictly correlate with temperature or time of year. Other factors such as changes in the watershed, rainfall amount, storm characteristics, and antecedent moisture conditions in the watershed may be more correlative with bacteria concentration. Additional sampling efforts will provide a larger dataset for evaluation of potential trends.

Dry Weather Sampling

Dry weather sampling intends to provide some background, baseline bacteria levels in the Wando River to represent conditions not influenced by stormwater runoff. These levels could be attributed to wildlife in or near the water, historic deposits, non-stormwater human contributions, or aquatic life. For sampling to be considered "dry weather," at least 72 hours must have passed since the last instance of greater than or equal to 0.1 in of rainfall. Dry weather sampling results are discussed below by location.

Wando Marina: Dry weather fecal coliform bacteria results at Wando Marina have been observed to be consistently low, typically less than the SCDHEC single sample threshold of 43 MPN/100ml, with the exception of three observations that occurred in September 2019 (72 MPN/100ml), September 2020 (50 MPN/100ml), and November 2020 (70 MPN/100ml). It is noteworthy that the September 2019 sampling occurred 11 days after Hurricane Dorian brought 7.19 in of rainfall, creating unusually wet antecedent conditions. The other two observations also occurred during "dry" periods but in months that had several inches of rainfall earlier in the month. Although these three observations stand out because they are higher than the consistently low results from the other Wando Marina dry weather samples, they are still lower than the average concentrations from Guerins Bridge and Chandler Road.

No seasonal variations in bacteria concentrations at Wando Marina have been observed.

Guerins Bridge: Dry weather fecal coliform results at Guerins Bridge have been observed to vary by three orders of magnitude, sometimes in the tens, hundreds, or thousands. The difference in conditions between those levels may be driven by season, tide, wildlife activity, or other factors. From the data collected thus far, there may be correlation between antecedent rainfall conditions previous to the required 72 hours of dry conditions and the dry weather results at Guerins Bridge. Specific events and their antecedent conditions are discussed below.

- It was discussed in the wet weather sampling section that February and March of 2019 were very dry months. These months also had dry weather sampling efforts with some of the lower dry weather results (all samples in the tens) at Guerins Bridge. For comparison within similar season/temperature conditions, the January 2019 sampling had somewhat higher results (two of three samples had bacteria concentrations greater than 100 MPN/100ml) and wetter antecedent conditions (1.23 in of rainfall in the 10-day period prior to the sampling event) compared to February and March.
- May and June of 2019 provide another point of dry weather comparison from adjacent months. June (5.56 in total rainfall) was a wetter month than May (0.71 in total rainfall) and the dry weather results at Guerins Bridge were higher in June than in May (hundreds vs. tens order of magnitude in June vs. May for all samples).
- The September 2019 (9/16/2019) dry weather sampling resulted in two of the higher single dry weather observations at Guerins Bridge (488 and 291 MPN/100 ml). As mentioned previously in the Wando Marina discussion, significant rainfall from Hurricane Dorian occurred on 9/5/2019, 11 days before the sampling effort which made for overall wet antecedent conditions in the watershed. A comparison can be made to the dry weather sampling results from September 2018 (126 and 260 MPN/100ml) and September 2020 (180, 120, and 40 MPN/100ml) which both produced mostly results in the hundreds at Guerins Bridge, though the actual values were all smaller than in September 2019.
- The October 2021 dry weather sampling had results varying up to the hundreds at Guerins Bridge, and up to the thousands at Chandler Road. Antecedent rainfall conditions were dry. The last storm happened 11 days before and was 1.65 in.

Initial seasonal observations for dry weather fecal coliform results at Guerins Bridge are summarized below.

- *Fall (October, November, December):* Fall 2021 results were split evenly between the tens and hundreds. Fall 2020 results were all of the hundreds, with the exception of one sample (35 MPN/100ml in October). November 2019 samples were lower than in Fall 2020, all of the tens. Generally, fall results were higher than winter results and similar to or higher than spring results.

- *Winter (January, February, March):* Winter 2019 and winter 2021 (no dry weather samples collected during winter 2020) were consistently low, suggesting a seasonal influence on dry weather bacteria concentrations. The winter months tend to be cooler and drier than the rest of the year, which may contribute to lower bacteria concentrations.
- *Spring (April, May, June):* Spring 2022 results were all in the tens. Spring 2021 results were mostly in the hundreds (six of nine samples), with some observations in the tens (three of nine samples). Speaking generally, spring results were higher than winter results and similar to or lower than fall results.
- *Summer (July, August, September):* Summer 2021 results were mostly in the hundreds, similar to the Summer 2020 results, and aligned with the general trends from spring and fall.

Chandler Road: Dry weather fecal coliform results at Chandler Road have been observed to vary by three orders of magnitude, sometimes in the tens, hundreds, or thousands. The difference in conditions between those levels may be driven by season, tide, wildlife activity, or other factors. From the data collected thus far, there may be correlation between tidal conditions and the dry weather results at Chandler Road. Multiple sampling events that collected samples as the tide fell reported higher bacteria concentrations in the samples collected at low tide than the high tide samples. The October 2021 dry weather sampling results at Chandler Road increased from 36 MPN/100ml at high tide to 1300 MPN/100ml at low tide. The higher bacteria concentrations could be influenced by the low flow that the Chandler Road sampling location receives. At low tide, there is very little water in the system, so potential pollutants may be less diluted as they enter the tributary at Chandler Road. However, there are exceptions to this trend, like the December 2021 sampling event that saw an increase in bacteria results in the later samples collected during high tide.

Initial seasonal observations for dry weather fecal coliform results at Chandler Road are summarized below.

- *Fall (October, November, December):* Fall 2021 results varied across three orders of magnitude. There were three samples in the tens, two samples in the hundreds, and four samples in the thousands. Fall results were generally higher than winter and matched closely with spring.
- *Winter (January, February, March):* Winter 2021 results varied across two orders of magnitude. There were two samples in the tens and seven samples in the hundreds. Winter 2021 results were somewhat lower than the other seasons since no winter results were in the thousands, suggesting a seasonal influence on dry weather bacteria concentrations. The winter months tend to be cooler and drier than the rest of the year, which may contribute to lower bacteria concentrations.
- *Spring (April, May, June):* Spring 2021 results varied across three orders of magnitude. There was one sample in the tens, five samples in the hundreds, and three samples in the thousands. Spring results were generally higher than winter and matched closely with fall.
- *Summer (July, August, September)***:** Chandler Road was not added as a sampling location until Fall 2021, so summer samples have not been collected as of this reporting period.

Continuation of the current monthly dry weather sampling and seasonal wet weather sampling schedule will provide additional data that may reveal other seasonal patterns or indicate other factors that may be correlative with bacteria levels. Further seasonal analysis will be considered in future memos after additional sampling has occurred.

As noted earlier, the trends and comparisons discussed in this memo are observations based on the limited dataset. This data is intended to provide the County with a preliminary understanding of the Wando River watershed and potential impacts of stormwater runoff on bacteria concentrations. The County intends to continue both wet weather and dry weather grab sampling to supplement these initial observations and continue to collect information about the dynamics of the Wando River.

Microbial Source Tracking Results

While the presence of fecal coliform and enterococcus bacteria acts as an indicator to detect fecal contamination, it does not indicate the origins of fecal contamination. Understanding the sources of contamination is essential for identifying effective remediation measures (BMPs), complying with legal (permit) responsibility, and characterizing potential public

health risks. The County included Microbial Source Tracking (MST) methods in their data collection efforts to target the source of the fecal bacteria through genetic markers in the bacteria. Host-associated genetic markers in gut bacteria have been identified based on the unique physiology in the gut of the host animal (e.g., diet, temperature, antibiotic treatment, etc.) that varies from one species of animal to another. These documented gut conditions and associated genetic markers of gut bacteria allow LuminUltra Technologies (formerly Source Molecular), an accredited MST laboratory, to use replicable methods to identify common hosts of gut bacteria and sources of fecal contamination.

Each individual MST analysis result is reported as the numeric result of DNA copies per 100ml sample at the bottom of the cell (Not Detected, DNQ meaning detected but below quantifiable levels, or the numeric result when it is quantifiable) and an approximate source contribution category at the top of each table cell (Absent, Low, Moderate, or High). The approximate source contribution categories that correspond with numeric results were originally provided in reports from the MST laboratory and are summarized below in Table 3. The lab no longer provides this interpretation in their reports, but the scale and range of reported numeric values has not changed and the categories are helpful for data visualization, so their inclusion in Table 3 has continued.

Table 3: Categories for Interpretation of MST Analysis Results

DNA Marker Quantified (# DNA Copies/100ml)	DNA Analytical Result	Approximate Source Contribution Category
ND	Not Detected	Not Detected
DNQ	Detected	Low
1-9,999	Detected	Low
10,000-99,999	Detected	Moderate
100,000 and up	Detected	High

The high cost (over 15 times the cost of a traditional bacteria sample) of MST reduces the feasibility of the County to use this method for every bacteria sample. To capitalize on MST efforts, the County conducted concurrent sampling for wet weather events where duplicate MST samples were collected along with standard fecal coliform and enterococcus bacteria samples. Fecal coliform and enterococcus bacteria samples were analyzed first and then, based on those bacteria concentration results and collaborative discussion, MST analysis can be conducted on the duplicate MST sample for select samples of interest. This ensured that the more expensive MST analysis was only performed on select samples that appeared likely to provide insight about fecal bacteria sources in the Wando River. All MST analysis results since September 2021 are shown in Table 4.

Total rainfall is included in Table 4 as a general indicator of size of the rainfall event. Other parameters such as rainfall distribution and intensity, tidal characteristics, and time of sampling relative to rainfall are also important to understand the sampling conditions associated with each MST analysis. Appendix C contains grab sampling figures showing these parameters for each event that included MST analysis, along with visual indication of which samples were analyzed.

Table 4: Microbial Source Tracking (MST) Results for Selected Samples

Sample Date & Time	Location	Dry / Wet	Total Rainfall (inches)	Fecal Coliform Result (MPN/100ml)	Enterococcus Result (MPN/100ml)	MST Result Interpretation (# DNA Copies/100ml)				
						Dog	Bird	Human	Ruminant	Horse
10/18/2021 12:27	Chandler Rd	Dry	—	365	>2420	Low DNQ	Moderate 3.68E+04	Absent ND	Absent ND	Absent ND
10/25/2021 13:45	Chandler Rd	Wet	0.73	700	320	Absent ND	Low 4.27E+03	Absent ND	Absent ND	Absent ND
12/29/2021 9:43	Chandler Rd	Dry	—	1330	3260	Low DNQ	Low DNQ	Absent ND	Absent ND	Absent ND
12/29/2021 10:12	Guerins Bridge	Dry	—	260	430	Low 5.01E+02	Low 5.80E+02	Absent ND	Absent ND	Absent ND
3/10/2022 13:36	Chandler Rd	Wet	1.01	1210	2760	Low 6.52E+02	Low 6.45E+03	Absent ND	Absent ND	Absent ND
5/10/2022 12:55	Chandler Rd	Dry	—	2380	<10	Low DNQ	Moderate 1.32E+04	Low DNQ	Absent ND	Absent ND
6/23/2022 9:25	Chandler Rd	Dry	—	320	2910	Absent ND	Moderate 5.45E+04	Absent ND	Absent ND	Absent ND
6/29/2022 11:49	Wando Marina	Wet	2.81	200	990	Absent ND	Low DNQ	Absent ND	Absent ND	Absent ND
6/29/2022 12:25	Guerins Bridge	Wet	2.81	1110	730	Low DNQ	Low DNQ	Absent ND	Absent ND	Absent ND
6/29/2022 12:42	Chandler Rd	Wet	2.81	>24200	>24200	Moderate 1.40E+04	Low DNQ	Low DNQ	Low DNQ	Absent ND

*DNQ = “Did Not Quantify,” presence of DNA markers was detected but below the minimum quantification level.

The frequency chart in Figure 1 displays the MST results by source and wet/dry sampling condition at Chandler Road. As of this memo, seven Chandler Road samples were run for MST. Chandler Road generally had higher bacteria concentration results than the other locations, so it produced more samples that were good candidates for MST analysis. At Chandler Road, Bird and Dog were the most frequent sources of bacteria. Horse was not detected in any of the samples, so Horse appears to not be a contributing bacteria source. Human was detected in two samples, and Ruminant in one, so they appear to be rarely contributing bacteria sources at Chandler Road. All Human and Ruminant samples were low, non-quantifiable results (Table 4), further supporting the perception that those sources are not major contributors of bacteria at Chandler Road. There was not a notable difference between which sources were present during wet or dry conditions. The most frequently appearing sources (Bird and Dog) were present in both wet or dry weather condition samples. Ruminant was the only source that was present in a wet weather sample and not present in dry weather samples; since it was only found in one wet weather sample, further correlations cannot be made at this time.

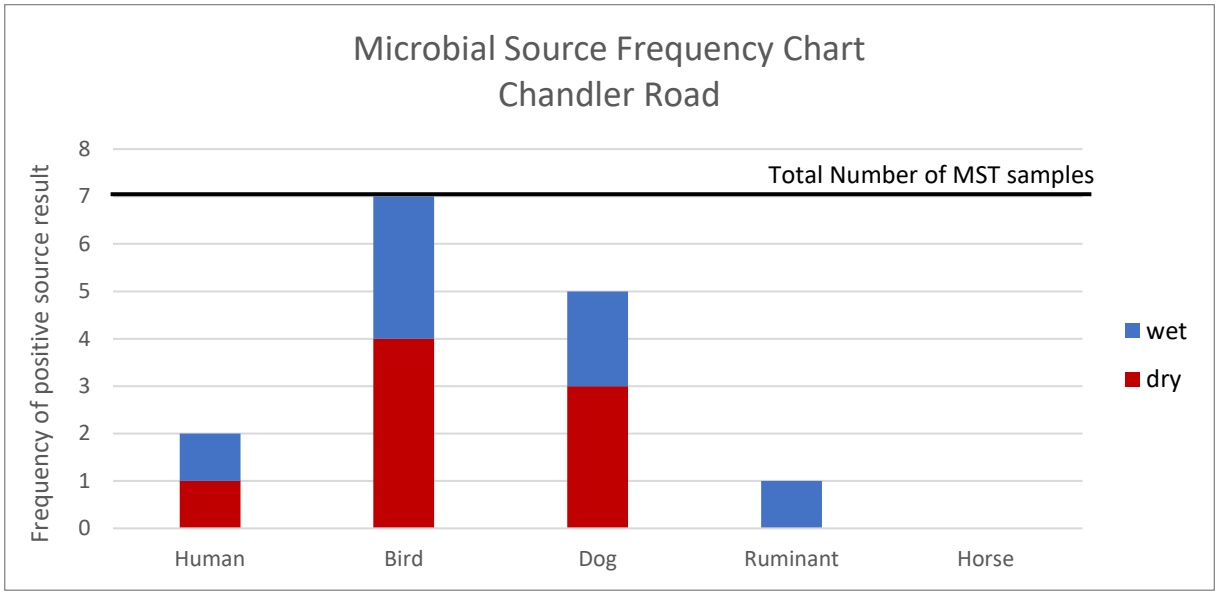


Figure 1: Frequency Chart of MST analysis on Chandler Road samples

The discussion of results at Guerins Bridge is limited since only two samples have been analyzed for MST so far. One sample was from wet conditions, and the other from dry conditions. Despite that difference, both samples returned positive results of the same sources: Bird and Dog. The other sources (Human, Ruminant, and Horse) were all absent. The results correlate to what has been observed at Chandler Road, that the main contributing sources appear to be Bird and Dog and that Human, Ruminant, and Horse are not main contributing sources.

Only one sample has been analyzed for MST so far at Wando Marina. In general, bacteria results from Wando Marina were lower than the other locations (typically <100 MPN/100ml) so it has been uncommon to have samples that are good candidates for MST analysis. The one sample analyzed was from the wet weather sampling effort in June 2022 and Bird was the only source that was detected. Since Wando Marina is the furthest downstream sampling location, bacteria present in the water may be diluted, so the bacteria does not show up in detectable quantities in the MST analysis. Since Bird was detected, it may be the source with the largest influence in the Wando River, being detected in moderate concentrations at upstream locations, and still detected at Wando Marina in low concentrations.

As noted earlier, the trends and comparisons discussed in this memo are observations based on the limited dataset. This data is intended to provide the County with a preliminary understanding of the Wando River watershed and potential impacts of stormwater runoff on bacteria concentrations. The County intends to continue both wet weather and dry weather grab sampling, with MST analysis of select samples to supplement these initial observations and continue to collect information about the dynamics of the Wando River.

Appendix A: Grab Sampling Results and Associated Field Conditions

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Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
6/8/2018	12:15	Guerins Bridge	194	N/A	Rising	Wet	Steady Rain Total Rainfall = 0.85" Avg Temp = 79°F
6/8/2018	12:45	Wando Marina	4	N/A	Rising	Wet	
6/8/2018	2:10	Guerins Bridge	219	N/A	Rising	Wet	
6/8/2018	2:35	Wando Marina	43	N/A	Rising	Wet	
9/21/2018	11:25	Wando Marina	5	N/A	Falling	Dry	Sunny 3 Days Since Rain Avg Temp = 84°F
9/21/2018	12:01	Guerins Bridge	126	N/A	Falling	Dry	
9/21/2018	1:28	Wando Marina	13	N/A	Rising	Dry	
9/21/2018	1:59	Guerins Bridge	260	N/A	Rising	Dry	
12/14/2018	10:18	Wando Marina	50	N/A	Rising	Wet	Light to Heavy Rain Total Rainfall = 3.38" Avg Temp = 63°F
12/14/2018	10:43	Guerins Bridge	754	N/A	Rising	Wet	
12/14/2018	11:25	Wando Marina	30	N/A	Rising	Wet	
12/14/2018	11:45	Guerins Bridge	1054	N/A	Rising	Wet	
12/14/2018	12:45	Wando Marina	228	N/A	Rising	Wet	
12/14/2018	1:08	Guerins Bridge	908	N/A	High	Wet	
1/29/2019	10:41	Wando Marina	6	N/A	Low/Rising	Dry	Cloudy 5 Days Since Rain Avg Temp = 58°F
1/29/2019	11:23	Guerins Bridge	70	N/A	Low/Rising	Dry	
1/29/2019	12:37	Wando Marina	5	N/A	Mid/Rising	Dry	
1/29/2019	1:01	Guerins Bridge	131	N/A	Mid/Rising	Dry	
1/29/2019	2:05	Wando Marina	4	N/A	Almost High/Rising	Dry	
1/29/2019	2:27	Guerins Bridge	144	N/A	Almost High/Rising	Dry	
2/28/2019	8:13	Guerins Bridge	69	N/A	Mid to Low/Falling	Dry	Clear 8 Days Since Rain Avg Temp = 68°F
2/28/2019	8:36	Wando Marina	4	N/A	Mid to Low/Falling	Dry	
2/28/2019	10:28	Guerins Bridge	54	N/A	Very Low/Trickling Out	Dry	
2/28/2019	10:57	Wando Marina	7	N/A	Very Low/Rising	Dry	
2/28/2019	12:15	Guerins Bridge	36	N/A	Mid to Low/Rising	Dry	
2/28/2019	12:43	Wando Marina	5	N/A	Mid/Rising	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
3/29/2019	9:55	Wando Marina	8	N/A	Low/Falling	Dry	Sunny 24 Days Since Rain Avg Temp = 70 °F
3/29/2019	10:22	Guerins Bridge	23	N/A	Low/Falling	Dry	
3/29/2019	11:44	Wando Marina	4	N/A	Low/Rising	Dry	
3/29/2019	12:11	Guerins Bridge	20	N/A	Low/Rising	Dry	
3/29/2019	1:40	Wando Marina	1	N/A	Mid/Rising	Dry	
3/29/2019	2:02	Guerins Bridge	37	N/A	Mid/Rising	Dry	
4/2/2019	7:16	Wando Marina	3	N/A	High/Rising	Wet	Light to Steady Rain High Winds Total Rainfall = 0.63" Avg Temp = 47°F
4/2/2019	7:52	Guerins Bridge	33	N/A	High/Rising	Wet	
4/2/2019	8:59	Wando Marina	3	N/A	High/Falling	Wet	
4/2/2019	9:23	Guerins Bridge	21	N/A	High/Falling	Wet	
4/2/2019	10:43	Wando Marina	5	N/A	High/Falling	Wet	
4/2/2019	11:05	Guerins Bridge	16	N/A	High/Falling	Wet	
5/22/2019	9:41	Wando Marina	3	N/A	Mid/Rising	Dry	Clear to Pt. Cloudy 8 Days Since Rainfall Avg Temp = 84°F
5/22/2019	10:02	Guerins Bridge	17	N/A	Mid/Rising	Dry	
5/22/2019	11:26	Wando Marina	5	N/A	High/Rising	Dry	
5/22/2019	11:49	Guerins Bridge	12	N/A	High/Rising	Dry	
5/22/2019	13:30	Wando Marina	11	N/A	High/Falling	Dry	
5/22/2019	13:54	Guerins Bridge	26	N/A	High/Falling	Dry	
6/27/2019	9:30	Wando Marina	3	N/A	Low/Slack	Dry	Clear 6 Days Since Rain Avg Temp = 91°F
6/27/2019	10:55	Guerins Bridge	118	N/A	Low/Rising	Dry	
6/27/2019	11:15	Wando Marina	5	N/A	Low/Rising	Dry	
6/27/2019	11:51	Guerins Bridge	204	N/A	Low/Rising	Dry	
6/27/2019	12:37	Wando Marina	5	N/A	Low to Mid/Rising	Dry	
6/27/2019	1:00	Guerins Bridge	261	N/A	Low to Mid/Rising	Dry	
7/24/2019	8:05	Wando Marina	64	N/A	Low	Wet	Cloudy Total Rainfall = 1.14" Avg Temp = 72°F
7/24/2019	8:35	Guerins Bridge	1553	N/A	Low/Rising	Wet	
7/24/2019	9:51	Wando Marina	15	N/A	Mid/Rising	Wet	
7/24/2019	10:13	Guerins Bridge	1553	N/A	Mid/Rising	Wet	
7/24/2019	11:34	Wando Marina	42	N/A	Mid/Rising	Wet	
7/24/2019	11:58	Guerins Bridge	649	N/A	High/Rising	Wet	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
8/28/2019	11:07	Wando Marina	10	N/A	Mid/Falling	Wet	Pt. Cloudy to Rain Total Rainfall = 1.28" Avg Temp = 81°F
8/28/2019	11:36	Guerins Bridge	< 10	N/A	Mid/Falling	Wet	
8/28/2019	12:04	Wando Marina	98	N/A	Mid/Falling	Wet	
8/28/2019	12:28	Guerins Bridge	98	N/A	Low/Falling	Wet	
8/28/2019	12:53	Wando Marina	52	N/A	Low/Falling	Wet	
8/28/2019	13:18	Guerins Bridge	313	N/A	Low	Wet	
9/16/2019	9:46	Wando Marina	23	N/A	High/Rising	Dry	Sunny 11 Days Since Rain Avg Temp = 86°F
9/16/2019	10:18	Guerins Bridge	58	N/A	High/Rising	Dry	
9/16/2019	11:45	Wando Marina	72	N/A	High/Falling	Dry	
9/16/2019	12:07	Guerins Bridge	291	N/A	High/Falling	Dry	
9/16/2019	13:46	Wando Marina	22	N/A	Mid/Falling	Dry	
9/16/2019	14:06	Guerins Bridge	488	N/A	Mid/Falling	Dry	
10/16/2019	10:16	Wando Marina	5	N/A	High/Rising	Wet	Cloudy Total Rainfall = 1.36" Avg Temp = 76°F
10/16/2019	10:39	Guerins Bridge	39	N/A	High/Rising	Wet	
10/16/2019	12:10	Wando Marina	2	N/A	High/Falling	Wet	
10/16/2019	12:29	Guerins Bridge	8	N/A	High/Falling	Wet	
10/16/2019	14:10	Wando Marina	3	N/A	Mid/Falling	Wet	
10/16/2019	14:28	Guerins Bridge	94	N/A	Mid/Falling	Wet	
11/22/2019	8:55	Wando Marina	<10	N/A	Mid/Falling	Dry	Clear 6 Days Since Rain Avg Temp = 63°F
11/22/2019	9:26	Guerins Bridge	52	N/A	Mid/Falling	Dry	
11/22/2019	9:53	Wando Marina	<10	N/A	Low/Falling	Dry	
11/22/2019	10:20	Guerins Bridge	20	N/A	Low/Falling	Dry	
11/22/2019	10:50	Wando Marina	<10	N/A	Low	Dry	
11/22/2019	11:17	Guerins Bridge	74	N/A	Low/Rising	Dry	
3/24/2020	10:00	Wando Marina	10	N/A	High/Slack	Wet	Cloudy to Rain Total Rainfall = 0.52" Avg Temp = 68°F
3/24/2020	10:29	Guerins Bridge	31	N/A	High/Rising	Wet	
3/24/2020	12:01	Wando Marina	10	N/A	Mid/Falling	Wet	
3/24/2020	12:24	Guerins Bridge	20	N/A	Mid/Falling	Wet	
3/24/2020	13:57	Wando Marina	<10	N/A	Low/Falling	Wet	
3/24/2020	14:27	Guerins Bridge	10	N/A	Low/Falling	Wet	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
4/20/2020	9:38	Wando Marina	<10	N/A	Mid/Falling	Wet	Pt. Cloudy to Rain Total Rainfall = 1.48" Avg Temp = 75°F
4/20/2020	10:11	Guerins Bridge	41	N/A	Mid/Falling	Wet	
4/20/2020	11:36	Wando Marina	20	N/A	Low/Falling	Wet	
4/20/2020	11:59	Guerins Bridge	132	N/A	Low/Falling	Wet	
4/20/2020	13:46	Wando Marina	20	N/A	Low/Slack	Wet	
4/20/2020	14:08	Guerins Bridge	404	N/A	Low/Rising	Wet	
9/17/2020	9:08	Wando Marina	90	135	High/Rising	Wet	Pt. Cloudy to Rain High Winds Total Rainfall = 1.48" Avg Temp = 82°F
9/17/2020	10:02	Guerins Bridge	40	228	High/Rising	Wet	
9/17/2020	11:04	Wando Marina	20	63	High/Falling	Wet	
9/17/2020	11:36	Guerins Bridge	30	144	High/Rising	Wet	
9/17/2020	13:05	Wando Marina	30	41	Mid/Falling	Wet	
9/17/2020	13:38	Guerins Bridge	110	146	High/Falling	Wet	
9/22/2020	9:25	Wando Marina	<10	20	Low/Rising	Dry	Sunny and Breezy 4 Days Since Rain Avg Temp = 66°F
9/22/2020	9:59	Guerins Bridge	180	288	Low/Rising	Dry	
9/22/2020	11:28	Wando Marina	50	<10	Mid/Rising	Dry	
9/22/2020	12:00	Guerins Bridge	120	148	Mid/Rising	Dry	
9/22/2020	13:28	Wando Marina	10	<10	High/Rising	Dry	
9/22/2020	14:02	Guerins Bridge	40	20	High/Rising	Dry	
10/28/2020	9:25	Guerins Bridge	36	48	High/Falling	Dry	Pt. Cloudy 3 Days Since Rain Avg Temp = 78°F
10/28/2020	10:00	Wando Marina	9	46	High/Falling	Dry	
10/28/2020	10:55	Guerins Bridge	108	49	Mid/Falling	Dry	
10/28/2020	11:45	Wando Marina	15	32	Mid/Falling	Dry	
10/28/2020	12:35	Guerins Bridge	172	179	Low/Falling	Dry	
10/28/2020	13:20	Wando Marina	23	53	Low/Slack	Dry	
11/12/2020	9:29	Wando Marina	28	142	Mid/Falling	Wet	Cloudy to Rain Total Rainfall = 1.77" Avg Temp = 75°F
11/12/2020	10:00	Guerins Bridge	1300	2420	Mid/Falling	Wet	
11/12/2020	11:36	Wando Marina	115	387	Low/Falling	Wet	
11/12/2020	12:11	Guerins Bridge	>2420	>2420	Low/Falling	Wet	
11/12/2020	13:26	Wando Marina	105	285	Low/Rising	Wet	
11/12/2020	13:55	Guerins Bridge	>2420	>2420	Low/Rising	Wet	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
11/23/2020	9:41	Wando Marina	70	52	Low/Rising	Dry	Sunny 11 Days Since Rain Avg Temp = 68°F
11/23/2020	10:11	Guerins Bridge	308	903	Low/Rising	Dry	
11/23/2020	11:24	Wando Marina	11	84	Mid/Rising	Dry	
11/23/2020	11:51	Guerins Bridge	291	903	Mid/Rising	Dry	
11/23/2020	13:27	Wando Marina	8	57	High/Rising	Dry	
11/23/2020	13:56	Guerins Bridge	172	770	High/Rising	Dry	
12/10/2020	9:52	Wando Marina	3	14	Low/Falling	Dry	Sunny 10 Days Since Rain Avg Temp = 60°F
12/10/2020	10:29	Guerins Bridge	261	1046	Low/Falling	Dry	
12/10/2020	11:39	Wando Marina	8	10	Low/Rising	Dry	
12/10/2020	12:10	Guerins Bridge	261	649	Low/Rising	Dry	
12/10/2020	13:32	Wando Marina	4	33	Mid/Rising	Dry	
12/10/2020	13:58	Guerins Bridge	326	172	Mid/Rising	Dry	
1/8/2021	8:38	Wando Marina	20	10	Low/Falling	Wet	Cloudy Total Rainfall = 0.92" Avg Temp = 46°F
1/8/2021	9:12	Guerins Bridge	380	30	Low/Falling	Wet	
1/8/2021	10:35	Wando Marina	120	17	Low	Wet	
1/8/2021	11:00	Guerins Bridge	1400	82	Low	Wet	
1/8/2021	12:30	Wando Marina	10	11	Low/Rising	Wet	
1/8/2021	12:54	Guerins Bridge	910	85	Low/Rising	Wet	
1/20/2021	9:25	Wando Marina	1	3	Low/Rising	Dry	Sunny 5 Days Since Rain Avg Temp = 60°F
1/20/2021	9:54	Guerins Bridge	82	15	Low/Rising	Dry	
1/20/2021	11:31	Wando Marina	2	1	Mid/Rising	Dry	
1/20/2021	12:02	Guerins Bridge	75	76	Mid/Rising	Dry	
1/20/2021	13:30	Wando Marina	3	3	High/Rising	Dry	
1/20/2021	13:56	Guerins Bridge	64	39	High/Rising	Dry	
2/25/2021	8:44	Wando Marina	4	10	High/Falling	Dry	Sunny 6 Days Since Rain Avg Temp = 67°F
2/25/2021	9:14	Guerins Bridge	147	201	High/Falling	Dry	
2/25/2021	10:32	Wando Marina	3	9	Mid/Falling	Dry	
2/25/2021	11:04	Guerins Bridge	74	66	Mid/Falling	Dry	
2/25/2021	12:31	Wando Marina	11	16	Low/Falling	Dry	
2/25/2021	13:01	Guerins Bridge	64	68	Low/Falling	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
3/15/2021	9:20	Wando Marina	15	12	High/Rising	Dry	Sunny 12 Days Since Rain Avg Temp = 61°F
3/15/2021	9:48	Guerins Bridge	142	272	High/Rising	Dry	
3/15/2021	11:19	Wando Marina	8	12	High	Dry	
3/15/2021	11:44	Guerins Bridge	104	27	High	Dry	
3/15/2021	13:41	Wando Marina	13	8	High/Falling	Dry	
3/15/2021	14:06	Guerins Bridge	99	66	High/Falling	Dry	
4/13/2021	9:13	Wando Marina	7	214	High/Slack	Dry	Sunny 13 Days Since Rain Avg Temp = 74°F
4/13/2021	9:41	Guerins Bridge	133	236	High/Slack	Dry	
4/13/2021	11:12	Wando Marina	3	180	High/Falling	Dry	
4/13/2021	11:42	Guerins Bridge	55	275	High/Falling	Dry	
4/13/2021	13:41	Wando Marina	2	248	Mid/Falling	Dry	
4/13/2021	14:05	Guerins Bridge	197	308	Mid/Falling	Dry	
5/13/2021	9:43	Wando Marina	5	461	High/Slack	Wet	Partly Cloudy Total Rainfall = 1.32" Avg Temp = 64°F
5/13/2021	10:10	Guerins Bridge	173	613	High/Slack	Wet	
5/13/2021	11:44	Wando Marina	3	205	High/Falling	Wet	
5/13/2021	12:14	Guerins Bridge	308	276	High/Falling	Wet	
5/13/2021	13:41	Wando Marina	5	308	Mid/Falling	Wet	
5/13/2021	14:12	Guerins Bridge	345	488	Mid/Falling	Wet	
5/21/2021	9:30	Wando Marina	<1	16	Low/Falling	Dry	Sunny 9 Days Since Rain Avg Temp = 79°F
5/21/2021	9:56	Guerins Bridge	144	276	Low/Falling	Dry	
5/21/2021	11:32	Wando Marina	1	12	Low/Rising	Dry	
5/21/2021	11:58	Guerins Bridge	86	88	Low/Rising	Dry	
5/21/2021	13:31	Wando Marina	<1	27	Mid/Rising	Dry	
5/21/2021	14:00	Guerins Bridge	75	45	Mid/Rising	Dry	
6/28/2021	9:13	Wando Marina	8	1203	Mid/Rising	Dry	Cloudy 6 Days Since Rain Avg Temp = 80°F
6/28/2021	9:41	Guerins Bridge	517	>2420	Mid/Rising	Dry	
6/28/2021	10:37	Wando Marina	4	1553	High/Rising	Dry	
6/28/2021	11:03	Guerins Bridge	185	>2420	High/Rising	Dry	
6/28/2021	12:25	Wando Marina	3	1046	High/Slack	Dry	
6/28/2021	12:52	Guerins Bridge	101	>2420	High/Slack	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
7/7/2021	8:17	Wando Marina	13	1,986	High/Falling	Dry	Cloudy 9 Days Since Rain Avg Temp = 83°F
7/7/2021	8:50	Guerins Bridge	214	>2,420	High/Falling	Dry	
7/7/2021	10:27	Wando Marina	3	>2,420	Mid/Falling	Dry	
7/7/2021	10:54	Guerins Bridge	260	>2,420	Mid/Falling	Dry	
7/7/2021	12:30	Wando Marina	4	2,420	Low/Falling	Dry	
7/7/2021	12:56	Guerins Bridge	411	>2,420	Low/Falling	Dry	
7/8/2021	8:56	Wando Marina	9	1,553	High/Falling	Wet	Cloudy Total Rainfall = 3.45" Avg Temp = 82°F
7/8/2021	9:21	Guerins Bridge	613	>2,420	High/Falling	Wet	
7/8/2021	11:15	Wando Marina	31	1,986	Mid/Falling	Wet	
7/8/2021	11:36	Guerins Bridge	>2,420	>2,420	Mid/Falling	Wet	
7/8/2021	13:27	Wando Marina	111	1,732	Low/Falling	Wet	
7/8/2021	13:50	Guerins Bridge	>2,420	>2,420	Low/Falling	Wet	
10/18/2021	9:48	Wando Marina	2	613	High/Falling	Dry	Sunny 11 Days Since Rain Avg Temp = 67°F
10/18/2021	10:14	Guerins Bridge	29	>2420	High/Falling	Dry	
10/18/2021	10:33	Chandler Road	36	>2420	High/Falling	Dry	
10/18/2021	11:35	Wando Marina	6	435	Mid/Falling	Dry	
10/18/2021	12:04	Guerins Bridge	49	>2420	Mid/Falling	Dry	
10/18/2021	12:27	Chandler Road	365	>2420	Mid/Falling	Dry	
10/18/2021	13:16	Wando Marina	3	613	Low/Falling	Dry	
10/18/2021	13:42	Guerins Bridge	214	1553	Low/Falling	Dry	
10/18/2021	14:02	Chandler Road	1300	>2420	Low/Falling	Dry	
10/25/2021	11:15	Chandler Road	1200	2760	High/Rising	Wet	Partly Cloudy Total Rainfall = 0.73" Avg Temp = 76°F
10/25/2021	11:40	Guerins Bridge	30	100	High/Rising	Wet	
10/25/2021	12:10	Wando Marina	40	120	High/Rising	Wet	
10/25/2021	12:40	Chandler Road	1380	600	High/Rising	Wet	
10/25/2021	12:55	Guerins Bridge	30	30	High/Rising	Wet	
10/25/2021	13:20	Wando Marina	<10	30	High/Rising	Wet	
10/25/2021	13:45	Chandler Road	700	320	High/Falling	Wet	
10/25/2021	14:00	Guerins Bridge	<10	<10	High/Falling	Wet	
10/25/2021	14:30	Wando Marina	<10	10	High/Falling	Wet	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
11/22/2021	9:44	Wando Marina	<10	<10	High/Rising	Dry	Partly Cloudy 11 Days Since Rain Avg Temp = 65°F
11/22/2021	10:08	Guerins Bridge	30	40	High/Rising	Dry	
11/22/2021	10:25	Chandler Road	10	50	High/Rising	Dry	
11/22/2021	11:20	Wando Marina	<10	<10	High/Falling	Dry	
11/22/2021	11:40	Guerins Bridge	<10	10	High/Rising	Dry	
11/22/2021	11:55	Chandler Road	40	40	High/Rising	Dry	
11/22/2021	13:00	Wando Marina	<10	<10	High/Falling	Dry	
11/22/2021	13:30	Guerins Bridge	20	80	High/Falling	Dry	
11/22/2021	13:50	Chandler Road	220	280	High/Falling	Dry	
12/29/2021	9:43	Chandler Road	1330	3260	Low/Rising	Dry	Partly Cloudy 8 Days Since Rain Avg Temp = 74°F
12/29/2021	10:12	Guerins Bridge	260	430	Low/Rising	Dry	
12/29/2021	10:52	Wando Marina	<10	10	Low/Rising	Dry	
12/29/2021	11:27	Chandler Road	1670	3260	Mid/Rising	Dry	
12/29/2021	11:45	Guerins Bridge	180	290	Mid/Rising	Dry	
12/29/2021	12:12	Wando Marina	30	10	Mid/Rising	Dry	
12/29/2021	12:51	Chandler Road	2250	1670	High/Rising	Dry	
12/29/2021	13:13	Guerins Bridge	170	230	High/Rising	Dry	
12/29/2021	13:42	Wando Marina	<10	<10	High/Rising	Dry	
1/20/2022	10:55	Chandler Road	80	140	High/Falling	Dry	Partly Cloudy 4 Days Since Rain Avg Temp = 70°F
1/20/2022	11:13	Guerins Bridge	20	30	High/Falling	Dry	
1/20/2022	11:43	Wando Marina	<10	<10	High/Falling	Dry	
1/20/2022	12:12	Chandler Road	170	50	Mid/Falling	Dry	
1/20/2022	12:30	Guerins Bridge	100	30	Mid/Falling	Dry	
1/20/2022	12:58	Wando Marina	<10	<10	Mid/Falling	Dry	
1/20/2022	13:30	Chandler Road	140	150	Low/Falling	Dry	
1/20/2022	13:51	Guerins Bridge	460	120	Low/Falling	Dry	
1/20/2022	14:17	Wando Marina	<10	<10	Low/Falling	Dry	

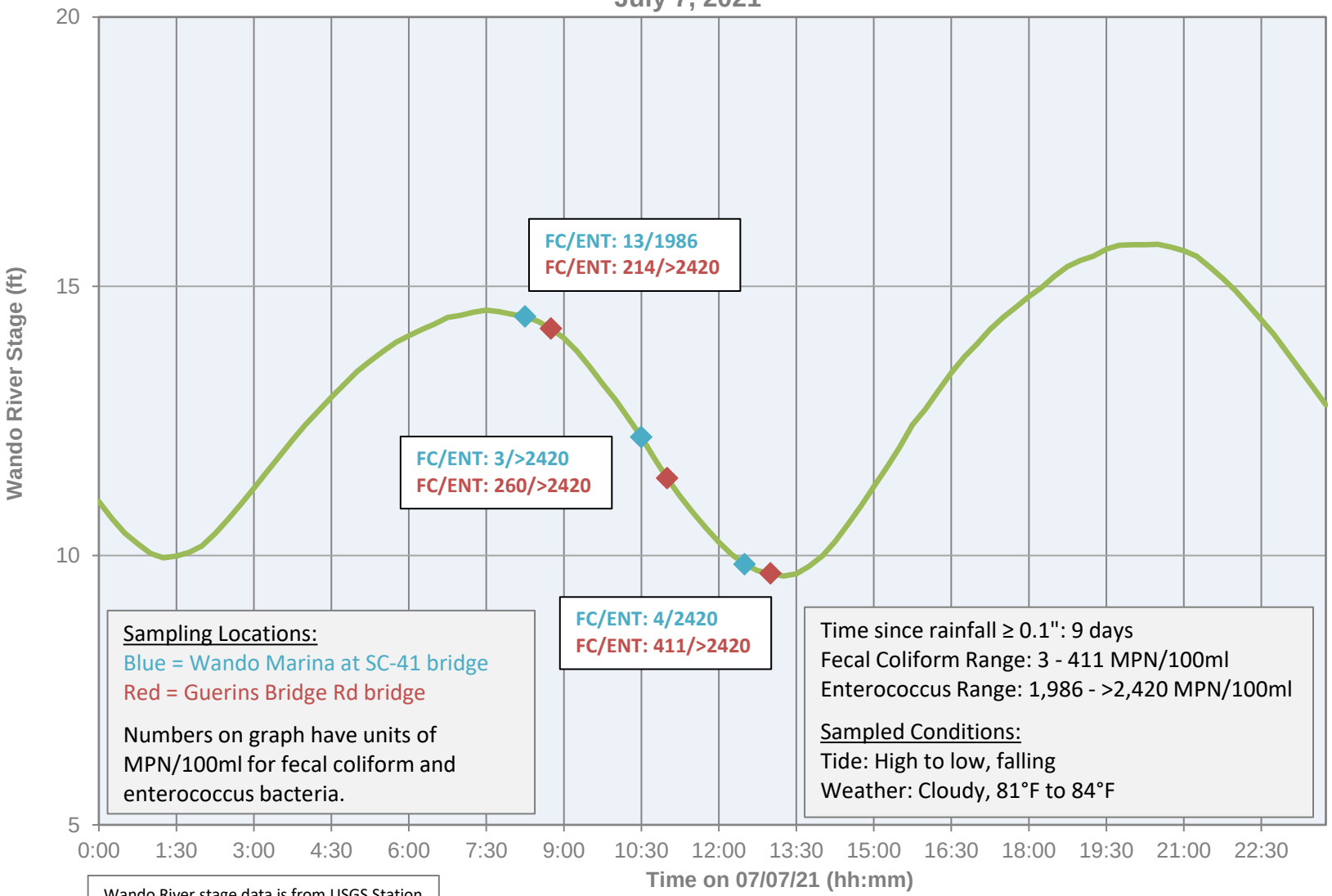
Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
2/11/2022	9:49	Wando Marina	<10	10	Low/Falling	Dry	
2/11/2022	10:24	Guerins Bridge	30	31	Low/Falling	Dry	
2/11/2022	10:47	Chandler Road	216	388	Low/Falling	Dry	
2/11/2022	11:15	Wando Marina	<10	<10	Low/Slack	Dry	Sunny
2/11/2022	11:45	Guerins Bridge	10	10	Low/Slack	Dry	7 Days Since Rain
2/11/2022	12:02	Chandler Road	238	74	Low/Slack	Dry	Avg Temp = 65°F
2/11/2022	13:05	Wando Marina	<10	10	Low/Rising	Dry	
2/11/2022	13:29	Guerins Bridge	41	31	Low/Rising	Dry	
2/11/2022	13:46	Chandler Road	146	62	Low/Rising	Dry	
3/10/2022	9:01	Wando Marina	10	10	Mid/Rising	Wet	
3/10/2022	9:58	Guerins Bridge	290	500	Mid/Rising	Wet	
3/10/2022	10:18	Chandler Road	2420	7700	Mid/Rising	Wet	
3/10/2022	11:01	Wando Marina	1620	10	High/Rising	Wet	Rainy
3/10/2022	11:28	Guerins Bridge	120	300	High/Rising	Wet	Total Rainfall = 1.01"
3/10/2022	11:45	Chandler Road	<10	3260	High/Rising	Wet	Avg Temp = 56°F
3/10/2022	12:52	Wando Marina	<10	20	High/Falling	Wet	
3/10/2022	13:18	Guerins Bridge	460	360	High/Falling	Wet	
3/10/2022	13:36	Chandler Road	1210	2760	High/Falling	Wet	
3/29/2022	10:05	Wando Marina	<10	<10	High/Falling	Dry	
3/29/2022	10:30	Guerins Bridge	20	40	High/Falling	Dry	
3/29/2022	10:47	Chandler Road	200	700	High/Falling	Dry	
3/29/2022	11:30	Wando Marina	<10	<10	Mid/Falling	Dry	Sunny
3/29/2022	11:55	Guerins Bridge	80	30	Mid/Falling	Dry	4 Days Since Rain
3/29/2022	12:15	Chandler Road	60	140	Mid/Falling	Dry	Avg Temp = 60°F
3/29/2022	13:00	Wando Marina	<10	10	Low/Falling	Dry	
3/29/2022	13:27	Guerins Bridge	170	40	Low/Falling	Dry	
3/29/2022	13:42	Chandler Road	110	90	Low/Falling	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
4/12/2022	9:40	Wando Marina	10	<10	Low/Falling	Dry	Sunny 5 Days Since Rain Avg Temp = 78°F
4/12/2022	10:05	Guerins Bridge	60	20	Low/Falling	Dry	
4/12/2022	10:27	Chandler Road	310	190	Low/Falling	Dry	
4/12/2022	11:15	Wando Marina	<10	<10	Low/Slack	Dry	
4/12/2022	11:41	Guerins Bridge	90	40	Low/Slack	Dry	
4/12/2022	12:00	Chandler Road	120	190	Low/Slack	Dry	
4/12/2022	13:06	Wando Marina	<10	<10	Low/Rising	Dry	
4/12/2022	13:32	Guerins Bridge	110	<10	Low/Rising	Dry	
4/12/2022	13:50	Chandler Road	90	120	Low/Rising	Dry	
5/10/2022	9:00	Wando Marina	<10	<10	Low/Falling	Dry	Sunny 6 Days Since Rain Avg Temp = 71°F
5/10/2022	9:26	Guerins Bridge	60	50	Low/Falling	Dry	
5/10/2022	9:43	Chandler Road	1260	2760	Low/Falling	Dry	
5/10/2022	10:02	Wando Marina	<10	20	Low/Falling	Dry	
5/10/2022	10:24	Guerins Bridge	160	40	Low/Falling	Dry	
5/10/2022	10:42	Chandler Road	280	930	Low/Falling	Dry	
5/10/2022	12:05	Wando Marina	<10	<10	Low/Rising	Dry	
5/10/2022	12:35	Guerins Bridge	110	30	Low/Rising	Dry	
5/10/2022	12:55	Chandler Road	2380	<10	Low/Rising	Dry	
6/23/2022	8:35	Wando Marina	<10	<10	Low/Falling	Dry	Sunny 4 Days Since Rain Avg Temp = 89°F
6/23/2022	9:01	Guerins Bridge	50	20	Low/Falling	Dry	
6/23/2022	9:25	Chandler Road	320	2910	Low/Falling	Dry	
6/23/2022	10:20	Wando Marina	30	<10	Low/Slack	Dry	
6/23/2022	10:45	Guerins Bridge	60	20	Low/Slack	Dry	
6/23/2022	11:02	Chandler Road	440	830	Low/Slack	Dry	
6/23/2022	11:45	Wando Marina	10	10	Low/Rising	Dry	
6/23/2022	12:10	Guerins Bridge	50	<10	Low/Rising	Dry	
6/23/2022	12:25	Chandler Road	1290	1670	Low/Rising	Dry	

Date	Time	Sampling Location (Guerins Bridge/ Wando Marina)	Fecal Coliform Result (MPN/100 ML)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
6/29/2022	10:06	Wando Marina	310	40	High/Falling	Wet	Rainy Total Rainfall = 2.81" Avg Temp = 79°F
6/29/2022	10:53	Guerins Bridge	760	210	High/Falling	Wet	
6/29/2022	11:16	Chandler Road	1010	>24200	High/Falling	Wet	
6/29/2022	11:44	Wando Marina	200	990	Mid/Falling	Wet	
6/29/2022	12:25	Guerins Bridge	1110	730	Mid/Falling	Wet	
6/29/2022	12:42	Chandler Road	>24200	>24200	Mid/Falling	Wet	
6/29/2022	13:10	Wando Marina	110	2990	Low/Falling	Wet	
6/29/2022	13:34	Guerins Bridge	15530	1940	Low/Falling	Wet	
6/29/2022	13:50	Chandler Road	>24200	>24200	Low/Falling	Wet	

Appendix B: Figures of Individual Storm Grab Sampling Results

Charleston County
Wando River Dry Weather Sampling
July 7, 2021



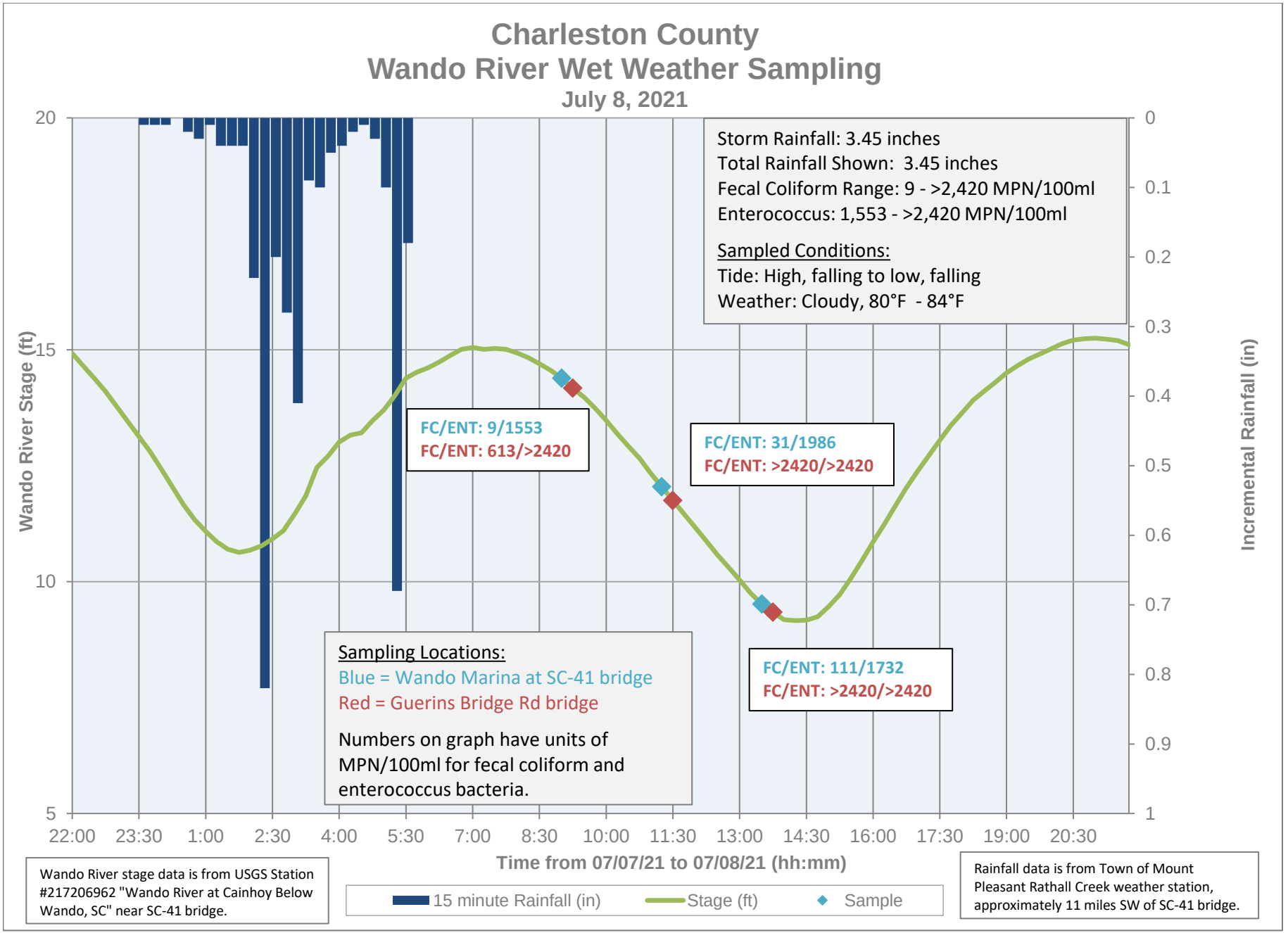
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge

Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.

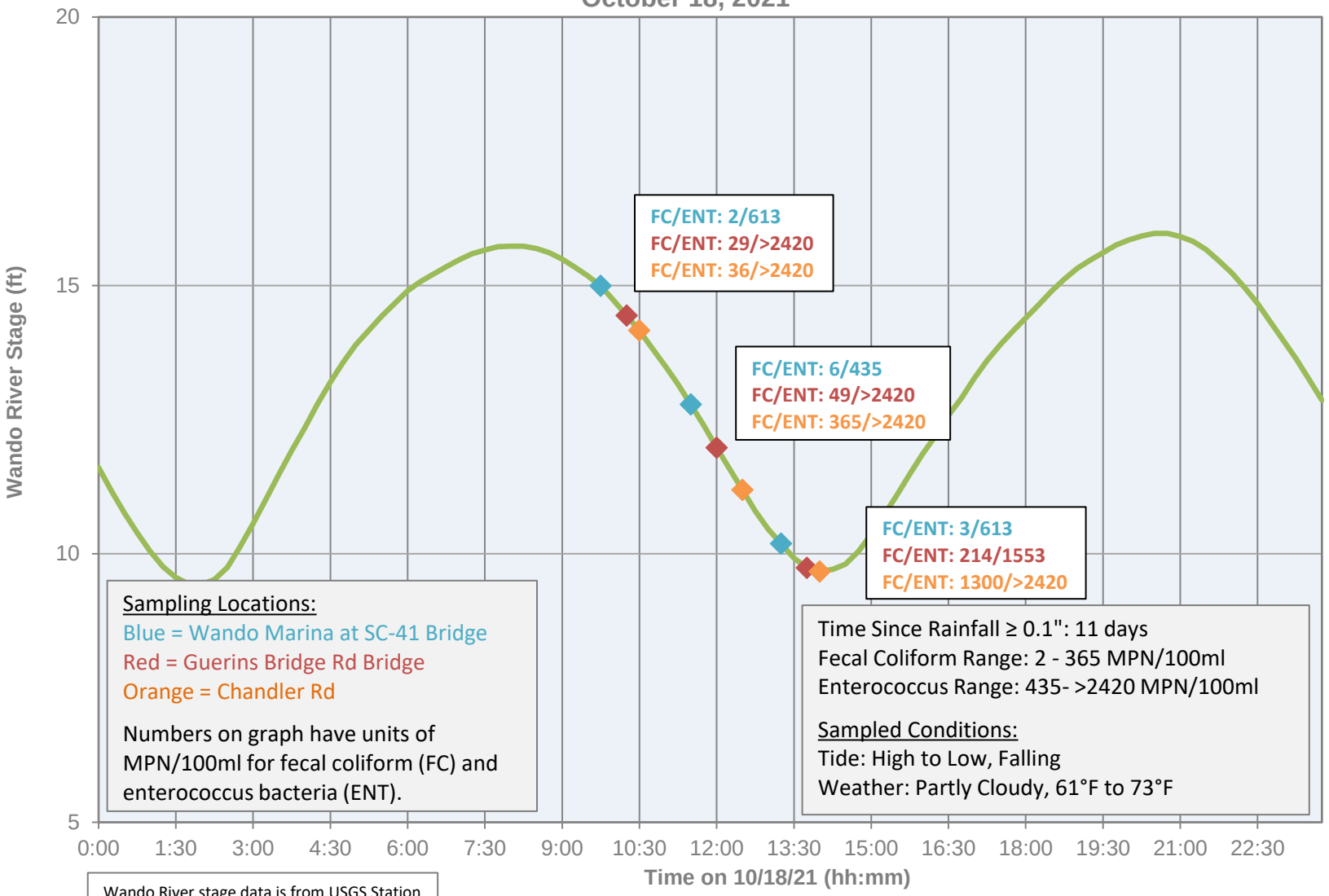
Time since rainfall ≥ 0.1": 9 days
Fecal Coliform Range: 3 - 411 MPN/100ml
Enterococcus Range: 1,986 - >2,420 MPN/100ml

Sampled Conditions:
Tide: High to low, falling
Weather: Cloudy, 81°F to 84°F

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.


Charleston County
Wando River Wet Weather Sampling
July 8, 2021
Storm Rainfall: 3.45 inches
Total Rainfall Shown: 3.45 inches
Fecal Coliform Range: 9 - >2,420 MPN/100ml
Enterococcus: 1,553 - >2,420 MPN/100ml
Sampled Conditions:
Tide: High, falling to low, falling
Weather: Cloudy, 80°F - 84°F
FC/ENT: 9/1553
FC/ENT: 613/>2420
FC/ENT: 31/1986
FC/ENT: >2420/>2420
FC/ENT: 111/1732
FC/ENT: >2420/>2420
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
22:00
23:30
1:00
2:30
4:00
5:30
7:00
8:30
10:00
11:30
13:00
14:30
16:00
17:30
19:00
20:30
Time from 07/07/21 to 07/08/21 (hh:mm)
15 minute Rainfall (in)
Stage (ft)
Sample
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
October 18, 2021



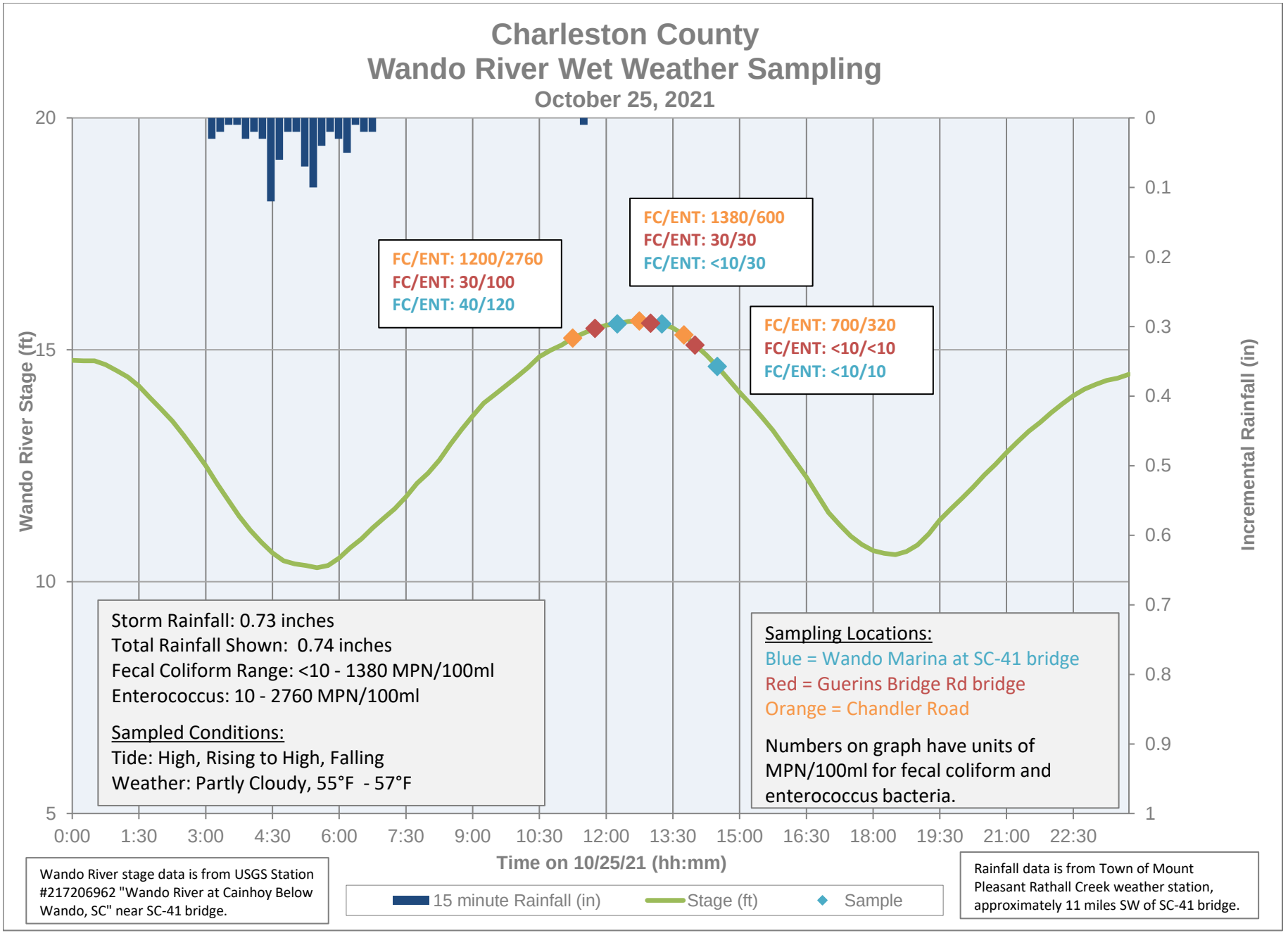
Sampling Locations:
Blue = Wando Marina at SC-41 Bridge
Red = Guerins Bridge Rd Bridge
Orange = Chandler Rd

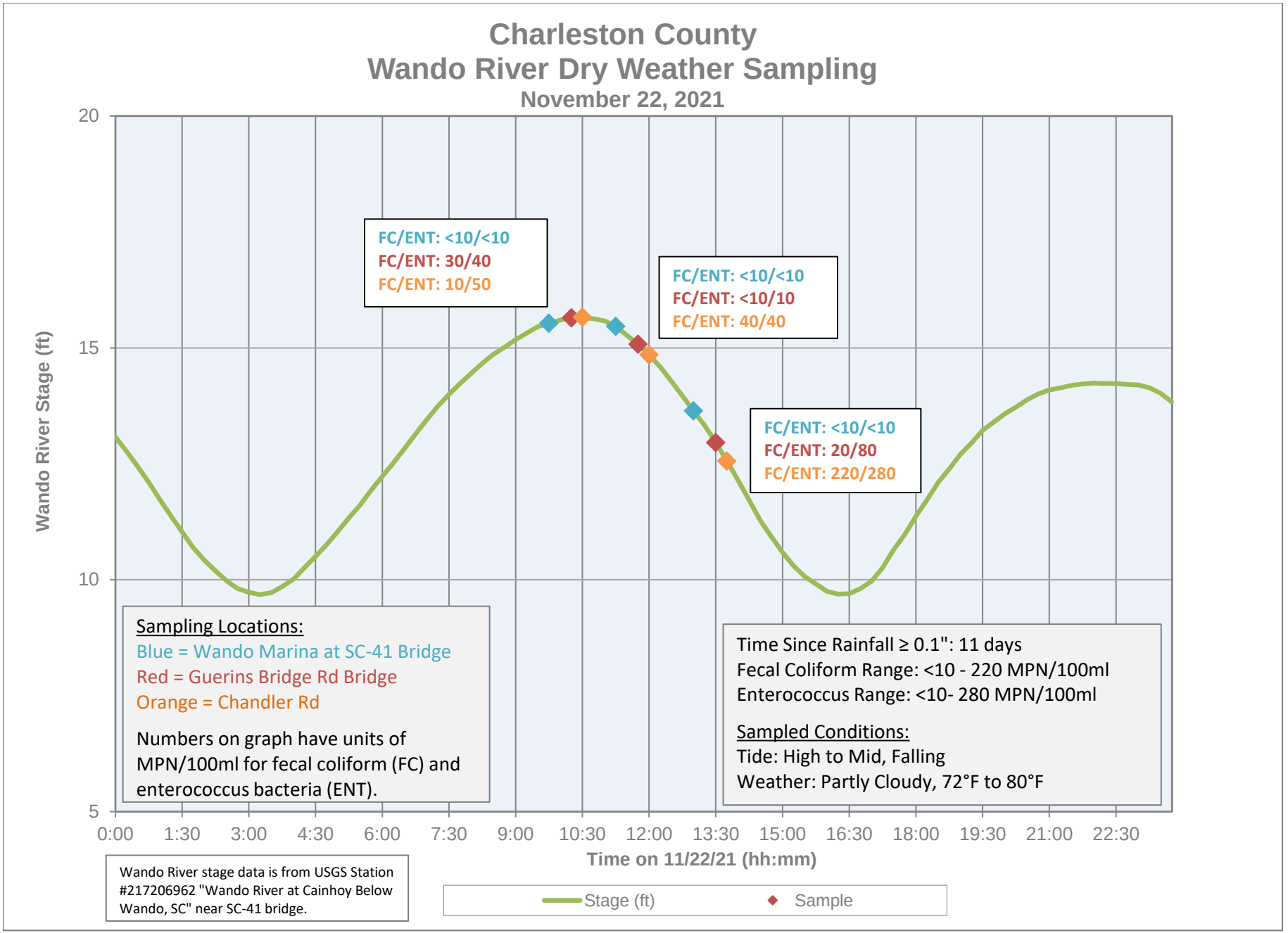
Numbers on graph have units of MPN/100ml for fecal coliform (FC) and enterococcus bacteria (ENT).

Time Since Rainfall ≥ 0.1": 11 days
Fecal Coliform Range: 2 - 365 MPN/100ml
Enterococcus Range: 435- >2420 MPN/100ml

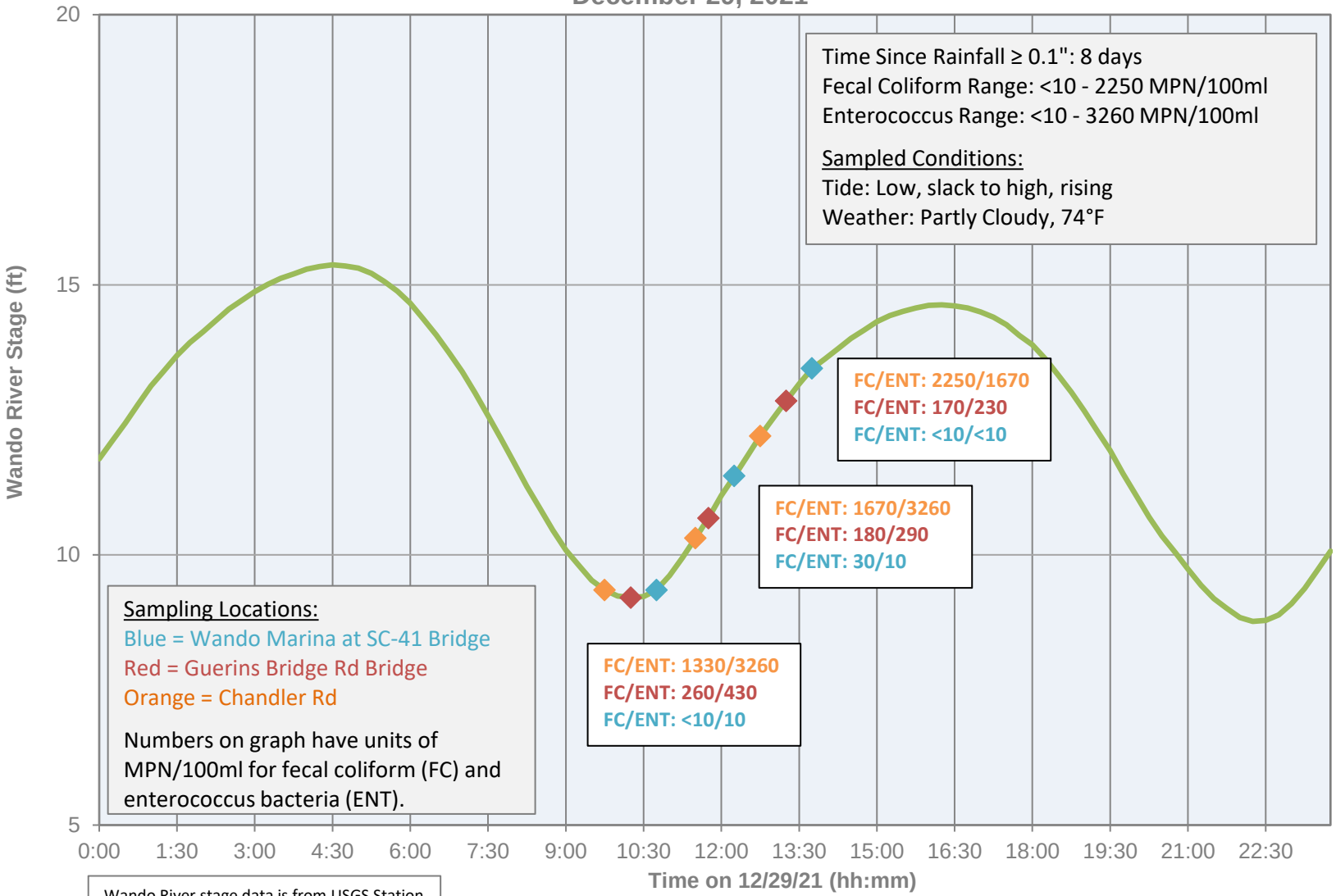
Sampled Conditions:
Tide: High to Low, Falling
Weather: Partly Cloudy, 61°F to 73°F

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

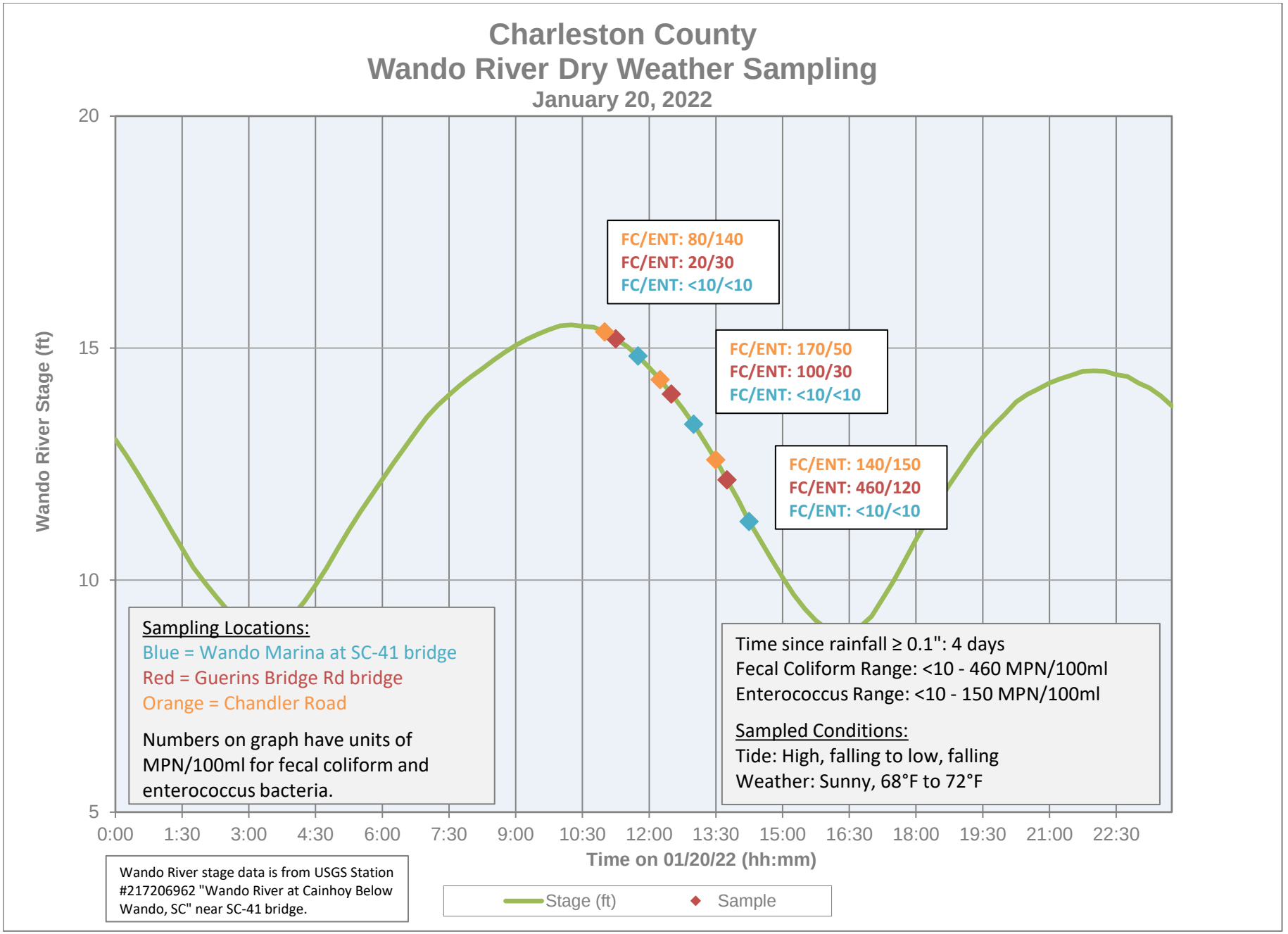

Charleston County
Wando River Wet Weather Sampling
October 25, 2021
Wando River Stage (ft)
Incremental Rainfall (in)
Time on 10/25/21 (hh:mm)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
FC/ENT: 1200/2760
FC/ENT: 30/100
FC/ENT: 40/120
FC/ENT: 1380/600
FC/ENT: 30/30
FC/ENT: <10/30
FC/ENT: 700/320
FC/ENT: <10/<10
FC/ENT: <10/10
Storm Rainfall: 0.73 inches
Total Rainfall Shown: 0.74 inches
Fecal Coliform Range: <10 - 1380 MPN/100ml
Enterococcus: 10 - 2760 MPN/100ml
Sampled Conditions:
Tide: High, Rising to High, Falling
Weather: Partly Cloudy, 55°F - 57°F
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Orange = Chandler Road
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.


Charleston County
Wando River Dry Weather Sampling
November 22, 2021
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 11/22/21 (hh:mm)
FC/ENT: <10/<10
FC/ENT: 30/40
FC/ENT: 10/50
FC/ENT: <10/<10
FC/ENT: <10/10
FC/ENT: 40/40
FC/ENT: <10/<10
FC/ENT: 20/80
FC/ENT: 220/280
Sampling Locations:
Blue = Wando Marina at SC-41 Bridge
Red = Guerins Bridge Rd Bridge
Orange = Chandler Rd
Numbers on graph have units of MPN/100ml for fecal coliform (FC) and enterococcus bacteria (ENT).
Time Since Rainfall ≥ 0.1": 11 days
Fecal Coliform Range: <10 - 220 MPN/100ml
Enterococcus Range: <10- 280 MPN/100ml
Sampled Conditions:
Tide: High to Mid, Falling
Weather: Partly Cloudy, 72°F to 80°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

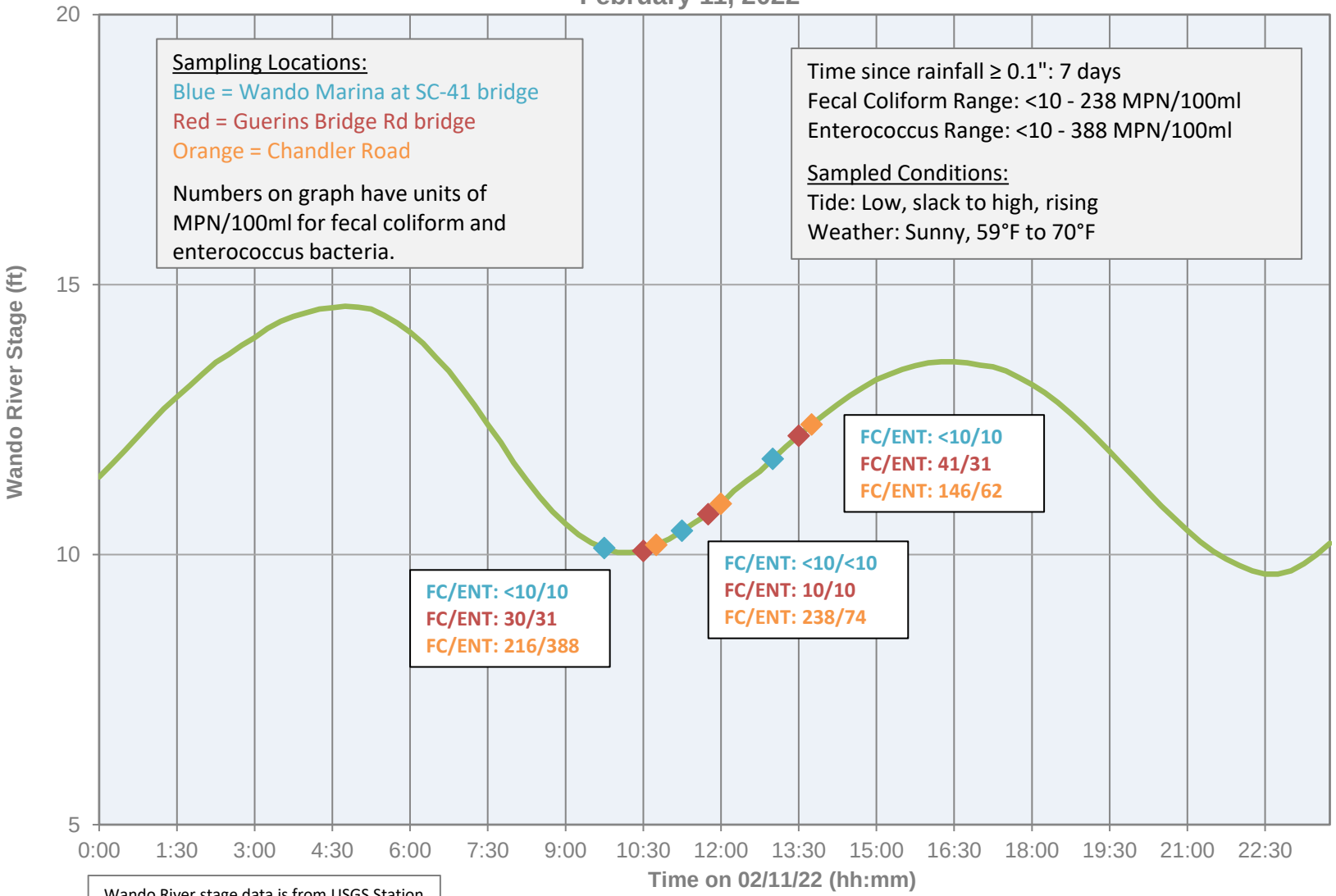
Charleston County
Wando River Dry Weather Sampling
December 29, 2021



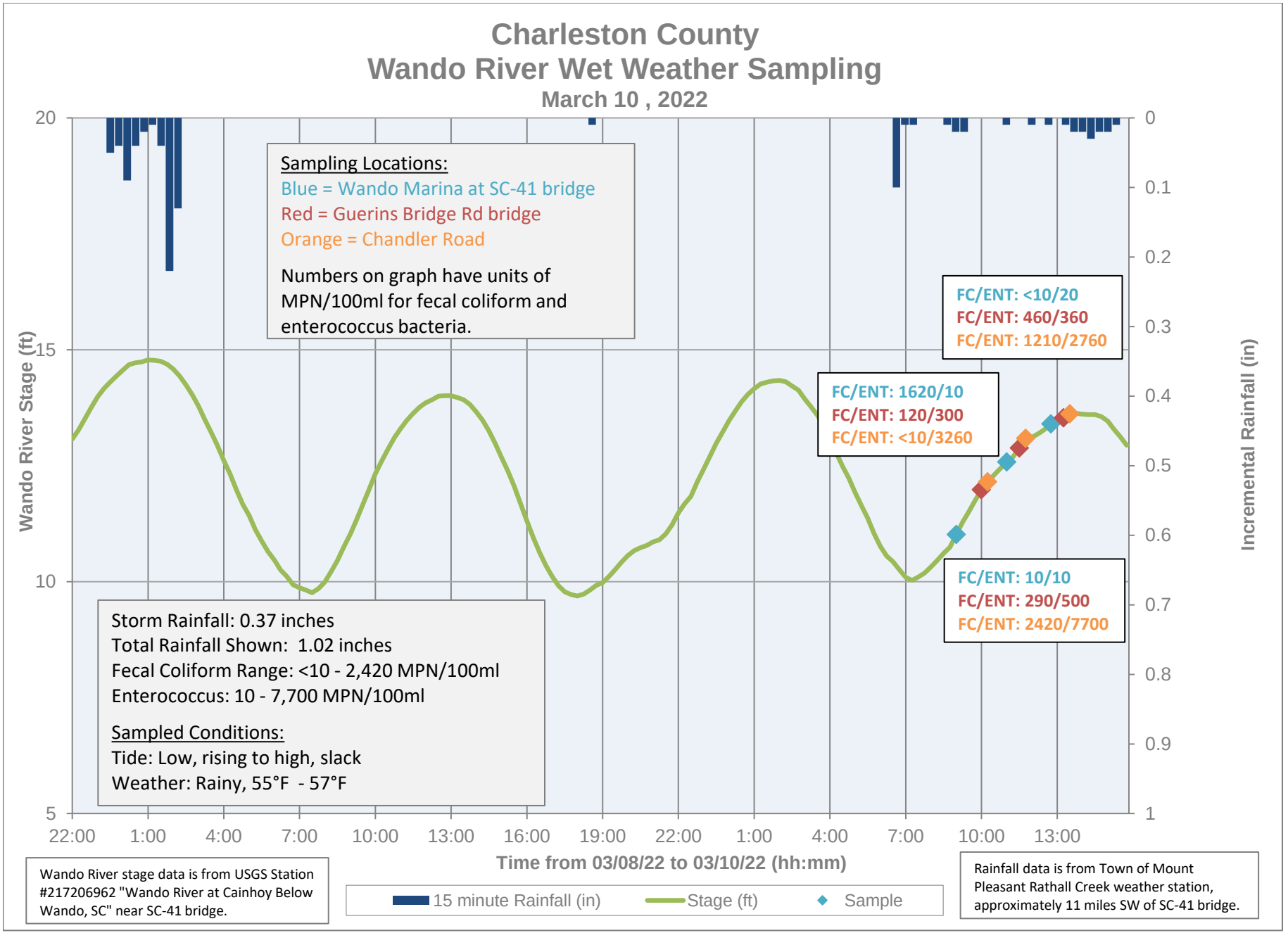
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.


Charleston County
Wando River Dry Weather Sampling
January 20, 2022
Wando River Stage (ft)
20
15
10
5
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
Time on 01/20/22 (hh:mm)
FC/ENT: 80/140
FC/ENT: 20/30
FC/ENT: <10/<10
FC/ENT: 170/50
FC/ENT: 100/30
FC/ENT: <10/<10
FC/ENT: 140/150
FC/ENT: 460/120
FC/ENT: <10/<10
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Orange = Chandler Road
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
Time since rainfall ≥ 0.1": 4 days
Fecal Coliform Range: <10 - 460 MPN/100ml
Enterococcus Range: <10 - 150 MPN/100ml
Sampled Conditions:
Tide: High, falling to low, falling
Weather: Sunny, 68°F to 72°F
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Stage (ft)
Sample

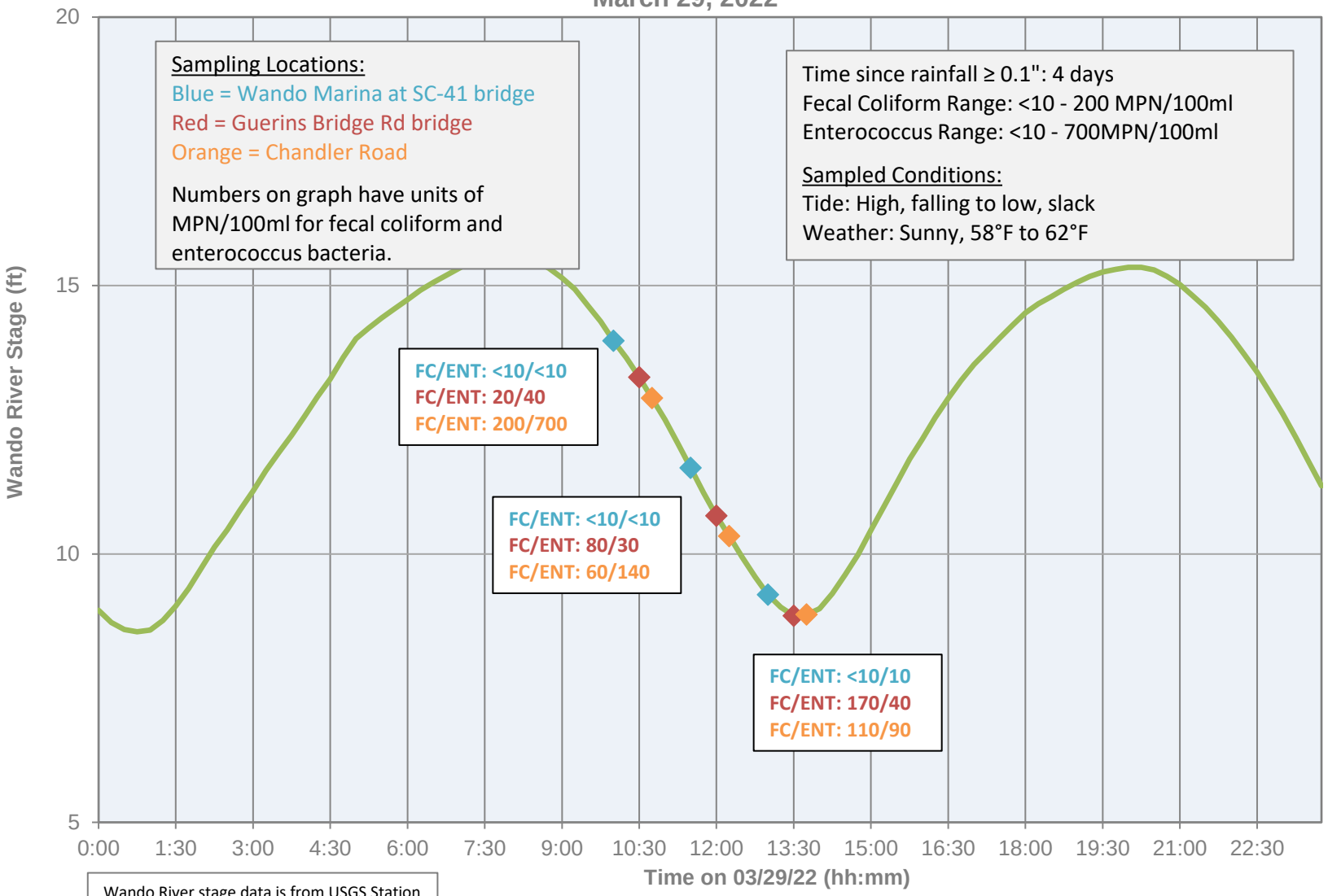
Charleston County
Wando River Dry Weather Sampling
February 11, 2022



Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

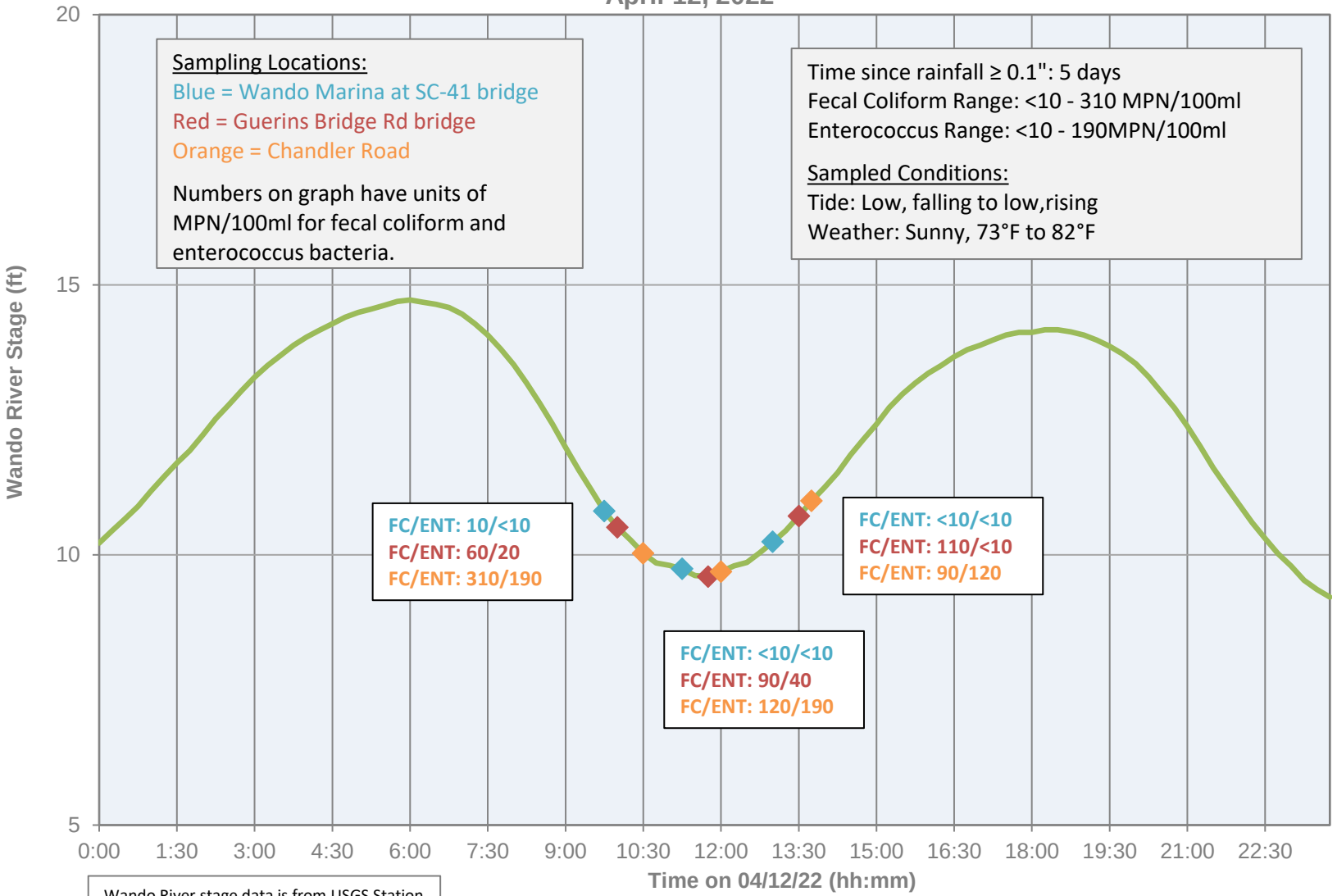

Charleston County
Wando River Wet Weather Sampling
March 10 , 2022
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Orange = Chandler Road
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
FC/ENT: <10/20
FC/ENT: 460/360
FC/ENT: 1210/2760
FC/ENT: 1620/10
FC/ENT: 120/300
FC/ENT: <10/3260
FC/ENT: 10/10
FC/ENT: 290/500
FC/ENT: 2420/7700
Storm Rainfall: 0.37 inches
Total Rainfall Shown: 1.02 inches
Fecal Coliform Range: <10 - 2,420 MPN/100ml
Enterococcus: 10 - 7,700 MPN/100ml
Sampled Conditions:
Tide: Low, rising to high, slack
Weather: Rainy, 55°F - 57°F
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
22:00
1:00
4:00
7:00
10:00
13:00
16:00
19:00
22:00
1:00
4:00
7:00
10:00
13:00
Time from 03/08/22 to 03/10/22 (hh:mm)
15 minute Rainfall (in)
Stage (ft)
Sample
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
March 29, 2022



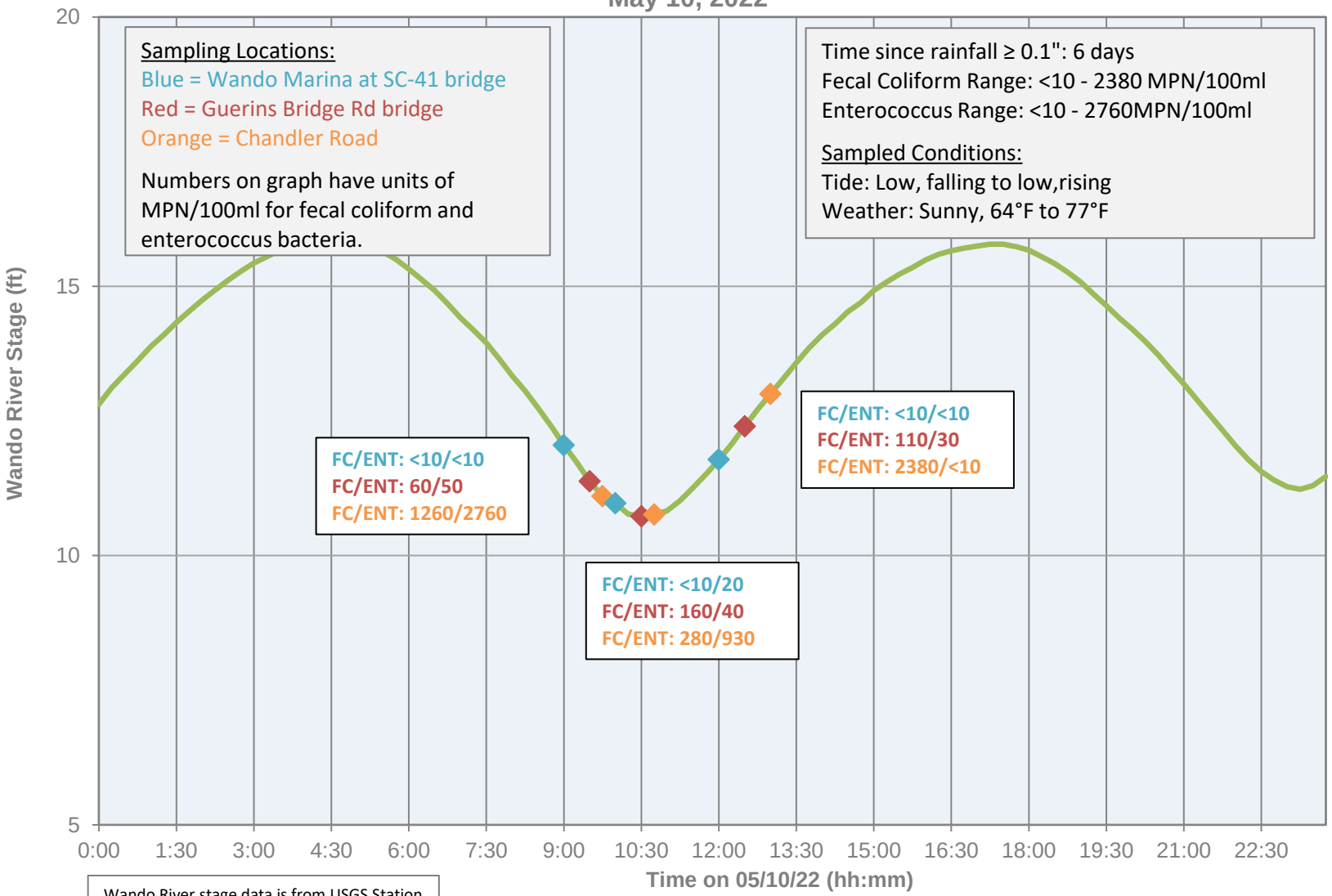
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
April 12, 2022



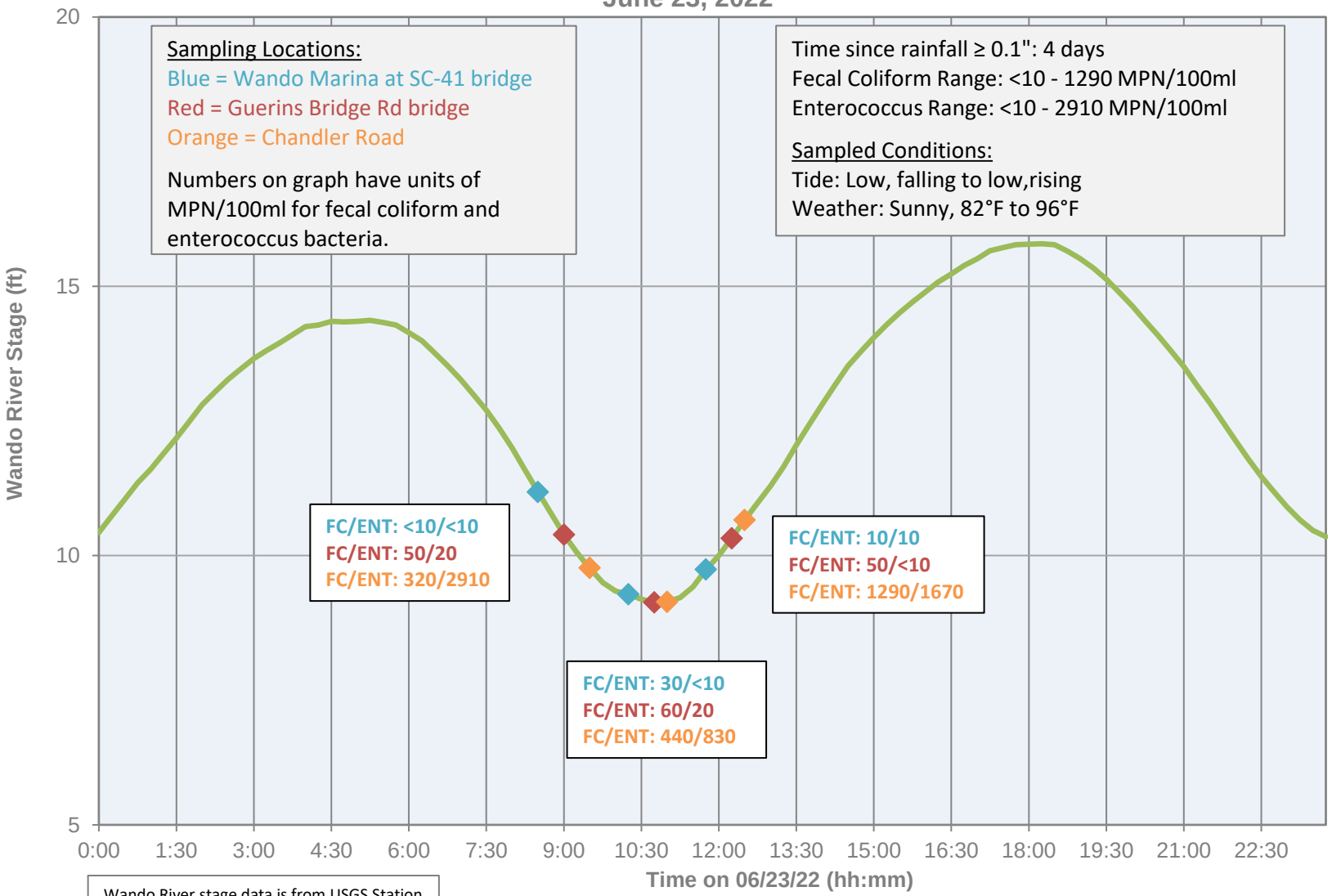
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
May 10, 2022

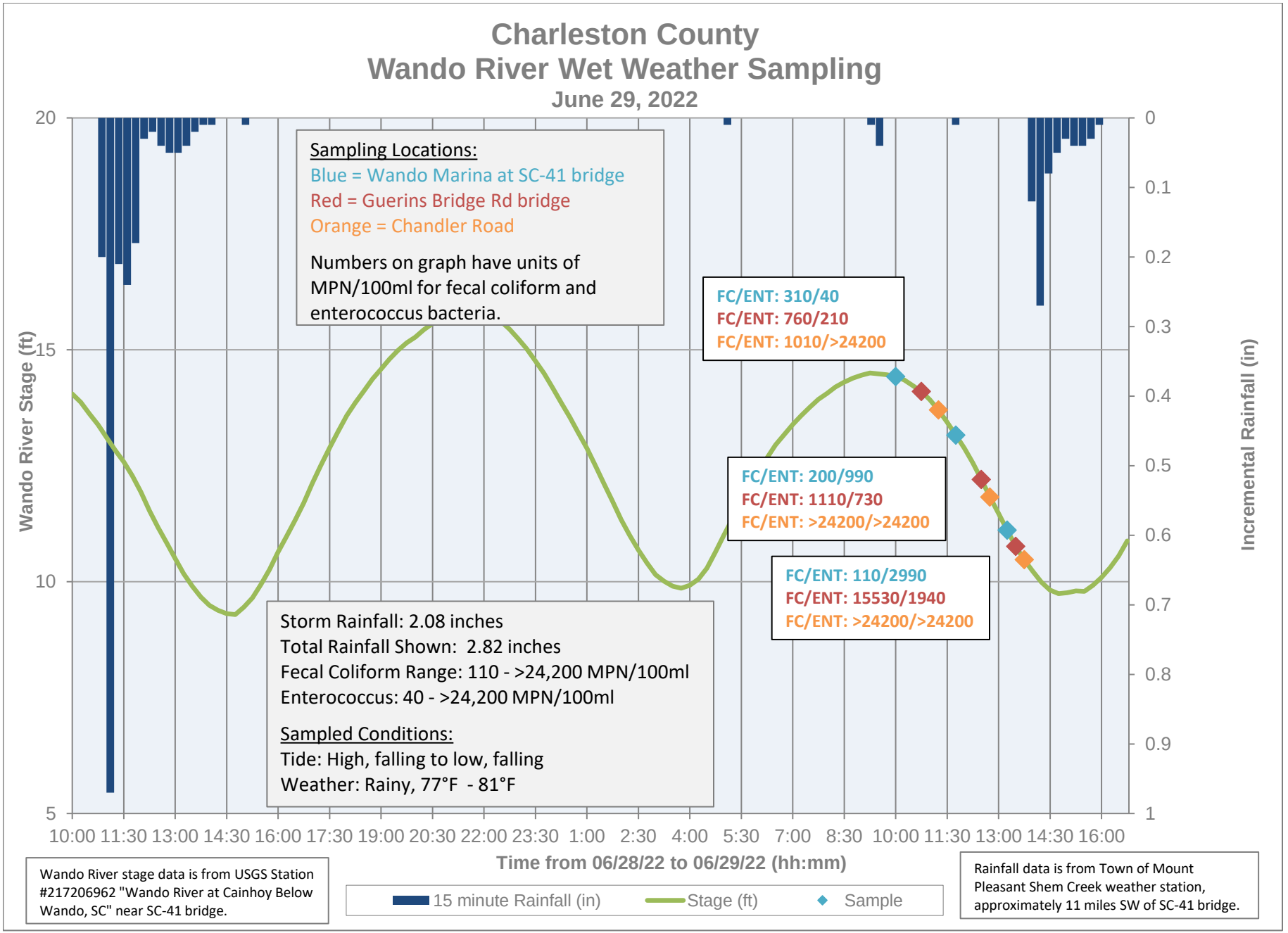


Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
June 23, 2022



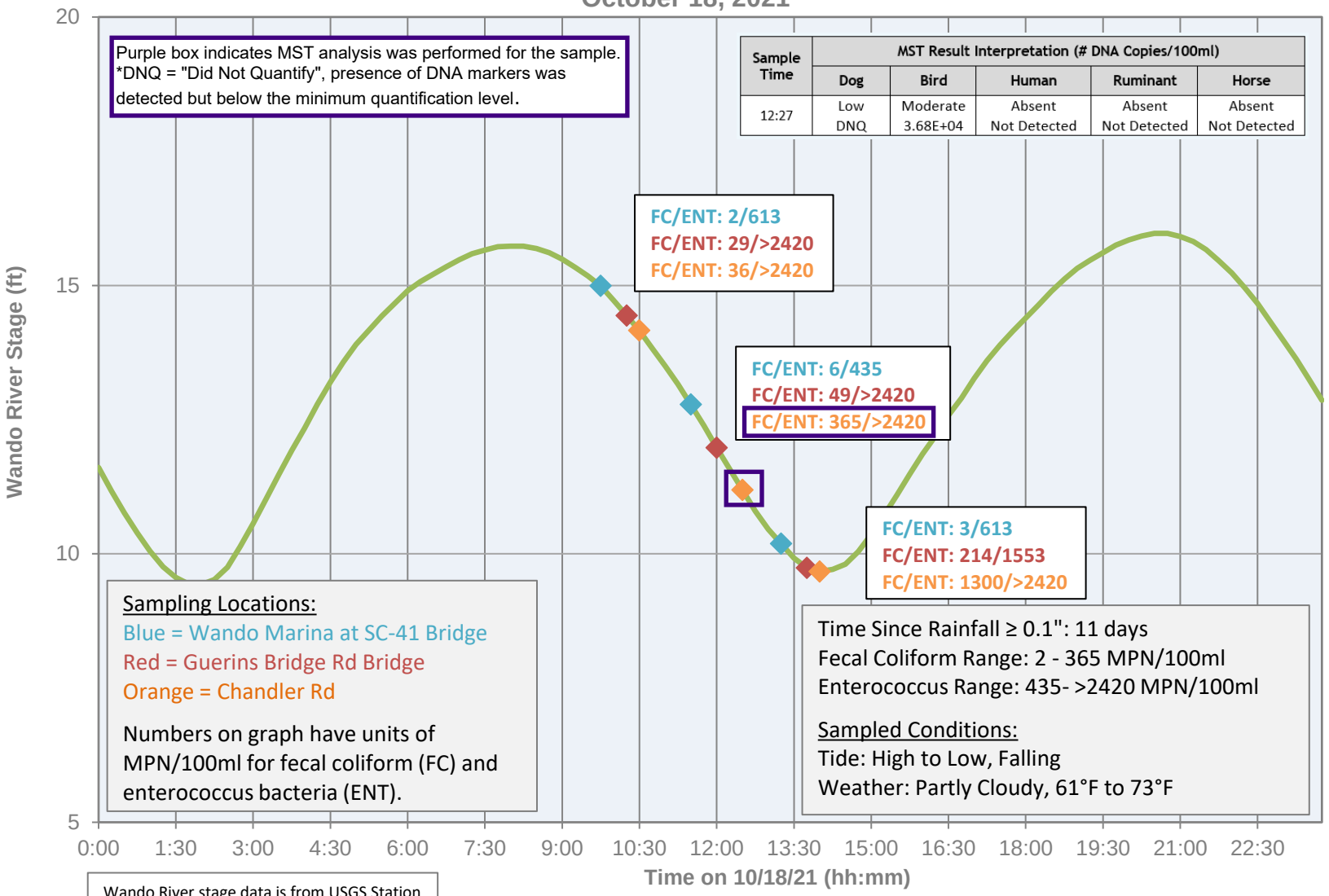
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.


Charleston County
Wando River Wet Weather Sampling
June 29, 2022
Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Orange = Chandler Road
Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.
FC/ENT: 310/40
FC/ENT: 760/210
FC/ENT: 1010/>24200
FC/ENT: 200/990
FC/ENT: 1110/730
FC/ENT: >24200/>24200
FC/ENT: 110/2990
FC/ENT: 15530/1940
FC/ENT: >24200/>24200
Storm Rainfall: 2.08 inches
Total Rainfall Shown: 2.82 inches
Fecal Coliform Range: 110 - >24,200 MPN/100ml
Enterococcus: 40 - >24,200 MPN/100ml
Sampled Conditions:
Tide: High, falling to low, falling
Weather: Rainy, 77°F - 81°F
Wando River Stage (ft)
Incremental Rainfall (in)
20
15
10
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
10:00 11:30 13:00 14:30 16:00 17:30 19:00 20:30 22:00 23:30 1:00 2:30 4:00 5:30 7:00 8:30 10:00 11:30 13:00 14:30 16:00
Time from 06/28/22 to 06/29/22 (hh:mm)
15 minute Rainfall (in)
Stage (ft)
Sample
Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.
Rainfall data is from Town of Mount Pleasant Shem Creek weather station, approximately 11 miles SW of SC-41 bridge.

Appendix C: Microbial Source Tracking Results Graphs

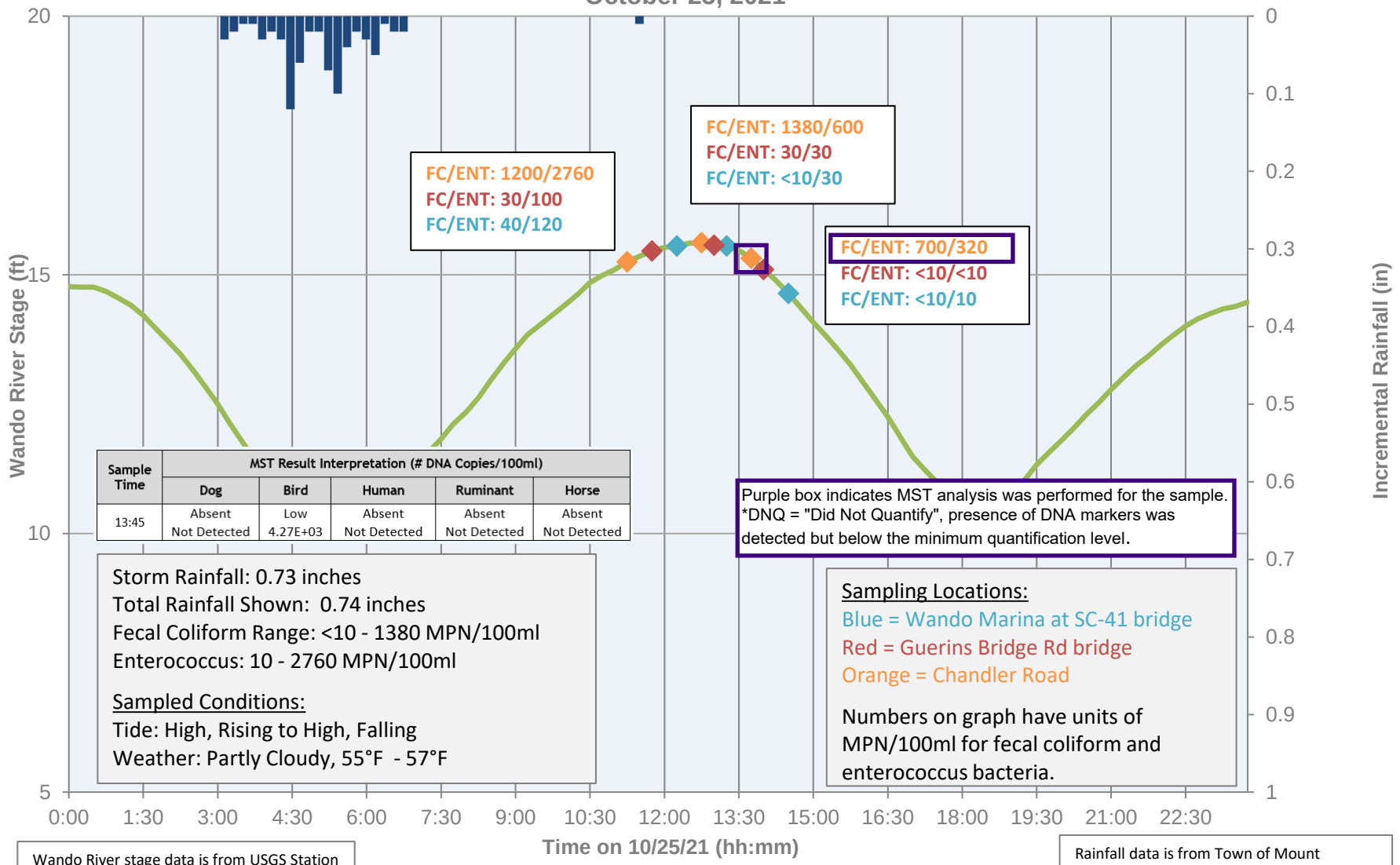
Woolpert, Inc.
4900 O'Hear Avenue, Suite 202
North Charleston, SC 29405
843.216.0401

Charleston County
Wando River Dry Weather Sampling
October 18, 2021



Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
12:27	Low DNQ	Moderate 3.68E+04	Absent Not Detected	Absent Not Detected	Absent Not Detected

Charleston County
Wando River Wet Weather Sampling
October 25, 2021



Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
13:45	Absent Not Detected	Low 4.27E+03	Absent Not Detected	Absent Not Detected	Absent Not Detected

Purple box indicates MST analysis was performed for the sample.
*DNQ = "Did Not Quantify", presence of DNA markers was detected but below the minimum quantification level.

Storm Rainfall: 0.73 inches
Total Rainfall Shown: 0.74 inches
Fecal Coliform Range: <10 - 1380 MPN/100ml
Enterococcus: 10 - 2760 MPN/100ml

Sampled Conditions:
Tide: High, Rising to High, Falling
Weather: Partly Cloudy, 55°F - 57°F

Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Orange = Chandler Road

Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

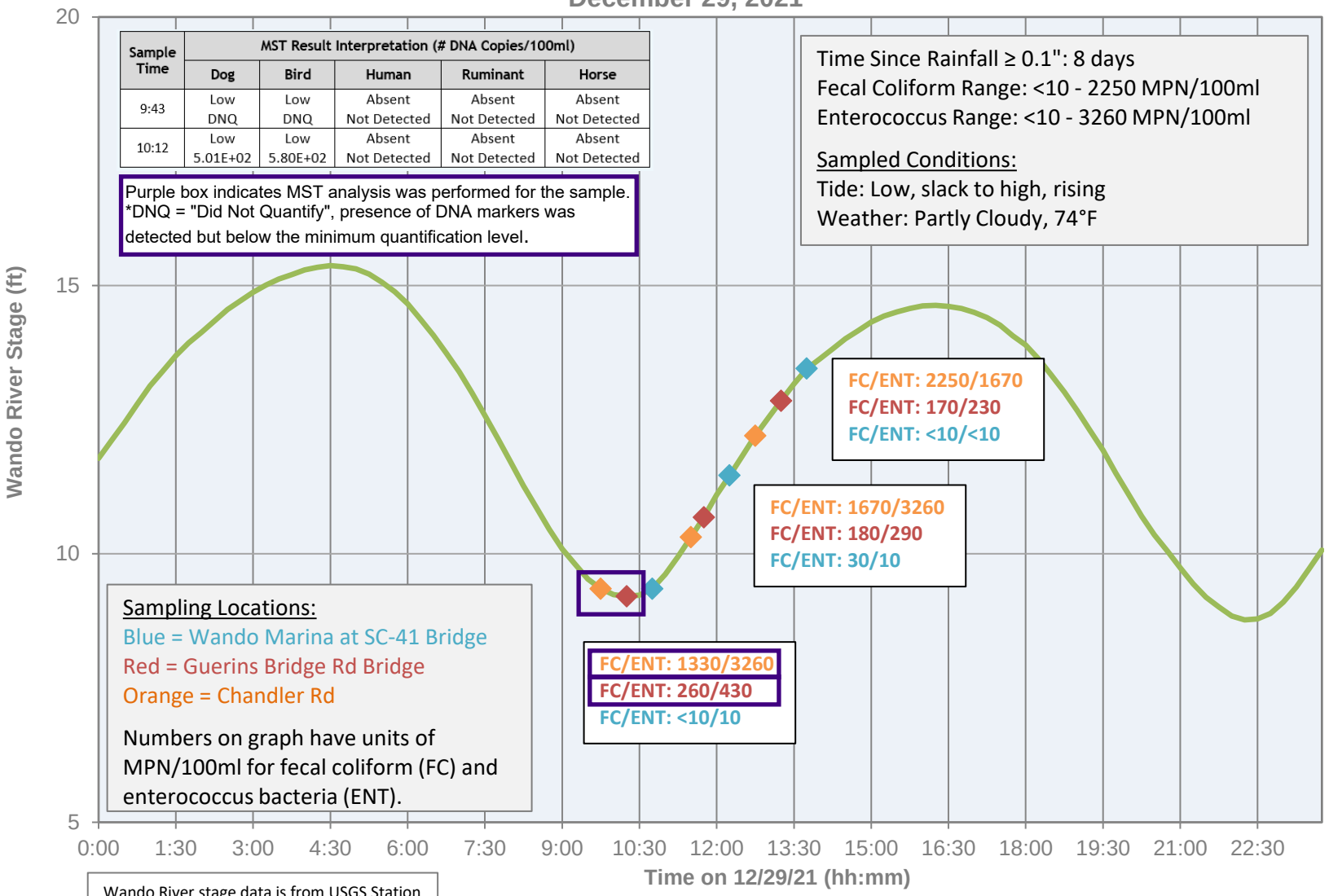
Charleston County
Wando River Dry Weather Sampling
December 29, 2021

Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
9:43	Low DNQ	Low DNQ	Absent Not Detected	Absent Not Detected	Absent Not Detected
10:12	Low 5.01E+02	Low 5.80E+02	Absent Not Detected	Absent Not Detected	Absent Not Detected

Purple box indicates MST analysis was performed for the sample.
*DNQ = "Did Not Quantify", presence of DNA markers was detected but below the minimum quantification level.

Time Since Rainfall ≥ 0.1": 8 days
Fecal Coliform Range: <10 - 2250 MPN/100ml
Enterococcus Range: <10 - 3260 MPN/100ml

Sampled Conditions:
Tide: Low, slack to high, rising
Weather: Partly Cloudy, 74°F

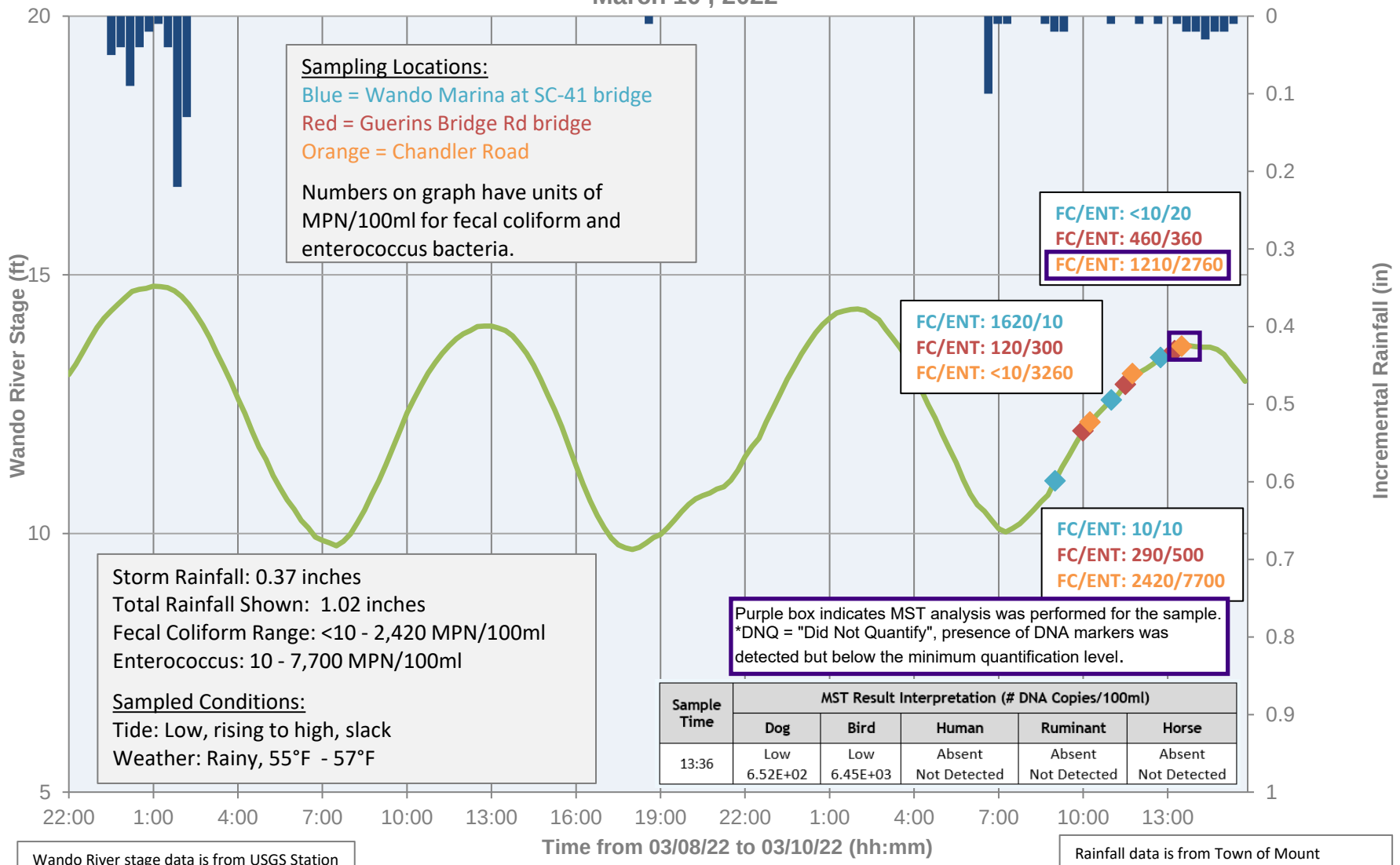


Sampling Locations:
Blue = Wando Marina at SC-41 Bridge
Red = Guerins Bridge Rd Bridge
Orange = Chandler Rd

Numbers on graph have units of MPN/100ml for fecal coliform (FC) and enterococcus bacteria (ENT).

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Charleston County
Wando River Wet Weather Sampling
March 10 , 2022



Storm Rainfall: 0.37 inches
Total Rainfall Shown: 1.02 inches
Fecal Coliform Range: <10 - 2,420 MPN/100ml
Enterococcus: 10 - 7,700 MPN/100ml

Sampled Conditions:
Tide: Low, rising to high, slack
Weather: Rainy, 55°F - 57°F

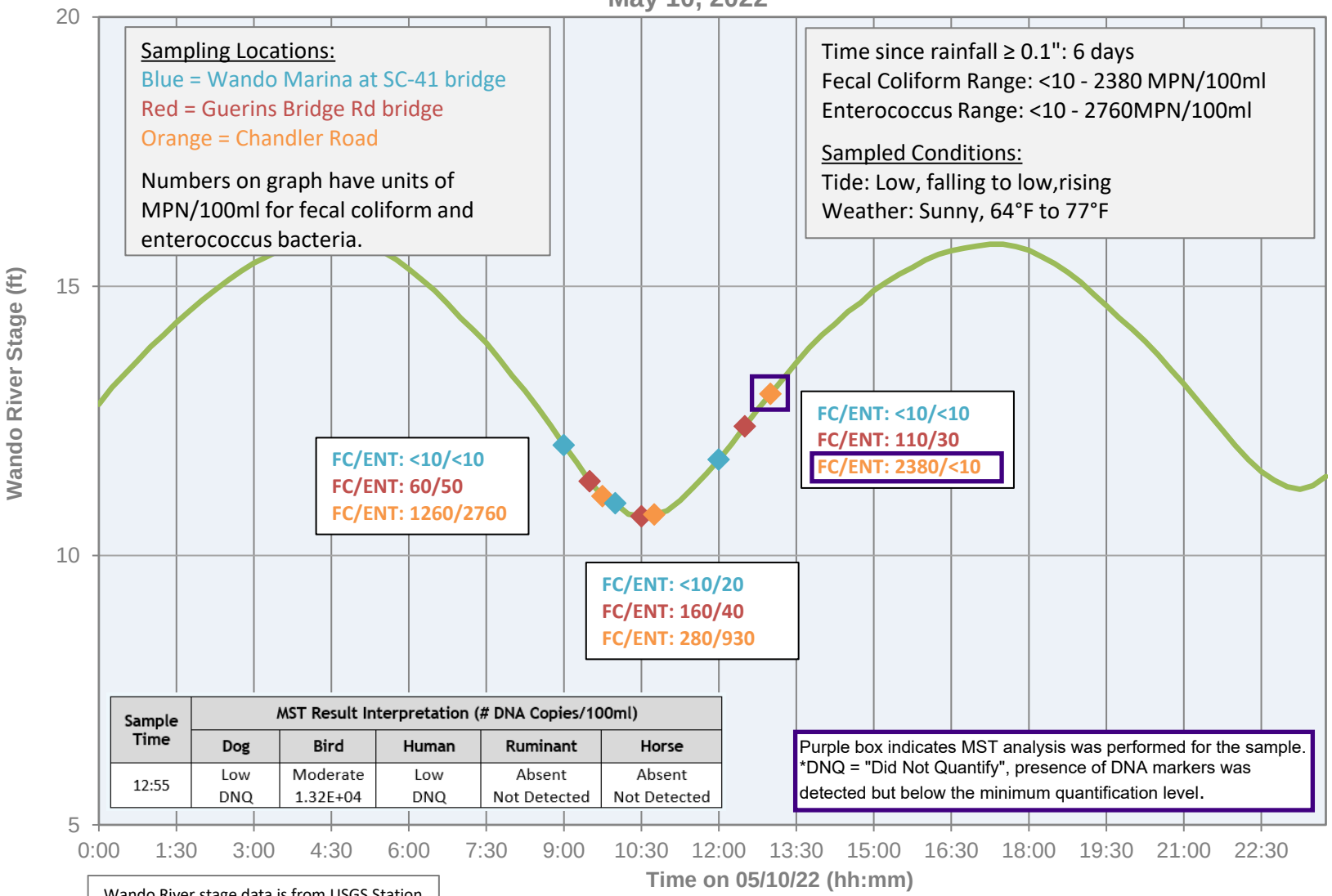
Purple box indicates MST analysis was performed for the sample.
*DNQ = "Did Not Quantify", presence of DNA markers was detected but below the minimum quantification level.

Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
13:36	Low 6.52E+02	Low 6.45E+03	Absent Not Detected	Absent Not Detected	Absent Not Detected

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Rainfall data is from Town of Mount Pleasant Rathall Creek weather station, approximately 11 miles SW of SC-41 bridge.

Charleston County
Wando River Dry Weather Sampling
May 10, 2022

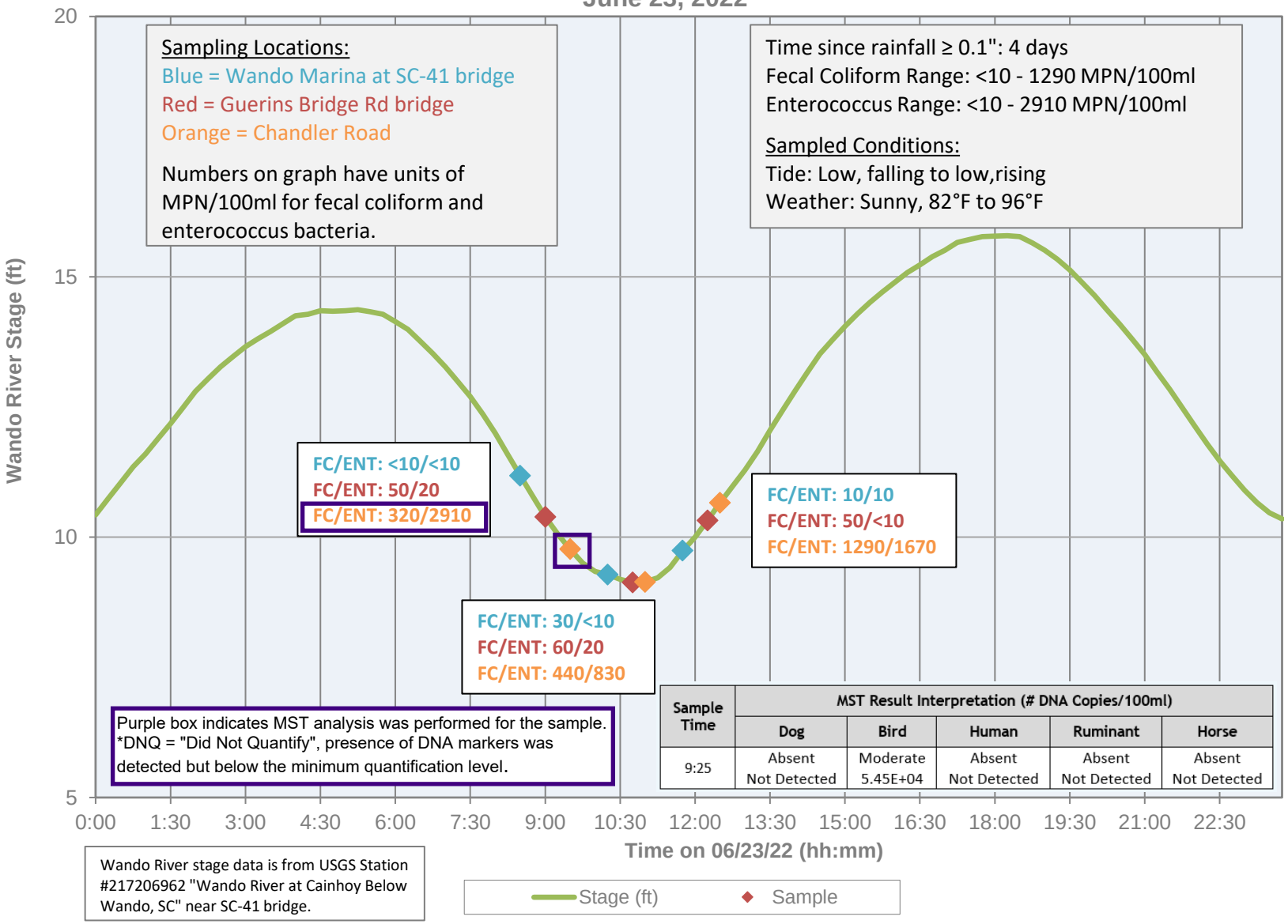


Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
12:55	Low DNQ	Moderate 1.32E+04	Low DNQ	Absent Not Detected	Absent Not Detected

Purple box indicates MST analysis was performed for the sample.
*DNQ = "Did Not Quantify", presence of DNA markers was detected but below the minimum quantification level.

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

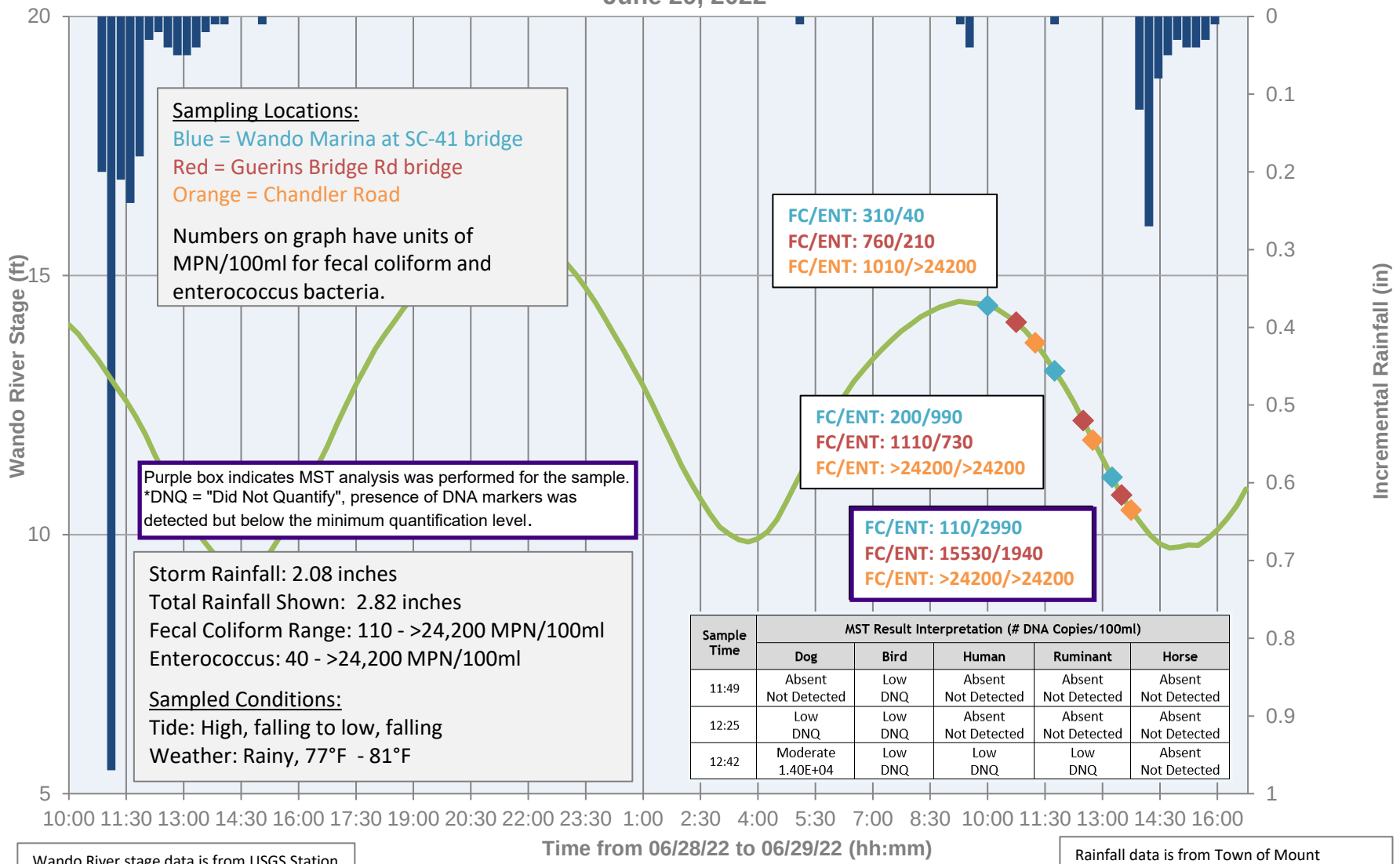
Charleston County
Wando River Dry Weather Sampling
June 23, 2022



Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
9:25	Absent Not Detected	Moderate 5.45E+04	Absent Not Detected	Absent Not Detected	Absent Not Detected

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Charleston County
Wando River Wet Weather Sampling
June 29, 2022



Sampling Locations:
Blue = Wando Marina at SC-41 bridge
Red = Guerins Bridge Rd bridge
Orange = Chandler Road

Numbers on graph have units of MPN/100ml for fecal coliform and enterococcus bacteria.

FC/ENT: 310/40
FC/ENT: 760/210
FC/ENT: 1010/>24200

FC/ENT: 200/990
FC/ENT: 1110/730
FC/ENT: >24200/>24200

FC/ENT: 110/2990
FC/ENT: 15530/1940
FC/ENT: >24200/>24200

Purple box indicates MST analysis was performed for the sample.
*DNQ = "Did Not Quantify", presence of DNA markers was detected but below the minimum quantification level.

Storm Rainfall: 2.08 inches
Total Rainfall Shown: 2.82 inches
Fecal Coliform Range: 110 - >24,200 MPN/100ml
Enterococcus: 40 - >24,200 MPN/100ml

Sampled Conditions:
Tide: High, falling to low, falling
Weather: Rainy, 77°F - 81°F

Sample Time	MST Result Interpretation (# DNA Copies/100ml)				
	Dog	Bird	Human	Ruminant	Horse
11:49	Absent Not Detected	Low DNQ	Absent Not Detected	Absent Not Detected	Absent Not Detected
12:25	Low DNQ	Low DNQ	Absent Not Detected	Absent Not Detected	Absent Not Detected
12:42	Moderate 1.40E+04	Low DNQ	Low DNQ	Low DNQ	Absent Not Detected

Wando River stage data is from USGS Station #217206962 "Wando River at Cainhoy Below Wando, SC" near SC-41 bridge.

Rainfall data is from Town of Mount Pleasant Shem Creek weather station, approximately 11 miles SW of SC-41 bridge.

City of Charleston

CHARLESTON COUNTY
SOUTH CAROLINA

TOWN OF JAMES ISLAND
NOLITE NOS CALCARE

TMDL MONITORING AND ASSESSMENT PLAN

James Island Creek TMDL Watershed

Charleston County
4045 Bridge View Drive
North Charleston, SC 29405-7464

Town of James Island
1122 Dills Bluff Road
James Island, SC 29412

City of Charleston
2 George Street
Charleston, SC 29401

January 2021

PREPARED IN ACCORDANCE WITH SCDHEC PERMIT #SCR030000

Table of Contents

***Table of Contents follows section numbers of #SCR030000.**

List of Tables

List of Acronyms and Abbreviations

MEP	Maximum Extent Practicable
MPN	Most Probable Number
POC	Pollutant of Concern
SCDHEC	South Carolina Department of Health and Environmental Control
SMS4	Small Municipal Separate Storm Sewer System
TMDL	Total Maximum Daily Load
WLA	Wasteload Allocation
WQMS	Water Quality Monitoring Stations
WWTP	Waste Water Treatment Plant

TMDL MONITORING AND ASSESSMENT PLAN

The following monitoring and assessment plan was developed to meet the requirements of Section 3 of the South Carolina Department of Health and Environmental Control (SCDHEC) Small Municipal Separate Storm Sewer System (SMS4) permit number SCR030000.

3.2 TMDL Monitoring and Assessment

3.2.1 Introduction

A Total Maximum Daily Load (TMDL) has been developed for bacteria in recreational waters in the James Island Creek Basin. The TMDL became effective in January 2020 and includes wasteload allocations (WLAs) for non-point source runoff that thereby includes three urbanized MS4 areas. The proposed pollutant of concern (POC) will be sampled at representative location(s) within the TMDL basin. An intricate municipal jurisdictional boundary occurs within the James Island Creek TMDL watershed; therefore, the City of Charleston, Charleston County, and Town of James Island SMS4s (a.k.a. Contributing MS4 Entities) are writing this as a joint monitoring plan and sampling effort. We believe this will reduce costs and increase coordination between the three Contributing MS4 Entities.

3.2.1.2 Monitoring Plan Requirements

3.2.1.2.1.b Requirements to Monitor the Pollutants of Concern

As stated in Permit Number SCR030000, the following topics will be addressed in Table 1 and Table 2.

i. Samples and measurements taken for the purpose of the TMDL Monitoring Plan shall:
   (1) Be representative of the SMS4 discharges,
   (2) Be reasonably distributed in time, while maintaining representative sampling,
   (3) Not be terminated for the purpose of preventing the analysis results from a permit or water quality violation,
   (4) Describe and consider frequency, mass and/or rate of discharge, as appropriate, and,
   (5) Be expressed in terms of units or measurements consistent with the requirements contained in the WLA.

ii. The information contained in the TMDL Monitoring Plan shall include:
   (1) Monitoring locations, appropriate for representative data collection,
   (2) Explanation of why monitoring is being conducted for selected locations,
   (3) A description of whether the location(s) are representative and contribute to pollutant loads,
   (4) An indication the seasons during which sampling is intended,
   (5) The pollutant of concern, or its surrogate(s), as a sampling parameter,
   (6) Description of the sampling equipment, and,
   (7) A rationale supporting the proposed monitored location(s) as reflective of water quality concerns to the Maximum Extent Practicable (MEP).

3.2.1.2.1.b.i-ii Monitoring and Assessment Plan Details

Table 1: Monitoring Plan Details

3.2.1.2.1.b.ii.(1) Monitoring location(s) and details on site selection:
In order to better determine Charleston County, City of Charleston, and Town of James Island (Contributing MS4 Entities) contribution to the 6.8 square mile James Island Creek TMDL watershed, while 5.9 square miles are within designated SMS4 areas (Contributing MS4 Entities). Two locations will be sampled/monitored within James Island Creek watershed (see map in Appendix A). The sampling stations are the stations identified within the TMDL as JIC1 and JIC2.
3.2.1.2.1.b.ii.(2) Explanation of why monitoring is being conducted for selected locations:
Intricate jurisdictional boundaries within James Island Creek TMDL watershed discharge into the watershed and contribute to the TMDL. Data collection will be conducted at the locations discussed above for the purposes of characterizing the water quality of James Island Creek entering from all three Contributing MS4 Entities. The monitoring effort will also aid in recording existing baseline conditions and/or emerging water quality problems over time.
3.2.1.2.1.b.ii.(3) Description of whether the location(s) are representative of the MS4 discharge and contribute to pollutant loads:
The selected locations provide the most representative data for the Contributing MS4 Entities urbanized area in the James Island Creek TMDL watershed. Due to the intricate municipal jurisdictional boundaries within the TMDL watershed, JIC1 and JIC2 monitoring stations are assumed to be representative of the watershed from each of the three Contributing MS4 Entities.
[SPACE INTENTIONALLY LEFT BLANK]

3.2.1.2.1.b.ii.(4) Indication of the seasons during which sampling is intended:
Multiple samples will be collected during storm events, with samples taken at least once per season. Seasons will be described as: Winter: January 1 to March 31 Spring: April 1 to June 30 Summer: July 1 to September 30 Fall: October 1 to December 31 Samples taken for each storm event will be reasonably distributed in time, pending appropriate weather conditions, watershed hydrologic response, and sample holding times.
3.2.1.2.1.b.ii.(5) The pollutant of concern, or its surrogate(s), as a sampling parameter:
The proposed pollutant of concern (POC) to be sampled is enterococci. The enterococci samples will be collected at both the JIC1 and JIC2 monitoring stations.
3.2.1.2.1.b.ii.(6) Description of the sampling equipment:
The Contributing MS4 Entities will use sealed, sterile sample bottles provided by the contracted, SCDHEC certified laboratory to collect manual grab samples.
3.2.1.2.1.b.ii.(7) Rationale supporting the proposed monitored location(s) as reflective of water quality concerns to the MEP:
The contributing watershed is comprised of multiple entities and sampling locations will always include sources of bacteria that are unrelated to the Contributing MS4 Entities area and are not within their authority to control. As discussed above in 3.2.1.2.1.b.ii.(3), due to the size of the watershed and the land use makeup, these proposed stations will not allow for the disaggregation between the natural conditions of the James Island Creek watershed. The collected data will be reflective of the urbanized contributions, to the MEP, within the Contributing MS4 Entities urbanized area.
[SPACE INTENTIONALLY LEFT BLANK]

Table 2 discusses how samples and measurements taken for the purpose of the TMDL Monitoring Plan shall meet the five points listed in section 3.2.1.2.1.b.i of the SMS4 permit number SCR030000.

Table 2: 3.2.1.2.1.b.i.1-5 Samples and Measurements

3.2.1.2.1.b.i.1	Be representative of the SMS4 discharges:
The proposed sampling/monitoring locations in tandem will provide representative data for the different land uses discussed.	
3.2.1.2.1.b.i.2	Be reasonably distributed in time, while maintaining representative sampling:
Multiple samples will be collected during each event, distributed through time, to characterize each sampled event. Samples will be collected, at a minimum, once per season per year. Samples will be collected in various sized storm events so that different flow rates and storm events are characterized, to the MEP. Data, which may include turbidity, specific conductivity, salinity, dissolved oxygen, temperature, and pH, may be collected to supplement the detection of discharges that may indicate the POC.	
3.2.1.2.1.b.i.3	Not be terminated for the purpose of preventing the analysis results from a permit or water quality violation:
Contributing MS4 Entities will not terminate sampling for the purpose of preventing the analysis results from a permit or water quality violation.	
3.2.1.2.1.b.i.4	Describe and consider frequency, mass and/or rate of discharge, as appropriate:
The velocity will be measured at the time of sampling to assist in quantifying the frequency and rate of discharge.	
3.2.1.2.1.b.i.5	Be expressed in terms of units or measurements consistent with the requirements contained in the WLA:
Enterococci sample concentrations will be expressed by the certified laboratory as MPN/100 mL.	

3.2.1.2.1.b.iii Monitoring and Assessment Plan Strategy

The TMDL monitoring plan for Contributing MS4 Entities is focused on enterococci. Samples and measurements collected will be used to characterize the quality and quantity of the permitted discharges to evaluate the progress toward the WLA and/or WQS attainment. In order to do this, Contributing MS4 Entities will implement the following strategies to the MEP:

X In-stream monitoring,
☐ Outfall monitoring.

The monitoring location(s) discussed above in Table 2 was selected based on the following checked boxes: Monitoring locations must include one/all/a combination of the following:

☐ % MS4 area draining to the WQMS, at least 25%,
☐ Collection of a representative contributing watershed,
X Inclusion of the entire TMDL watershed within the MS4.

Table 3 discusses how samples and measurements taken for the purpose of the TMDL Monitoring Plan shall meet the requirements of 3.2.1.2.1.b.iv-x of the SMS4 permit number SCR030000.

Table 3: 3.2.1.2.1.b.iv-x Sampling Details

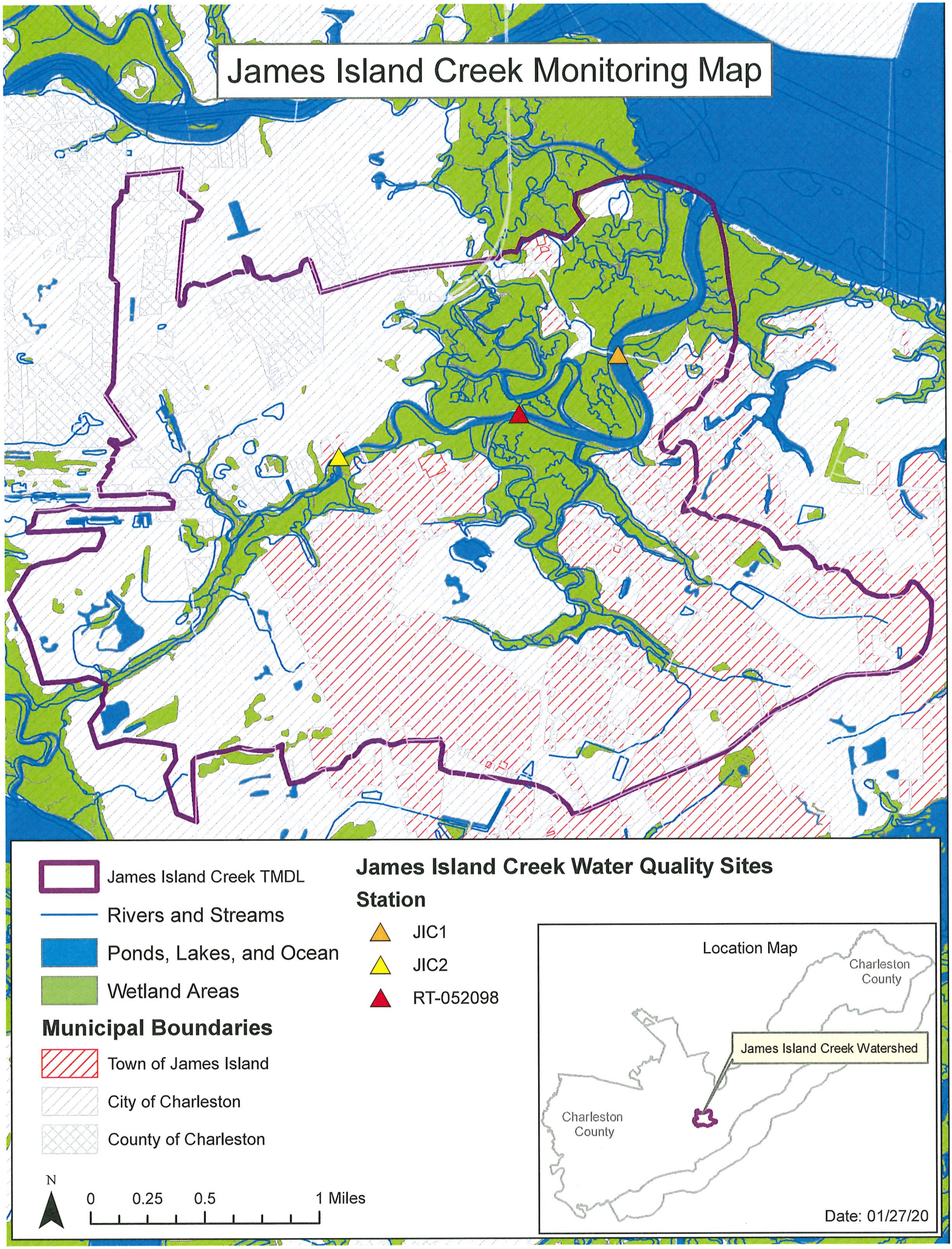
3.2.1.2.1.b.vi	Method descriptions, if not approved under 40 CFR 136:
Not applicable	
3.2.1.2.1.b.vii	When no approved analytical method is used:
Not applicable	
3.2.1.2.1.b.viii	Sampling minimum:
For each monitoring location, samples of stormwater discharges shall be collected, at a minimum, once per season per year.	
3.2.1.2.1.b.ix	Sample analysis:
Samples collected for laboratory analysis shall be analyzed for enterococci, the POC.	
3.2.1.2.1.b.x	Tidal waters:
The selected monitoring locations are in an area that are influenced by the tide. Sampling protocol will be followed as described in this document. The Contributing MS4 Entities will collect samples for the POC at the selected locations during stormwater runoff conditions in an attempt to collect samples that are least effected by the tide.	

3.2.1.2.1.d Reporting

Contributing MS4 Entities will report on the progress of the characterization of the POC for the James Island Creek TMDL watershed. Resulting data will be included in every annual report following the commencement of monitoring for TMDL pollutant characterization.

Appendix A

James Island Creek Monitoring Map


James Island Creek Monitoring Map
James Island Creek TMDL
Rivers and Streams
Ponds, Lakes, and Ocean
Wetland Areas
Municipal Boundaries
Town of James Island
City of Charleston
County of Charleston
James Island Creek Water Quality Sites
Station
JIC1
JIC2
RT-052098
Location Map
Charleston County
James Island Creek Watershed
Charleston County
Date: 01/27/20
N
0
0.25
0.5
1 Miles

WOOLPERT
ARCHITECTURE | ENGINEERING | GEOSPATIAL

Memo

To:	Charleston County; Town of James Island; City of Charleston
From:	Woolpert, Inc.
Date:	January 31, 2022
Subject:	James Island Creek Grab Sampling Results Memo: DRAFT Fall 2021 – data through December 2021

The James Island Creek TMDL for Enterococcus bacteria became effective in January 2020, and to maintain compliance with their NPDES General Permit, Charleston County, the Town of James Island, and the City of Charleston (the permittees) were required to submit a TMDL Monitoring Plan to SCDHEC within 12 months of the TMDL effective date (January 2021) and begin monitoring activities within 18 months of the TMDL effective date (July 2021). In accordance with the submitted TMDL Monitoring Plan, the permittees initiated monitoring activities in July 2021 and collected the first seasonal wet weather grab sample in August 2021. The sampling efforts have targeted both wet and dry conditions in order to assess bacteria concentrations in James Island Creek in response to storm events and during base flow conditions. This memo summarizes and discusses data collected through December 2021. It will be a cumulative document with new data added to the existing dataset as additional samples are collected. All sample results (August 2021 through December 2021) and notes about associated weather and tidal conditions are included in Appendix A.

Grab sampling efforts have included taking samples at three strategic locations in the watershed, shown in **Figure 1** below. The downstream-most site (Harbor View Bridge) is located at the bridge where Harbor View Road crosses James Island Creek. Continuing up the main stem of James Island Creek, the next site (Folly Road Bridge) is located at the bridge where Folly Road crosses James Island Creek. The upstream-most site (Riley Road) is located at the end of Riley Road, approximately 0.5 miles upstream of Folly Road Bridge. The contributing drainage area to all locations includes human influence from suburban, urban, and developed areas. The Folly Road Bridge sampling location was added in December 2021 in response to input from the James Island Creek Task Force. It is anticipated that sampling locations may be added or modified in the future based on stakeholder input and as additional site access permissions are secured.

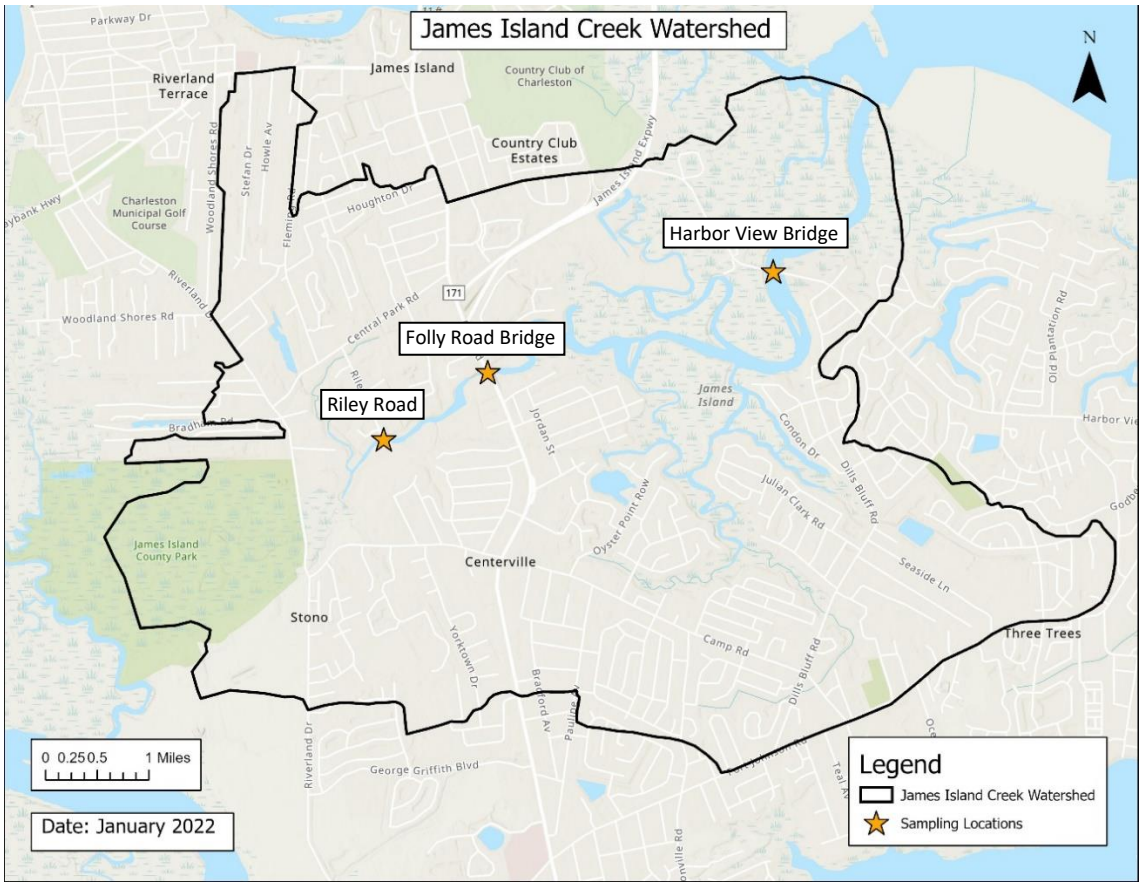


Figure 1: James Island Creek Sampling Locations

Samples were analyzed by Trident Laboratory in Ladson, SC, an EPA-approved laboratory, for Enterococcus bacteria using the SM-9230D method and results were reported as the Most Probable Number of bacteria per 100 milliliter sample (MPN/100ml). Summary statistics for Enterococcus grab sampling results to date (through December 2021) are shown in

Table 1 for each sampling location and weather condition. As of this memo, sampling has taken place during only Summer and Fall seasons, so the summary statistics are not representative of the water quality throughout the year and interpretation and discussion of the data will be limited until the sample size has increased.

Table 1: Summary Statistics for Grab Sample Enterococcus Results - By Location and Weather Condition

Sampling Location	Weather Condition	Summary Statistic (units of MPN/100ml)				# of Samples
		Mean	Median	Maximum	Minimum	
Harbor View Bridge	Dry	31	10	140	10	15
Harbor View Bridge	Wet	187	75	810	10	12
Folly Road Bridge[1]	Dry	223	220	310	140	3
Folly Road Bridge	Wet	—	—	—	—	—
Riley Road[2]	Dry	276	209	1110	40	14
Riley Road	Wet	1618	585	8160	10	12

[1]Folly Road Bridge sampling location added in December 2021.

[2]One outlier result of 17,330 MPN/100ml on 11/24/21 was excluded from summary statistics; trash dumping occurred at the sampling location prior to collection and appeared to influence bacteria concentration.

Due to the many factors that influence bacteria concentrations (e.g., potential bacteria sources, season, weather, rainfall intensity, antecedent rainfall, tides, timing of watershed storm response), it is important to consider individual storm results in their own context in addition to summary statistics. To facilitate this kind of assessment, figures were created to illustrate the grab sampling results at each location along with approximate relative stage in James Island Creek, approximate rainfall data (for wet weather sampling), and observations about weather and tidal conditions. These figures were created for all sampling efforts and are located in Appendix B in chronological order. Available tide prediction and rainfall data were used to best approximate conditions in James Island Creek during sampling. Tide prediction data was obtained from NOAA station #8665530 "Charleston, Cooper River Entrance, SC" which is approximately 2.5 miles northeast from the Harbor View Bridge sampling location. For the wet weather sampling efforts, rainfall data was obtained from the Town of Mount Pleasant's Ravenel Bridge rain gauge, approximately 4.5 miles northeast of Harbor View Bridge. This gauge represents the closest source of incremental rainfall data that is available to approximate rainfall in the James Island Creek watershed. For the purposes of analysis and discussion, a "storm rainfall" was established which was a running sum of rainfall until 3 consecutive hours go by with zero additional precipitation that occurred closest to the time of sampling. In some cases, if there was additional rainfall outside the "storm rainfall" that was relevant to describing the watershed conditions, analysis may refer to a "total rainfall" or "largest storm rainfall" that is larger than the "storm rainfall" that occurred closest to the time of sampling.

Overall Trends

The summary statistics as well as individual storm results were reviewed and compared to observe trends and/or correlations between bacteria concentration sampling results and a variety of potential associated factors. It is important to note that with this limited data set, the following discussion is not asserting statistical significance, but rather seeking to explore possible relationships in an effort to start to understand the complex natural aquatic system of James Island Creek. The summary statistics in

Table 1 indicate two overall trends with respect to Enterococcus concentrations: higher concentrations in the upper portion of the watershed (Folly Road Bridge and Riley Road) than the lower portion (Harbor View Bridge) and higher concentrations in wet conditions than in dry conditions. When comparing individual storm results in Appendix A (list form) and Appendix B (graphical form), it does appear that bacteria concentrations tend to be higher in wet weather conditions than dry weather conditions. However, a comparison of results for individual wet weather versus dry weather sampling efforts does not provide a clear trend; there is variation among both the wet weather events and dry weather events (e.g., some dry weather samples are slightly higher than some wet weather samples, contrary to the overall trend seen with summary statistics). This variation may be driven by some or all of the factors influencing bacteria concentrations mentioned previously. The limited dataset of grab sample results provides a glimpse of the water quality conditions that may also contribute to these variations. Though the dataset is limited, the following sections provide a discussion of specific sampling events and how they may or may not show potential trends for wet and dry weather conditions.

Wet Weather Sampling

The goal of wet weather sampling is to quantify the bacteria levels present in stormwater runoff by collecting grab samples during or soon after storm events. In tidal systems, such as James Island Creek, it can be difficult to differentiate between stormwater runoff and tidal flow using only nearby available stage and rainfall data. For purposes of discussion, bacteria concentrations will be approximated as order of magnitude. From the available grab sampling data, wet weather results at Harbor View Bridge have been observed to vary by two orders of magnitude, typically in the "tens" (10-99 MPN/100ml) and "hundreds" (100-999 MPN/100ml). Wet weather results at Riley Road have been observed to vary by three orders of magnitude, sometimes as low as the "tens" and sometimes as high as the "thousands" (10^3).

A brief description of each wet weather sampling effort since August 2021 is provided below.

- The August 2021 event (8/3/2021) had a rainfall total of 0.20" prior to sampling with samples collected from low to high tide, as the tide rose. The bacteria levels were relatively low, in the "tens" at Harbor View Bridge and varied between "tens" and "hundreds" at Riley Road. Additional rainfall was forecast to occur before and during the sampling window but did not actually occur until later in the day after the available sampling window (limited by laboratory hours).

- The September 2021 event (9/21/2021) had a rainfall total of 2.39" prior to and during sampling with samples collected from high to low tide, as the tide fell. This larger storm event correlated with relatively high bacteria levels (results in the "hundreds" at Harbor View Bridge and results in the "thousands" at Riley Road).
- The December 2021 event (12/8/2021) had a rainfall total of 0.96" that fell primarily in two waves, one a few hours before sampling began and one while sampling occurred. Results were in the "hundreds" and "thousands" at Riley Road. Results at Harbor View Bridge were one order of magnitude lower, varying between values in the "tens" and "hundreds".

Comparing the wet weather sampling events thus far, the events with more rainfall associated with sampling had higher observed bacteria concentrations. The falling tide may also be associated with higher observed bacteria concentrations, when compared to samples taken during the rising or near a slack high tide. As additional data is collected, potential correlations between bacteria concentrations and tidal conditions, seasons, or other rainfall characteristics will be considered.

Dry Weather Sampling

Dry weather sampling intends to provide some background, baseline bacteria levels in James Island Creek to represent conditions not influenced by stormwater runoff. These levels could be attributed to wildlife in or near the water, historic deposits, non-stormwater human contributions, or aquatic life. In order for sampling to be considered "dry weather," at least 72 hours must have passed since the last instance of greater than or equal to 0.1" of rainfall.

Dry weather results at Harbor View Bridge were low, with the majority of results being in the "tens" order of magnitude or less. Dry weather results at upstream sites (Folly Road Bridge and Riley Road) were higher and more variable than at Harbor View Bridge, with results varying from the "tens" to the "thousands" order of magnitude. The bacteria concentrations at all sites may demonstrate correlation with tidal conditions, as most sampling events showed higher results during lower tidal conditions. Correlation between bacteria concentration and tide, as well as other environmental factors, will continue to be assessed as additional data is collected.

Microbial Source Tracking Results

While the presence of Enterococcus bacteria acts as an indicator to detect fecal contamination, it does not indicate the origins of fecal contamination. Understanding the sources of contamination is essential for identifying effective remediation measures (BMPs), complying with legal (permit) responsibility, and characterizing potential public health risks. The permittees included Microbial Source Tracking (MST) methods in their data collection efforts to target the source of the fecal bacteria through genetic markers in the bacteria. Host-associated genetic markers in gut bacteria have been identified based on the theory that the physiology in the gut of the host animal (e.g., diet, temperature, antibiotic treatment, etc.) is unique from one species of animal to another. These documented gut conditions and associated genetic markers of gut bacteria allow LuminUltra Technologies (formerly Source Molecular), an accredited MST laboratory, to use replicable methods to identify common hosts of gut bacteria and sources of fecal contamination.

The high cost (over 15 times the cost of a traditional bacteria sample) of MST reduces the feasibility of the permittees using this method for every bacteria sample. To capitalize on MST efforts, the permittees have conducted concurrent sampling for wet weather events where duplicate MST samples were collected along with standard Enterococcus bacteria samples. Enterococcus bacteria samples were analyzed first and then, based on those bacteria concentration results and collaborative discussion, MST analysis can be conducted on the duplicate MST sample for select samples of interest. This ensured that the more expensive MST analysis was only performed on select samples that appeared likely to provide insight about fecal bacteria sources in James Island Creek.

The permittees budgeted to conduct MST analysis for up to four total samples over the course of one year of sampling, so samples must be selected carefully. One sample was analyzed previously in Summer 2021. In the Fall 2021 season, MST duplicate samples for the wet weather event on 12/8/21 were sent to the lab to be processed and held for potential MST analysis. However, in the interest of conserving the remaining three budgeted MST analyses, they have not yet been analyzed. These samples may be analyzed at a future date as budget and stakeholder interest dictate. All MST analysis results since August 2021 are shown in **Table 2**.

Table 2: Microbial Source Tracking (MST) Results for Selected Samples

Sample Date & Time	Site Name	Total Rainfall (inches)	Enterococcus Result (MPN/100ml)	MST Result Interpretation (# DNA Copies/100ml)			
				Dog	Bird	Human	Ruminant
9/21/2021 10:49	Riley Road	2.39	4110	Low (DNQ*)	Moderate (1.23E+05)	Low (DNQ*)	Absent (Not Detected)

*DNQ = "Did Not Quantify," presence of DNA markers was detected but below the minimum quantification level.

Total Rainfall is included in **Table 2** as a general indicator of size of the rainfall event. Other parameters such as rainfall distribution and intensity, tidal characteristics, and time of sampling relative to rainfall are also important to understand the sampling conditions associated with each MST analysis. Appendix C contains grab sampling figures showing these parameters for each event that included MST analysis, along with visual indication of which samples were analyzed.

The sample chosen from the September 2021 sampling effort was from the middle of the sampling period at Riley Road. It was collected during a high falling tide, the second falling tide that occurred during this extended period of rainfall. The Enterococcus concentration was relatively high, being of the "thousands" order of magnitude. As indicated in **Table 2**, the MST analysis indicated a stronger presence of Bird than the other sources. Dog and Human were present in the sample, but below the minimum quantification limit (DNQ). Ruminant (e.g., deer, goats, sheep) was not present in the sample. More MST data will be collected to add to observations about bacteria sources for other storms during different combinations of conditions and at other times of year.

MST analysis was also conducted by LuminUltra for two sampling efforts conducted by Charleston Water Systems (not associated with the permittees' efforts). In an effort to capitalize on all data collection efforts in James Island Creek and increase the understanding of the watershed, Woolpert reviewed the results of these sampling efforts for inclusion in this memo. Samples were collected by Charleston Water Systems at three locations in the watershed on 3/4/2021 and 5/18/2021 and submitted to LuminUltra for MST analysis of Human, Dog, and Bird DNA markers. The results are summarized as follows with reference to historic rainfall data from the Ravenel Bridge Rain Gauge provided for context.

- 3/4/2021 samples were collected the day after 1.41" of rainfall occurred and indicated Low (but quantifiable) results for Human and Bird, and Low (DNQ) results for Dog at all three watershed locations.
- 5/18/2021 samples were collected under dry conditions (last rainfall was 1.06" on 5/12/2021) and indicated Low (but quantifiable), Low (DNQ), and No Detect results for Human, and a mix of Low (DNQ) and No Detect results for both Bird and Dog among the different watershed locations.

Regarding these two Charleston Water Systems sampling events, during wet weather sampling on 3/4/2021, the source results were generally consistent at different locations throughout the watershed. In comparison, the dry weather sample results on 5/18/2021 were more variable at different locations in the watershed.

As noted earlier, the trends and comparisons discussed in this memo are observations based on the limited dataset. This data is intended to provide the permittees with a preliminary understanding of the James Island Creek watershed and potential impacts of stormwater runoff on bacteria concentrations. The permittees intend to continue both wet weather and dry weather grab sampling, with MST analysis of up to four total select samples, to supplement these initial observations and continue to collect information about the dynamics of James Island Creek.

Appendix A: Grab Sampling Results and Associated Field Conditions

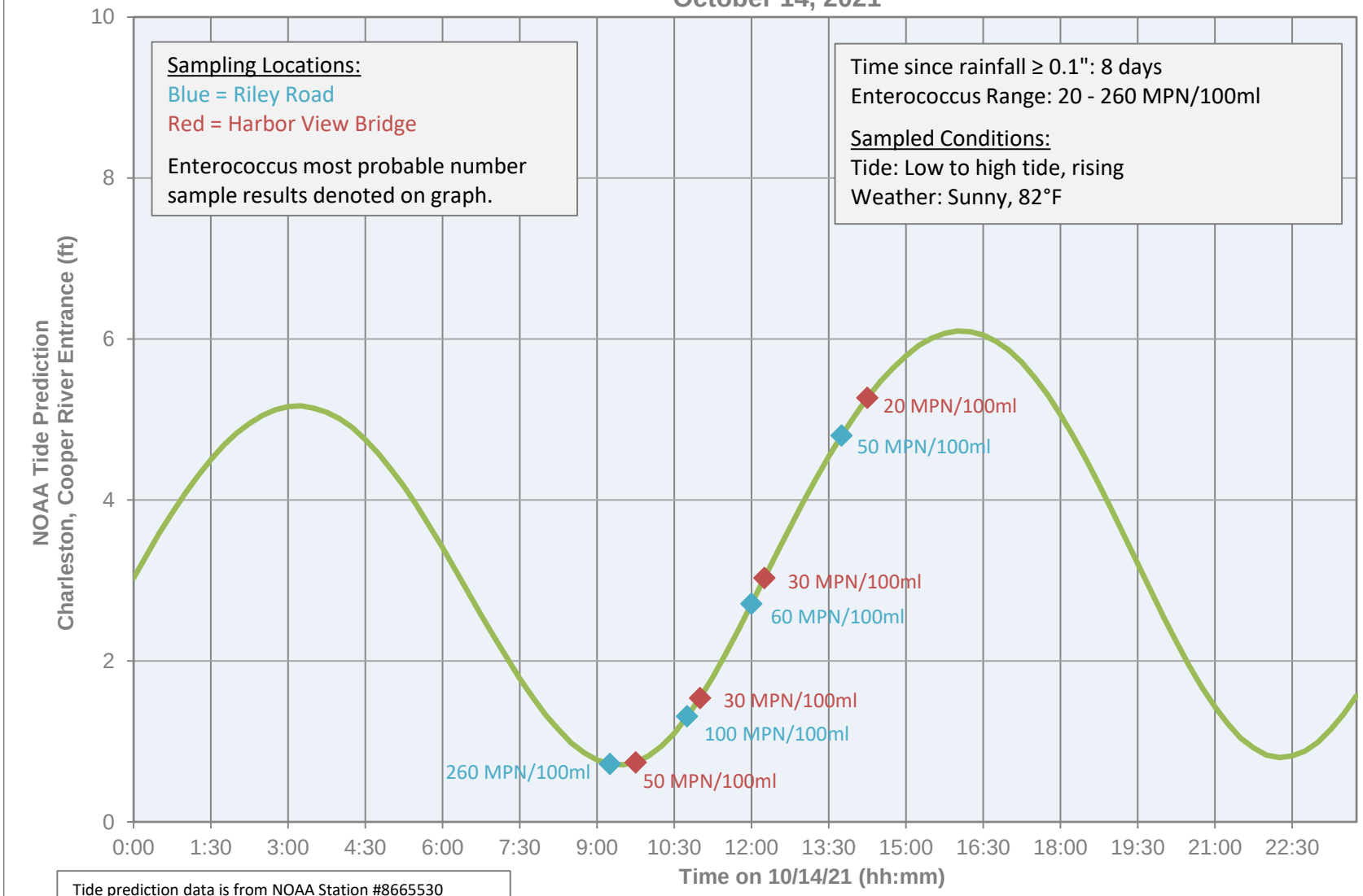
Date	Time	Sampling Location (Riley Rd/Harbor View Bridge)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
8/3/2021	9:36	Riley Road	320	Low/Falling	Wet	Raining Total Rainfall = 0.20" Avg Temp = 78°F
8/3/2021	10:07	Harbor View Bridge	90	Low/Falling	Wet	
8/3/2021	10:33	Riley Road	10	Low/Rising	Wet	
8/3/2021	11:02	Harbor View Bridge	60	Low/Rising	Wet	
8/3/2021	12:15	Riley Road	380	Mid/Rising	Wet	
8/3/2021	12:30	Harbor View Bridge	50	Mid/Rising	Wet	
8/3/2021	13:56	Riley Road	90	High/Rising	Wet	
8/3/2021	14:20	Harbor View Bridge	20	High/Rising	Wet	
8/31/2021	9:29	Riley Road	1110	Low/Rising	Dry	Partly Cloudy 9 Days Since Rain Avg Temp = 85°F
8/31/2021	9:52	Harbor View Bridge	<10	Low/Rising	Dry	
8/31/2021	10:45	Riley Road	580	Mid/Rising	Dry	
8/31/2021	11:04	Harbor View Bridge	10	Mid/Rising	Dry	
8/31/2021	11:44	Riley Road	470	High/Rising	Dry	
8/31/2021	12:03	Harbor View Bridge	<10	High/Rising	Dry	
8/31/2021	13:30	Riley Road	250	High/Slack	Dry	
8/31/2021	13:53	Harbor View Bridge	<10	High/Slack	Dry	
9/21/2021	9:30	Riley Road	640	High/Rising	Wet	Rainy Total Rainfall = 2.39" Avg Temp = 76°F
9/21/2021	9:50	Harbor View Bridge	120	High/Rising	Wet	
9/21/2021	10:49	Riley Road	4110	High/Falling	Wet	
9/21/2021	11:15	Harbor View Bridge	290	High/Falling	Wet	
9/21/2021	12:13	Riley Road	2760	Mid-High/Falling	Wet	
9/21/2021	12:30	Harbor View Bridge	620	Mid-High/Falling	Wet	
9/21/2021	13:15	Riley Road	8160	Mid-Low/Fallng	Wet	
9/21/2021	13:35	Harbor View Bridge	810	Mid-Low/Fallng	Wet	

Date	Time	Sampling Location (Riley Rd/Harbor View Bridge)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
10/14/2021	9:22	Riley Road	260	Low/Slack	Dry	Sunny 8 Days Since Rain Avg Temp = 82°F
10/14/2021	9:45	Harbor View Bridge	50	Low/Rising	Dry	
10/14/2021	10:40	Riley Road	100	Mid/Rising	Dry	
10/14/2021	11:00	Harbor View Bridge	30	Mid/Rising	Dry	
10/14/2021	12:07	Riley Road	60	Mid/Rising	Dry	
10/14/2021	12:22	Harbor View Bridge	30	Mid/Rising	Dry	
10/14/2021	13:48	Riley Road	50	High/Rising	Dry	
10/14/2021	14:08	Harbor View Bridge	20	High/Rising	Dry	
11/24/2021	9:48	Harbor View Bridge	20	High/Rising	Dry	Sunny 13 Days Since Rain Avg Temp = 52°F
11/24/2021	10:05	Riley Road	40	High/Rising	Dry	
11/24/2021	11:12	Harbor View Bridge	<10	High/Slack	Dry	
11/24/2021	11:35	Riley Road	75	High/Slack	Dry	
11/24/2021	12:35	Harbor View Bridge	10	High/Falling	Dry	
11/24/2021	12:46	Riley Road	197	High/Falling	Dry	
11/24/2021	13:50	Harbor View Bridge	10	Mid/Falling	Dry	
11/24/2021	14:02	Riley Road	17330	Mid/Falling	Dry	
12/8/2021	9:36	Harbor View Bridge	10	High/Rising	Wet	Rainy Total Rainfall = 0.96" Avg Temp = 63°F
12/8/2021	9:48	Riley Road	530	High/Rising	Wet	
12/8/2021	11:28	Harbor View Bridge	<10	High/Slack	Wet	
12/8/2021	11:40	Riley Road	170	High/Slack	Wet	
12/8/2021	12:45	Harbor View Bridge	10	High/Falling	Wet	
12/8/2021	12:57	Riley Road	860	High/Falling	Wet	
12/8/2021	13:52	Harbor View Bridge	150	Mid/Falling	Wet	
12/8/2021	14:05	Riley Road	1380	Mid/Falling	Wet	

Date	Time	Sampling Location (Riley Rd/Harbor View Bridge/Folly Road Bridge)	Enterococcus Result (MPN/100 ML)	Tidal Conditions (High/Mid/Low, Rising/Falling)	Type of Sample (Wet/Dry)	Weather Conditions
12/29/2021	9:03	Riley Road	300	Low/Falling	Dry	Partly Cloudy 8 Days Since Rain Avg Temp = 74°F
12/29/2021	9:20	Folly Road Bridge	310	Low/Falling	Dry	
12/29/2021	9:37	Harbor View Bridge	140	Low/Falling	Dry	
12/29/2021	11:04	Riley Road	220	Low/Rising	Dry	
12/29/2021	11:21	Folly Road Bridge	140	Low/Rising	Dry	
12/29/2021	11:38	Harbor View Bridge	90	Low/Rising	Dry	
12/29/2021	12:57	Riley Road	150	Mid/Rising	Dry	
12/29/2021	13:08	Folly Road Bridge	220	Mid/Rising	Dry	
12/29/2021	13:26	Harbor View Bridge	10	Mid/Rising	Dry	

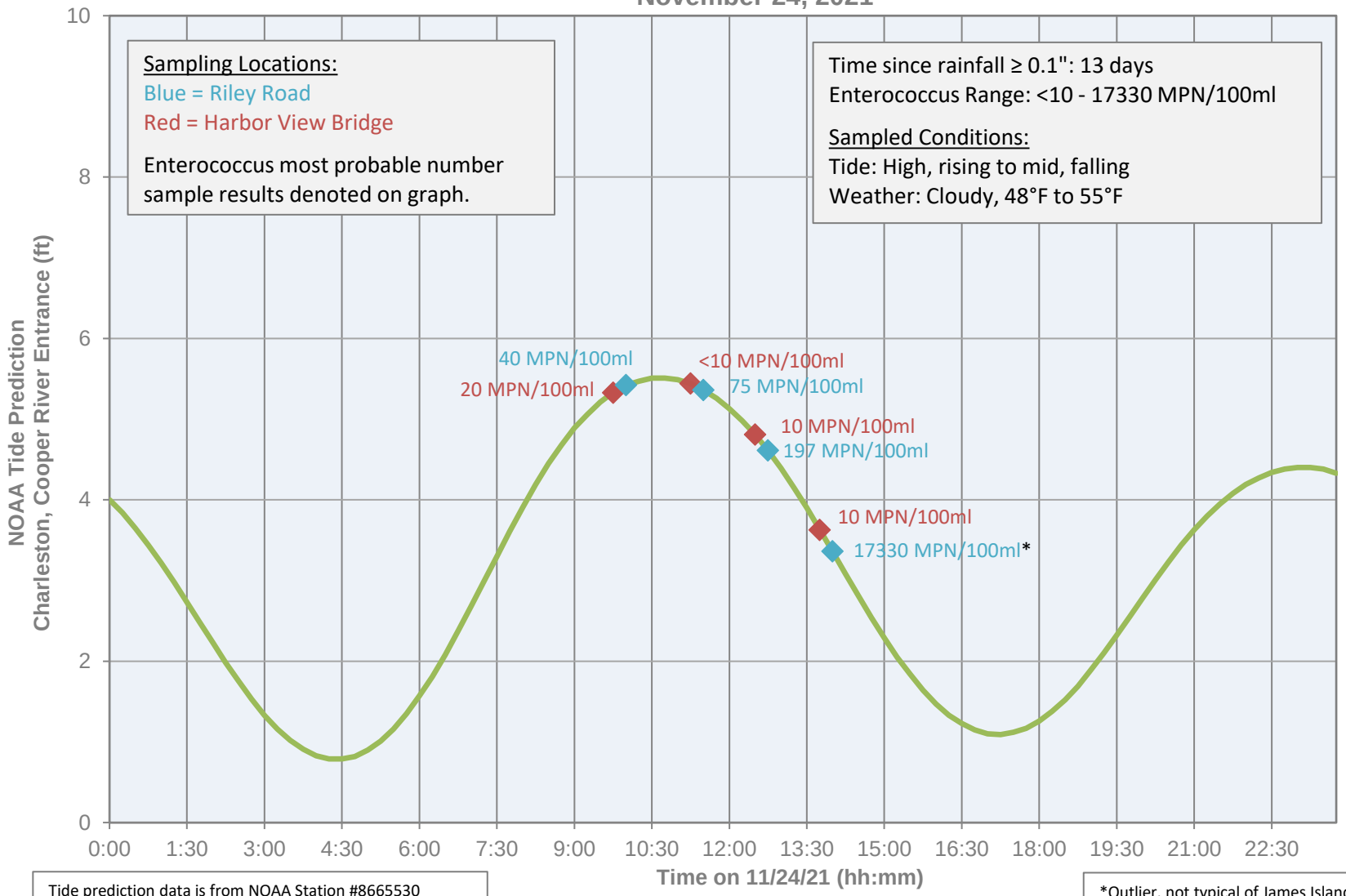
Appendix B: Figures of Individual Storm Grab Sampling Results

Charleston County
James Island Creek Dry Weather Sampling
October 14, 2021



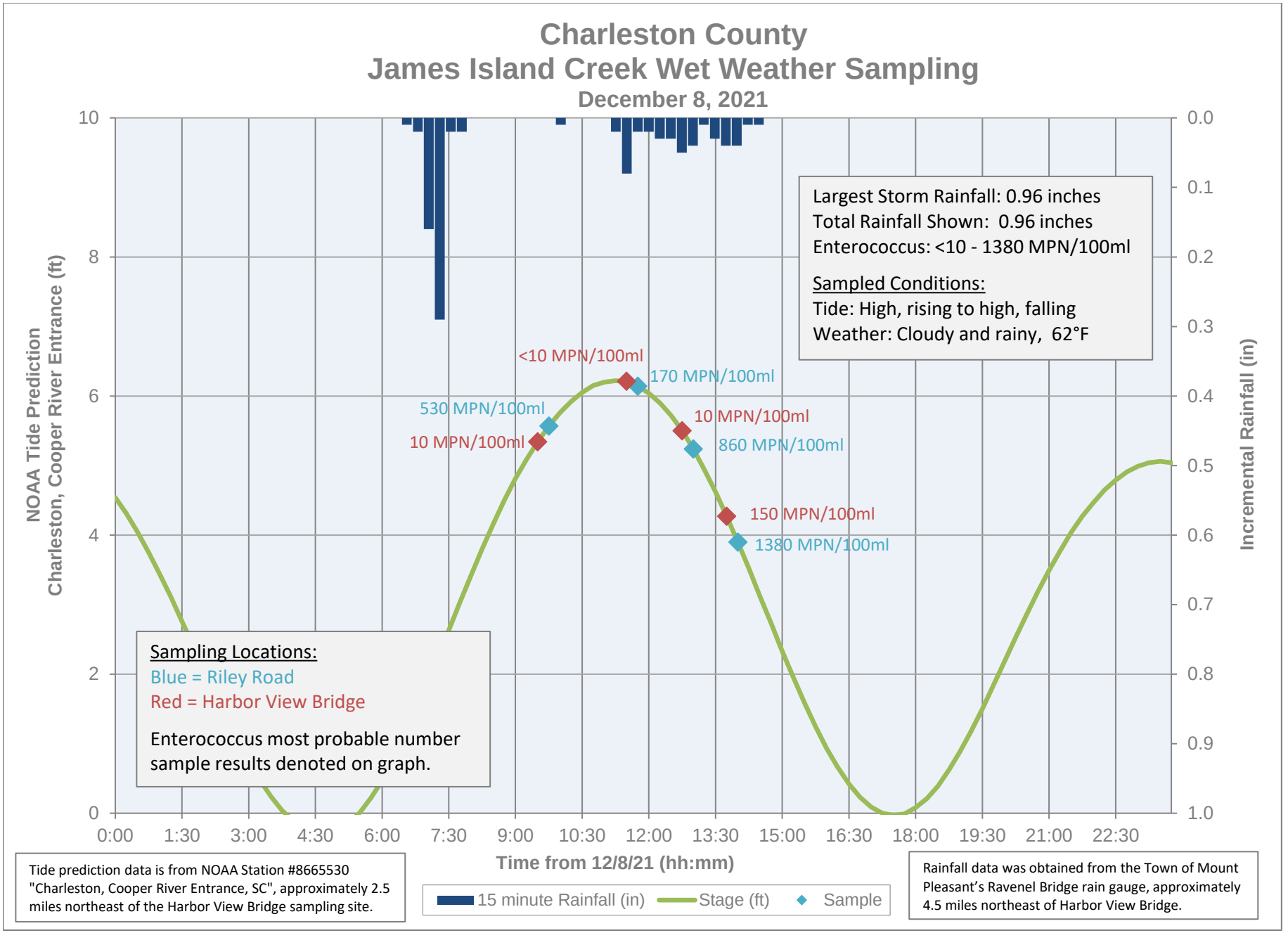
Tide prediction data is from NOAA Station #8665530 "Charleston, Cooper River Entrance, SC", approximately 2.5 miles northeast of the Harbor View Bridge sampling site.

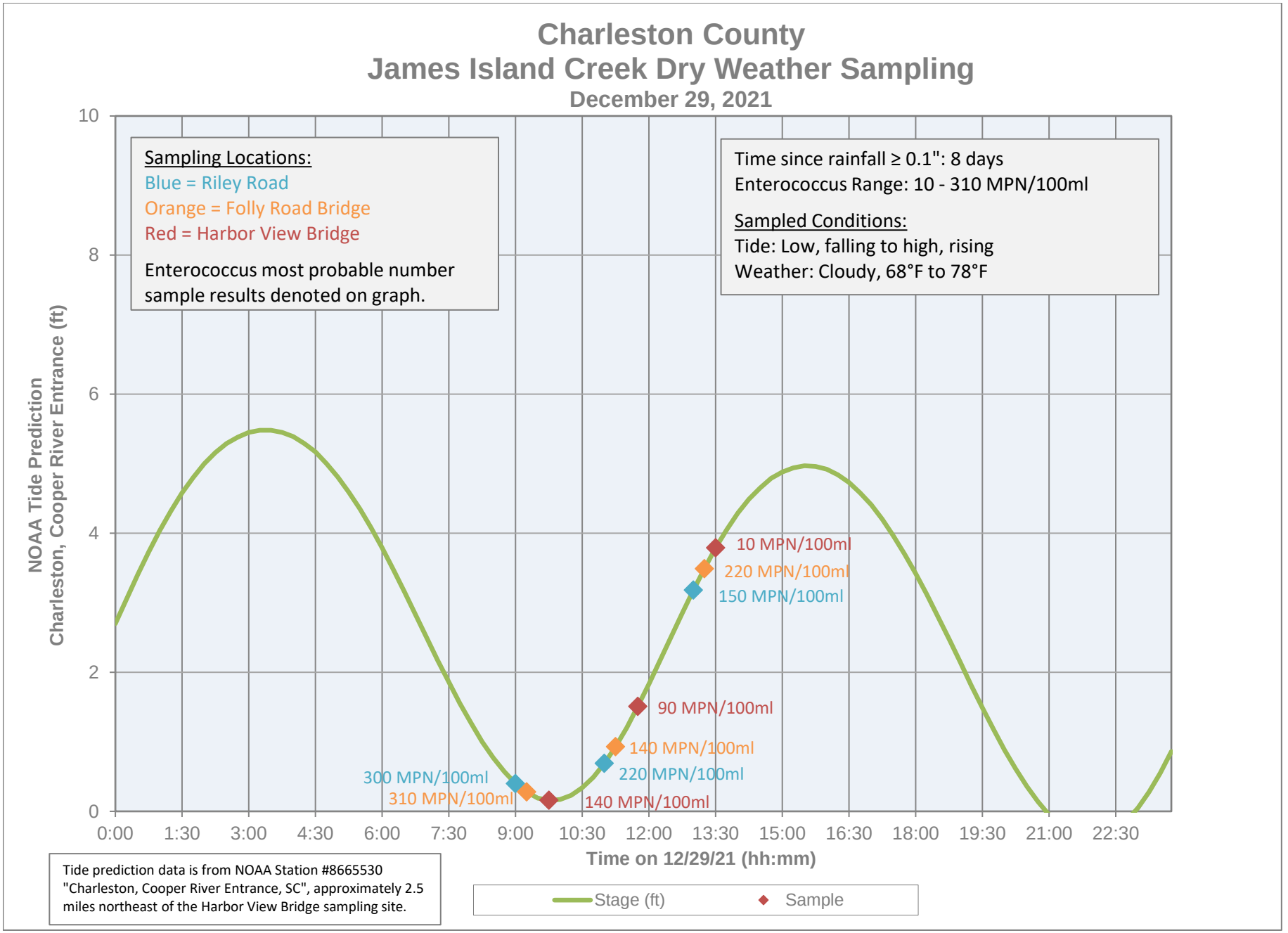
Charleston County
James Island Creek Dry Weather Sampling
November 24, 2021



Tide prediction data is from NOAA Station #8665530 "Charleston, Cooper River Entrance, SC", approximately 2.5 miles northeast of the Harbor View Bridge sampling site.

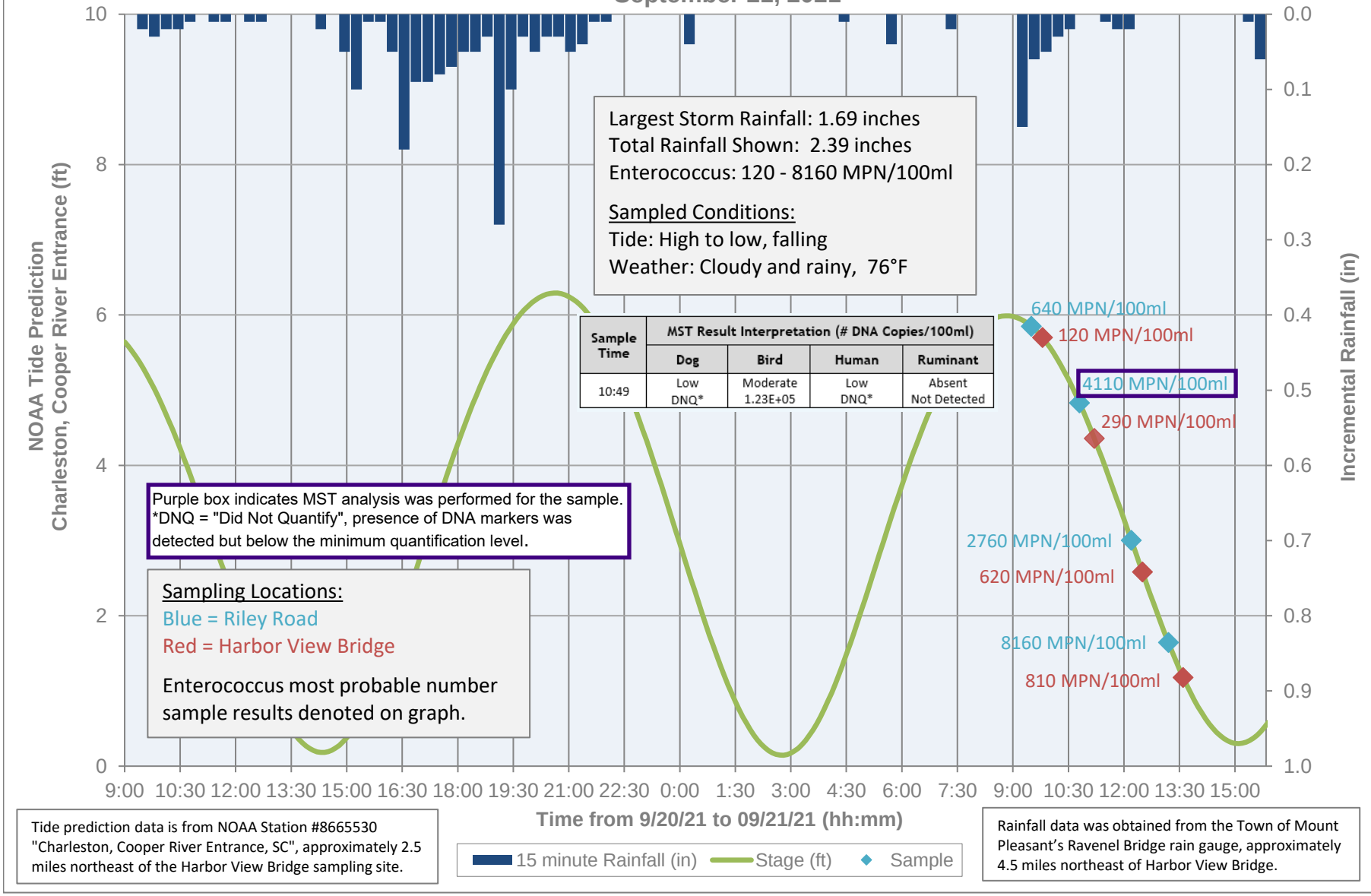
*Outlier, not typical of James Island Creek conditions. Trash dumping at sampling location appeared to influence result.


Charleston County
James Island Creek Wet Weather Sampling
December 8, 2021
NOAA Tide Prediction
Charleston, Cooper River Entrance (ft)
Incremental Rainfall (in)
Time from 12/8/21 (hh:mm)
0:00
1:30
3:00
4:30
6:00
7:30
9:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
0
2
4
6
8
10
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Largest Storm Rainfall: 0.96 inches
Total Rainfall Shown: 0.96 inches
Enterococcus: <10 - 1380 MPN/100ml
Sampled Conditions:
Tide: High, rising to high, falling
Weather: Cloudy and rainy, 62°F
<10 MPN/100ml
170 MPN/100ml
530 MPN/100ml
10 MPN/100ml
10 MPN/100ml
860 MPN/100ml
150 MPN/100ml
1380 MPN/100ml
Sampling Locations:
Blue = Riley Road
Red = Harbor View Bridge
Enterococcus most probable number sample results denoted on graph.
Tide prediction data is from NOAA Station #8665530 "Charleston, Cooper River Entrance, SC", approximately 2.5 miles northeast of the Harbor View Bridge sampling site.
15 minute Rainfall (in)
Stage (ft)
Sample
Rainfall data was obtained from the Town of Mount Pleasant's Ravenel Bridge rain gauge, approximately 4.5 miles northeast of Harbor View Bridge.


Charleston County
James Island Creek Dry Weather Sampling
December 29, 2021
Sampling Locations:
Blue = Riley Road
Orange = Folly Road Bridge
Red = Harbor View Bridge
Enterococcus most probable number sample results denoted on graph.
Time since rainfall ≥ 0.1": 8 days
Enterococcus Range: 10 - 310 MPN/100ml
Sampled Conditions:
Tide: Low, falling to high, rising
Weather: Cloudy, 68°F to 78°F
NOAA Tide Prediction
Charleston, Cooper River Entrance (ft)
10 MPN/100ml
220 MPN/100ml
150 MPN/100ml
90 MPN/100ml
140 MPN/100ml
220 MPN/100ml
140 MPN/100ml
300 MPN/100ml
310 MPN/100ml
Time on 12/29/21 (hh:mm)
Tide prediction data is from NOAA Station #8665530 "Charleston, Cooper River Entrance, SC", approximately 2.5 miles northeast of the Harbor View Bridge sampling site.
Stage (ft)
Sample

Appendix C: Microbial Source Tracking Results Graphs

Charleston County
James Island Creek Wet Weather Sampling
September 21, 2021



Largest Storm Rainfall: 1.69 inches
Total Rainfall Shown: 2.39 inches
Enterococcus: 120 - 8160 MPN/100ml

Sampled Conditions:
Tide: High to low, falling
Weather: Cloudy and rainy, 76°F

Sample Time	MST Result Interpretation (# DNA Copies/100ml)			
	Dog	Bird	Human	Ruminant
10:49	Low DNQ*	Moderate 1.23E+05	Low DNQ*	Absent Not Detected

640 MPN/100ml
120 MPN/100ml
4110 MPN/100ml
290 MPN/100ml
2760 MPN/100ml
620 MPN/100ml
8160 MPN/100ml
810 MPN/100ml

Purple box indicates MST analysis was performed for the sample.
*DNQ = "Did Not Quantify", presence of DNA markers was detected but below the minimum quantification level.

Sampling Locations:
Blue = Riley Road
Red = Harbor View Bridge

Enterococcus most probable number sample results denoted on graph.

Tide prediction data is from NOAA Station #8665530 "Charleston, Cooper River Entrance, SC", approximately 2.5 miles northeast of the Harbor View Bridge sampling site.

Rainfall data was obtained from the Town of Mount Pleasant's Ravenel Bridge rain gauge, approximately 4.5 miles northeast of Harbor View Bridge.

TMDL Monitoring and Assessment Plan for Enterococcus in Shem Creek

Town of Mount Pleasant & Charleston County

Town of Mount Pleasant
100 Ann Edwards Lane
Mount Pleasant, SC 29464
843-856-2157

Charleston County
4045 Bridge View Drive
North Charleston, SC 29405
843-202-7600

January 2021

Prepared in accordance with SCDHEC Permit #SCR030000

Table of Contents

***Table of Contents follows section numbers of #SCR030000.**

List of Tables

List of Acronyms and Abbreviations

MEP	Maximum Extent Practicable
MPN	Most Probable Number
POC	Pollutant of Concern
SCDHEC	South Carolina Department of Health and Environmental Control
SMS4	Small Municipal Separate Storm Sewer System
TMDL	Total Maximum Daily Load
WLA	Wasteload Allocation
WQMS	Water Quality Monitoring Stations

TOWN OF MOUNT PLEASANT
TMDL MONITORING AND ASSESSMENT PLAN

The following monitoring and assessment plan was developed to meet the requirements of Section 3 of the South Carolina Department of Health and Environmental Services (SCDHEC) Small Municipal Separate Storm Sewer System (SMS4) permit number SCR030000.

3.2 TMDL Monitoring and Assessment

3.2.1 Introduction

A Total Maximum Daily Load (TMDL) has been developed for recreational use related to Enterococcus bacteria in the Shem Creek watershed, which includes portions of the urbanized area within the Town of Mount Pleasant and Charleston County (the SMS4s). The posted TMDL has an effective date of November 2019; an SCDHEC Public Notice cited the TMDL was approved by EPA with an effective date of January 2020. The TMDL includes wasteload allocations for non-point source runoff that thereby includes these urbanized areas. The proposed pollutant of concern to be sampled by the SMS4s at a representative location within the urbanized area is Enterococcus. The proposed location is at the bridge where Bowman Road crosses Shem Creek (Bowman Bridge), as shown in Appendix A.

3.2.1.2 Monitoring Plan Requirements

3.2.1.2.1.b Requirements to Monitor the Pollutants of Concern

As stated in Permit Number SCR030000, the following topics will be addressed in Table 1 and Table 2.

i. Samples and measurements taken for the purpose of the TMDL Monitoring Plan shall:
   (1) Be representative of the SMS4 discharges,
   (2) Be reasonably distributed in time, while maintaining representative sampling,
   (3) Not be terminated for the purpose of preventing the analysis results from a permit or water quality violation,
   (4) Describe and consider frequency, mass and/or rate of discharge, as appropriate, and,
   (5) Be expressed in terms of units or measurements consistent with the requirements contained in the WLA.

ii. The information contained in the TMDL Monitoring Plan shall include:
   (1) Monitoring locations, appropriate for representative data collection,
   (2) Explanation of why monitoring is being conducted for selected locations,
   (3) A description of whether the location(s) are representative and contribute to pollutant loads,
   (4) An indication the seasons during which sampling is intended,
   (5) The pollutant of concern, or its surrogate(s), as a sampling parameter,
   (6) Description of the sampling equipment, and,
   (7) A rationale supporting the proposed monitored location(s) as reflective of water quality concerns to the Maximum Extent Practicable (MEP).

.2.1.2.1.b.i-ii Monitoring and Assessment Plan Details

Table 1 below discusses how samples and measurements taken for the purpose of the TMDL Monitoring Plan shall meet the five points listed in section 3.2.1.2.1.b.i of the SMS4 permit number SCR030000.

Table 1: 3.2.1.2.1.b.i.1-5 Samples and Measurements

3.2.1.2.1.b.i.1 Be representative of the SMS4 discharges:
The proposed monitoring location at Bowman Bridge (see Appendix A) will provide representative data from the SMS4s, as the selected location drains similar land use as the entire SMS4 area within the Shem Creek watershed. The representative traits of the location are detailed further in Table 2.
3.2.1.2.1.b.i.2 Be reasonably distributed in time, while maintaining representative sampling:
Multiple samples will be collected during each event, distributed through time, to characterize each sampled event. Samples will be collected, at a minimum, once per season per year. Samples will be collected in various sized storm events so that different flow rates and storm events are characterized, to the maximum extent practicable (MEP).
3.2.1.2.1.b.i.3 Not be terminated for the purpose of preventing the analysis results from a permit or water quality violation:
The SMS4s will not terminate sampling for the purpose of preventing the analysis results from a permit or water quality violation.
3.2.1.2.1.b.i.4 Describe and consider frequency, mass and/or rate of discharge, as appropriate:
The SMS4s will rely on the tipping bucket rain gauge and radar creek stage measurement instrumentation to be installed at the site to attempt to distinguish data taken during high flow conditions. Due to tidal influence and the transient nature of the stream cross section, the SMS4s will not be able to approximate flow rate.
3.2.1.2.1.b.i.5 Be expressed in terms of units or measurements consistent with the requirements contained in the WLA:
Enterococcus sample concentrations will be expressed by the certified laboratory as MPN/100 mL.

Table 2 on the following pages discusses how samples and measurements taken for the purpose of the TMDL Monitoring Plan shall meet the seven points listed in section 3.2.1.2.1.b.ii of the SMS4 permit number SCR030000.

Table 2: 3.2.1.2.1.b.ii.1-7 Information Contained in the TMDL Monitoring Plan

3.2.1.2.1.b.ii.1 Monitoring location(s) and details on site selection:
In order to determine the contribution of the SMS4s to the approximately 4.2 square mile Shem Creek TMDL watershed, one in-stream monitoring station will be installed on Shem Creek at Bowman Bridge, as shown in Appendix A. This location provides a feasible location to install equipment, with approved SCDOT encroachment, as well as safe access for maintenance and sampling via sidewalks on both sides of the Bowman Road. This station is strategically located to be high enough in the watershed to lessen tidal influence but low enough that flow is consistently present, which is important for sampling as well as the water quality instrumentation to be installed.
3.2.1.2.1.b.ii.2 Explanation of why monitoring is being conducted for selected location(s):
The selected location drains 516 acres, approximately 19% of the Shem Creek watershed, of which, approximately 94% is the Town of Mount Pleasant's SMS4 area. Approximately 4.1% of the Shem Creek watershed is Charleston County SMS4 area, of which 29% is located in the monitoring site drainage area. The South Carolina Department of Transportation (SCDOT) SMS4 area is also in this watershed. The area draining to the monitoring station has a mix of land use that is highly representative of land use in the SMS4s, as discussed in the section below. This location will provide a general assessment of bacteria within the SMS4 urbanized area in the Shem Creek watershed. As mentioned previously, safe access, feasible installation, limited tidal influence, and consistent presence of flow are other reasons this location was chosen.
3.2.1.2.1.b.ii.3 Description of whether the location(s) are representative of the SMS4 discharge and contribute to pollutant loads:
The selected location provides representative data for the SMS4 urbanized area in the Shem Creek watershed due to the high percentage of urbanized area within the sub-watershed. This monitoring location sub-watershed includes mostly developed areas, a mix of commercial and residential with varying densities, with some forested wetland areas. This is similar to the overall SMS4 landuse and considered representative for monitoring the POC as it enters the Shem Creek.
3.2.1.2.1.b.ii.4 Indication of the seasons during which sampling is intended:
Multiple samples will be collected for storm events at least once per season. Seasons will be described as: Winter: January 1 to March 31 Spring: April 1 to June 30 Summer: July 1 to September 30 Fall: October 1 to December 31 Samples taken for each storm event will be reasonably distributed in time, pending appropriate weather conditions, watershed hydrologic response, and sample holding times.

3.2.1.2.1.b.ii.5 The pollutant of concern, or its surrogate(s), as a sampling parameter:
The proposed pollutant of concern to be sampled is Enterococcus, due to the Shem Creek TMDL being published for Enterococcus. The Enterococcus samples will be collected at the Bowman Bridge in-stream monitoring station, to be installed in Shem Creek.
3.2.1.2.1.b.ii.6 Description of the sampling equipment:
Qualified field technicians will use sealed, sterilized sampling bottles provided by the contracted, SCDHEC certified, laboratory to collect manual grab samples. To supplement the grab samples, the SMS4s will install the following equipment to provide information that puts the samples into context with weather, tide, and water quality conditions: • Tipping bucket rain gauge to collect rainfall data • Nile radar non-contact level sensor to monitor stream stage • YSI multiparameter datasonde with sensors to collect continuous data for turbidity, specific conductivity, dissolved oxygen, temperature, and pH.
3.2.1.2.1.b.ii.7 Rationale supporting the proposed monitored location(s) as reflective of water quality concerns to the MEP:
The proposed monitoring location is reflective of water quality concerns because of to the proportion of SMS4 area in the watershed and the representative types of landuse in the watershed. Therefore, data from this proposed station will be generally reflective of the urbanized contributions to the MEP within the SMS4 urbanized area. The monitoring location at Bowman Bridge also has the added advantage of minimal tidal influence, which makes sampling representative of stormwater discharges from the SMS4 area more feasible. Locations lower in the watershed were considered but have greater tidal influence, potentially diluting stormwater runoff and making it more difficult to take representative samples.

3.2.1.2.1.b.iii-x Monitoring and Assessment Plan Strategy

The TMDL monitoring plan for the SMS4s is focused on Enterococcus. Samples and measurements collected will be used to characterize the quality and quantity of the permitted discharges to evaluate the progress toward the WLA and/or WQS attainment. In order to do this, the SMS4s will implement the following strategies to the MEP:

- ☑ In-stream monitoring,
- ☐ Outfall monitoring.

The monitoring location(s) discussed above in Table 2 was selected based on the following checked boxes: Monitoring locations must include one/all/a combination of the following:

- ☐ % SMS4 area draining to the WQMS, at least 25%,
- ☑ Collection of a representative contributing watershed,
- ☐ Inclusion of the entire TMDL watershed within the SMS4.

Table 3 discusses how samples and measurements taken for the purpose of the TMDL Monitoring Plan shall meet the requirements of 3.2.1.2.1.b.iv-x of the SMS4 permit number SCR030000.

Table 3: 3.2.1.2.1.b.iv-x Sampling Details

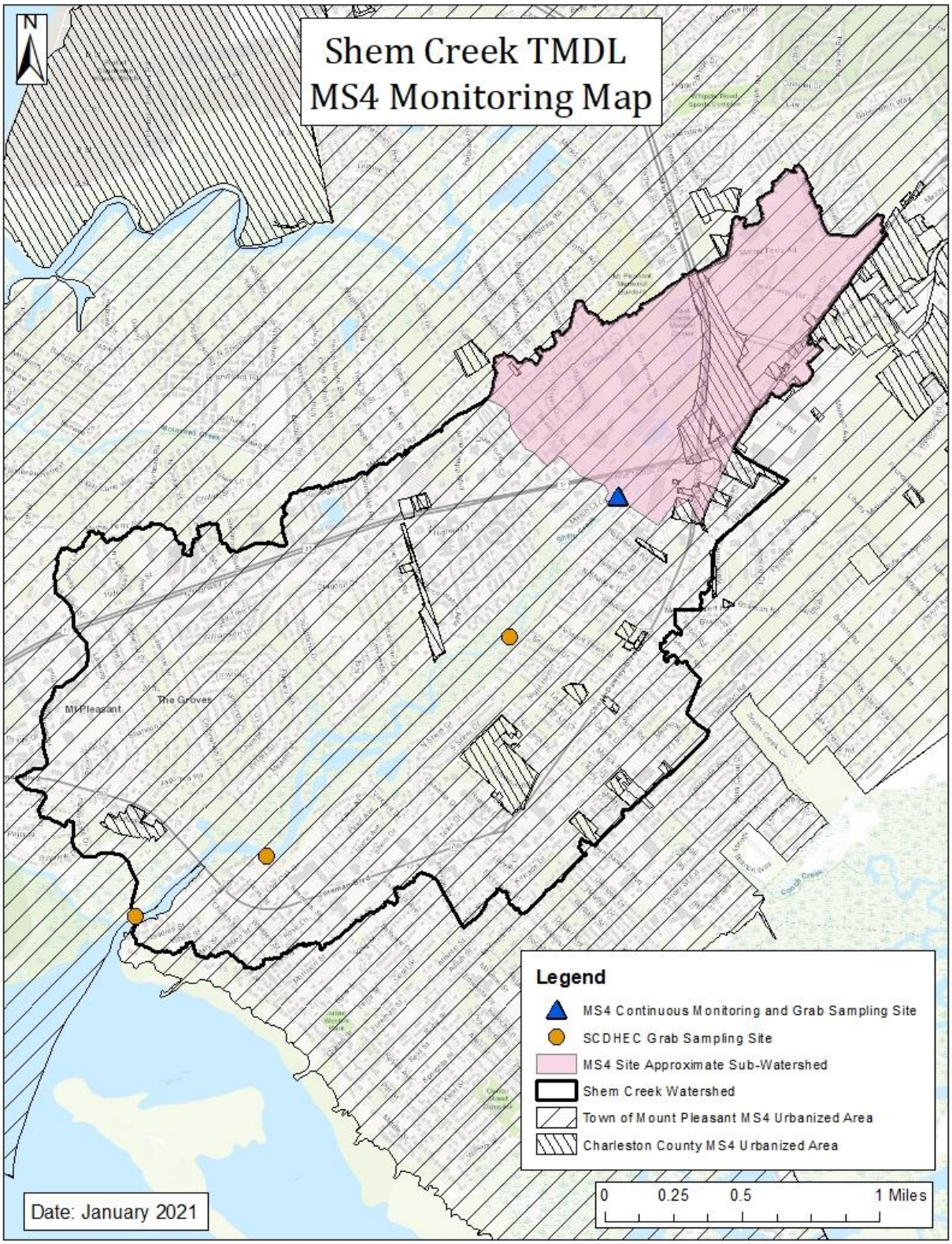
3.2.1.2.1.b.iv-vi Method Descriptions:
Analytical methods will follow 40 CFR 136 as specified by the permit.
3.2.1.2.1.b.vii When no approved analytical method is used:
Not applicable.
3.2.1.2.1.b.viii Sampling minimum:
For the monitoring location, samples of stormwater discharges shall be collected, at a minimum, once per season per year.
3.2.1.2.1.b.ix Sample analysis:
Samples collected for laboratory analysis shall be analyzed for Enterococcus, the pollutant of concern.
3.2.1.2.1.b.x Tidal waters:
The selected monitoring location is in an area that is influenced by the tide. Sampling protocol will be followed as described in this document. The Town will collect samples for the pollutant of concern at the selected location during stormwater conditions and attempt to collect these samples as they are least affected by the tide.

3.2.1.2.1.d Reporting

The SMS4s will report on the progress of the characterization of the pollutant of concern to the Shem Creek watershed. Resulting data will be included in every annual report following the commencement of monitoring for TMDL pollutant characterization.

Appendix A

Shem Creek TMDL MS4 Monitoring Map


Shem Creek TMDL
MS4 Monitoring Map
N
Mt Pleasant
The Groves
Legend
MS4 Continuous Monitoring and Grab Sampling Site
SCDHEC Grab Sampling Site
MS4 Site Approximate Sub-Watershed
Shem Creek Watershed
Town of Mount Pleasant MS4 Urbanized Area
Charleston County MS4 Urbanized Area
0
0.25
0.5
1 Miles
Date: January 2021

Discharge Monitoring Report

Permittee Names:	Town of Mount Pleasant, Charleston County
MS4 Permit Number:	SCR031906
TMDL Watershed:	Shem Creek
Pollutant of Concern:	Enterococcus
Monitoring Location:	Bowman Road bridge over Shem Creek
Latitude / Longitude:	32° 48' 43" N / 79° 51' 17" W
Monitoring Period:	January 2021 to December 2021

Conditions	Sampled Date	Sampled Time	Specific Sampling Location	Sampled By	Laboratory	Lab Analysis Date	Lab Technician	Lab Method	Lower/Min Detection Limit (MPN/100ML)	Enterococcus Result (MPN/100ML)
Wet	1/8/2021	8:36 AM	Sonde Well	LR	Trident Labs	1/8/2021	WW	SM 9230D	10	980
Wet	1/8/2021	9:51 AM	Sonde Well	LR	Trident Labs	1/8/2021	WW	SM 9230D	10	548
Wet	1/8/2021	11:26 AM	Sonde Well	LR	Trident Labs	1/8/2021	WW	SM 9230D	10	313
Wet	1/8/2021	12:52 PM	Sonde Well	LR	Trident Labs	1/8/2021	WW	SM 9230D	10	41
Wet	5/12/2021	10:13 AM	Sonde Well	LR	Trident Labs	5/12/2021	SMJ	SM 9230D	10	6,130
Wet	5/12/2021	11:20 AM	Sonde Well	LR	Trident Labs	5/12/2021	SMJ	SM 9230D	10	5,470
Wet	5/12/2021	12:20 PM	Sonde Well	LR	Trident Labs	5/12/2021	SMJ	SM 9230D	10	14,140
Wet	5/12/2021	1:31 PM	Sonde Well	LR	Trident Labs	5/12/2021	SMJ	SM 9230D	10	15,530
Wet	7/8/2021	9:35 AM	Sonde Well	LR	Trident Labs	7/8/2021	MDS	SM 9230D	10	921
Wet	7/8/2021	10:26 AM	Sonde Well	LR	Trident Labs	7/8/2021	MDS	SM 9230D	10	435
Wet	7/8/2021	11:35 AM	Sonde Well	LR	Trident Labs	7/8/2021	MDS	SM 9230D	10	525
Wet	7/8/2021	1:22 PM	Sonde Well	LR	Trident Labs	7/8/2021	MDS	SM 9230D	10	387
Wet	8/4/2021	10:20 AM	Sonde Well	LR	Trident Labs	8/4/2021	SMJ	SM 9230D	10	866
Wet	8/4/2021	11:28 AM	Sonde Well	LR	Trident Labs	8/4/2021	SMJ	SM 9230D	10	727
Wet	8/4/2021	12:40 PM	Sonde Well	LR	Trident Labs	8/4/2021	SMJ	SM 9230D	10	650
Wet	8/4/2021	1:48 PM	Sonde Well	LR	Trident Labs	8/4/2021	SMJ	SM 9230D	10	517
Dry	9/15/2021	9:52 AM	Sonde Well	LR	Trident Labs	9/15/2021	SMJ	SM 9230D	10	680
Dry	9/15/2021	11:04 AM	Sonde Well	LR	Trident Labs	9/15/2021	SMJ	SM 9230D	10	960
Dry	9/15/2021	12:19 PM	Sonde Well	LR	Trident Labs	9/15/2021	SMJ	SM 9230D	10	830
Dry	9/15/2021	1:35 PM	Sonde Well	LR	Trident Labs	9/15/2021	SMJ	SM 9230D	10	270
Dry	10/20/2021	9:54 AM	Sonde Well	LR	Trident Labs	10/20/2021	SMJ	SM 9230D	10	530
Dry	10/20/2021	11:08 AM	Sonde Well	LR	Trident Labs	10/20/2021	SMJ	SM 9230D	10	410
Dry	10/20/2021	12:35 PM	Sonde Well	LR	Trident Labs	10/20/2021	SMJ	SM 9230D	10	230
Dry	10/20/2021	2:02 PM	Sonde Well	LR	Trident Labs	10/20/2021	SMJ	SM 9230D	10	300
Wet	10/25/2021	11:25 AM	Sonde Well	LR	Trident Labs	10/25/2021	SMJ	SM 9230D	10	6130
Wet	10/25/2021	12:45 PM	Sonde Well	LR	Trident Labs	10/25/2021	SMJ	SM 9230D	10	6130
Wet	10/25/2021	1:50 PM	Sonde Well	LR	Trident Labs	10/25/2021	SMJ	SM 9230D	10	6490

SWMP Appendix D
Charleston County
Stormwater Management Ordinance

Ord. # 1464

Adopted 9/19/06

AN ORDINANCE

ESTABLISHING A STORMWATER MANAGEMENT UTILITY FOR THE PURPOSE OF PLANNING, DESIGNING, FUNDING, CONSTRUCTING AND MAINTAINING STORMWATER MANAGEMENT, SEDIMENT AND EROSION CONTROL, AND FLOOD AND STORMWATER DISCHARGE PROGRAMS, PROJECTS AND FACILITIES, AND REVIEWING AND APPROVING STORMWATER MANAGEMENT AND SEDIMENT CONTROL PLANS FOR LAND DISTURBING ACTIVITIES, AND PROVIDING FOR THE ADMINISTRATION AND ENFORCEMENT THEREOF.

WHEREAS, the South Carolina General Assembly adopted The Stormwater Management and Sediment Reduction Act (Act), South Carolina Code Annotated, Section 48-14-10 et seq. which authorizes a local government to establish a stormwater management utility and adopt a fee system to help fund program administration, and the South Carolina Land Resources Commission has promulgated comprehensive regulations under the Act which regulates implementation of a Stormwater Management Utility; and

WHEREAS, the federal Clean Water Act, as amended by the Water Quality Act of 1987 (33 U.S.C. 1251 et seq.), other amendments, and rules promulgated by the United States Environmental Protection Agency pursuant to the Clean Water Act and its amendments has placed increased requirements and emphasis on the role of local governments in developing, implementing and funding stormwater management programs which address water quality impacts of stormwater runoff; and

WHEREAS, Charleston County Council desires to create and implement a comprehensive stormwater management program that is in the best interests of the citizens of Charleston County and the economy, environment, and water quality of this County.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNTY COUNCIL OF CHARLESTON COUNTY, SOUTH CAROLINA, IN MEETING DULY ASSEMBLED, AS FOLLOWS:

Section 1. Findings.

Charleston County Council makes the following findings that:

A. In Charleston County, the management of stormwater runoff and sediment is necessary to reduce pollution, siltation, sedimentation, flooding, inflow and infiltration of stormwater into the public sewer collection system and stream channel erosion, all of which impact adversely on the land and water resources and the health, safety, property and general welfare of the citizens of Charleston County.

B. Charleston County maintains a system of stormwater management facilities, including but not limited to, inlets, conduits, manholes, channels, ditches, drainage easements, retention and detention basins, infiltration facilities, and other components as well as natural waterways.

C. The stormwater management facilities and components of Charleston County need to be expanded and additional stormwater management facilities and measures need to be implemented and installed throughout the County.

D. There is a lack of resources of equipment, manpower, and funds in Charleston County to address stormwater runoff in a comprehensive manner and within a defined time frame.

E. In Charleston County, there is current and anticipated growth which will contribute to the need for a comprehensive stormwater management system.

F. In Charleston County, the extent of use of the stormwater management system by each classification of real property is dependent on a variety of factors that influence runoff, such as total area, land use, intensity of development, amount of impervious surface, and location in a particular watershed or basin.

G. In Charleston County, real property owners should finance the stormwater management system to the extent they contribute to the need for the system and benefit from the system, and charges should bear a reasonable relationship to the cost of the service.

H. A utility provides the most practical and appropriate means of properly delivering stormwater management services and benefits throughout the unincorporated portions of the County.

Section 2. Article Designation and Authority.

This article may be cited as the Stormwater Management Utility Ordinance and is adopted pursuant to South Carolina Code Annotated, Sections 48-14-10 et seq.; Section 5-7-30; and South Carolina Code Annotated, Regulations 72-300, et seq. and Section 5-31-10, et seq.

Section 3. Definitions.

Unless the context specifically indicates otherwise, the meaning of words and terms used in this Ordinance shall be set forth in South Carolina Code Annotated, Section 48-10-20 and South Carolina Code Annotated, Regulation 72-301.

The following words, terms and phrases, when used in this Ordinance, shall have the meaning ascribed to them in this section, except where the context clearly indicates a different meaning:

“County” means Charleston County, South Carolina.

“County Council” means the elected officials of Charleston County, South Carolina.

“County Administrator” means the county administrator of Charleston County, South Carolina.

“Equivalent Residential Unit” means a unit of measure which relates a typical single family residential property to all other properties.

“Public Works Director” means the director of the Department of Public Works of Charleston County, South Carolina or an authorized representative.

“Stormwater Management Systems and Facilities” means those natural and man-made channels, swales, ditches, swamps, rivers, streams, creeks, branches, reservoirs, ponds, drainage ways, inlets, catch basins, pipes, head walls, storm sewers, lakes and other physical works, properties, and improvements which transfer, control, convey, or otherwise influence the movement of stormwater runoff.

“Utility customer” means the owner of record of real property.

Section 4. Establishment of a Stormwater Management Utility; Administration; Duties and Powers.

County Council hereby establishes a Stormwater Management Utility (Utility) to carry out the purposes, functions and responsibilities set forth herein. The governing body of the Utility shall be the County Administrator and County Council. The County Administrator shall administer the Utility under the Department of Public Works. The Utility shall have the powers and duties set forth below, which powers are not necessarily exclusive to the Utility, to wit:

A. Stormwater management planning and preparation of comprehensive watershed master plans for stormwater management;

B. Regular inspections of public and private stormwater management facilities and measures and the construction thereof;

C. Maintenance and improvements of stormwater management facilities that have been accepted by the County for that purpose;

D. Plan review and inspection for sediment control and stormwater management plans, measures, and practices;

E. Retrofitting designated watersheds to reduce existing flooding problems or to improve water quality;

F. Acquisition of interest of land, including easements;

G. Design and construction of stormwater management facilities and measures and acquisition of equipment;

H. Water quantity and water quality management, including monitoring and surveillance;

I. Billing and collecting a stormwater management utility fee shall be pursuant to the Charleston County Stormwater Management Utility Fee Ordinance that sets forth the amount of the fees ;

J. Make reasonable regulations relating to the administration of this ordinance; and

K. Any and all powers and duties delegated or granted to it as a local government implementing agency under the laws and regulations of the State of South Carolina and the ordinances of this County.

Section 5. Boundaries and Jurisdiction.

The boundaries and jurisdiction of the Stormwater Management Utility shall encompass all those portions of the unincorporated County, as they may exist from time to time and such additional areas lying inside the corporate limits of those jurisdictions within the C ounty as shall be approved by Charleston County Council.

Section 6. Regulation of Land Disturbing Activity.

County Council shall establish by ordinance a program regulating land disturbing activities, including, but not limited to, provisions for reviewing and approving stormwater management and sediment control plans, creating design requirements for such plans and land disturbing activities; and providing operational maintenance requirements for stormwater management facilities and measures.

Section 7. Stormwater Utility Fees.

County Council shall establish by ordinance the amounts and classifications of stormwater management utility fees to be implemented to help fund the Utility and its programs and projects.

County Council shall consider, among other things, the following criteria in establishing fees:

A. The fee system shall be reasonable and equitable so that users pay to the extent they contribute to the need from the Utility, and the fee shall be apportioned with approximate equality and upon a reasonable basis of equality with due regards for the benefits conferred. County Council recognizes that these benefits, while substantial, in many cases cannot be measured directly.

B. The components of the calculations used to establish fees shall include, but shall not be limited to, the following cost factors:

1. Stormwater management planning and preparation of comprehensive watershed master plans for stormwater management;

2. Regular inspections of public and private stormwater management facilities and measures and the construction thereof;

3. Maintenance and improvements of stormwater management facilities that have been accepted by the County for that purpose;

4. Plan review and inspection for sediment control and stormwater management plans, measures, and practices;

5. Retrofitting designated watersheds to reduce exiting flooding problems or to improve water quality;

6. Acquisition of interest of land, including easements;

7. Design and construction of stormwater management facilities and measures and acquisition of equipment;

8. Administration of enforcement;

9. Water quantity and water quality management, including monitoring and surveillance; and

10. Debt service and financing costs.

C. The practical difficulties and limitations related to establishing, calculating, and administering such fees.

D. The components of the calculations used to establish fees shall be based on an “equivalent residential unit”, to be determined and approved by County Council with reasonable general adjustments being made for, but not limited to, the following factors:

1. Land use;

2. Lot or tract size;

3. The amount of site that is impervious; and

4. Other generally accepted factors relevant to such calculations based upon the provisions of this Ordinance.

Pending the adoption of a permanent fee system and rate structure, County Council may adopt an interim fee system and rate structure to help fund the establishment of the Utility, pending the completion and adoption of a Stormwater Utility Rate Study.

Section 8. Investment and Reinvestment of Funds and Borrowing.

Funds generated for the Stormwater Management Utility from fees, bond issues, other borrowing, and other sources shall be utilized only for those purposes for which the utility has been established, including but not limited to: planning; acquisition of interests in land including easements; design and construction of facilities; maintenance of the stormwater system, billing and administration; and water quality and water quantity management, including monitoring, surveillance, private maintenance inspection, construction inspection and other activities which are reasonably required. Such funds shall be invested and reinvested pursuant to the same procedures and practices established by the County for investing and reinvestment of funds. County Council may use any form of borrowing authorized by the laws of the State of South Carolina to fund capital acquisitions or expenditures for the Stormwater Management Utility.

Section 9. When Fee is Delinquent.

The utility fee shall be due and payable thirty (30) days after it is mailed to the utility customer.

Section 10. Written Notice of Objection.

A. A utility customer may request a reconsideration of any determination or interpretation by the Public Works Director in the operation of the stormwater management utility. Such request must be in writing specifically explaining the grounds for the request including the following:

TMS # for the property;

Utility customer information: name, address, and telephone number;

A statement outlining the reasons for the appeal, including any law or authority, upon which the utility customer relies;

A statement of facts supporting the utility customer's position; and

The amount which the utility customer considers the fair amount of the fee.

The written request is a notice of objection for purposes of the section. The failure to serve written request within the time period constitutes a waiver of the utility customer's right of protest for that year.

B. Request for reconsideration of the annual fee amounts shall be submitted within thirty (30) days after the date the fee shall be due and payable.

C. In cases where the applicant believes the fee to be inappropriate based on the actual impervious area of the property in which he has interest, the applicant should submit technical data such as a site survey of said property to assist in the evaluation.

The survey should be prepared by a licensed Land Surveyor in accordance with the minimum state survey standards. The survey should include the following:

Property boundary;

Parking areas;

Driveway(s);

Building(s);

Storm drainage facilities;

Any other surface improvements; and

Calculation of total impervious area.

Calculation of total pervious area

Date when the field survey was conducted.

D. The Public Works Director shall render, in writing, a decision on the request within thirty (30) working days of the receipt of the written request for reconsideration.

E. The utility customer may appeal the decision of the Public Works Director to the Charleston County Construction Board of Adjustment and Appeals within thirty (30) days after the date of the Public Works Director's response. The Public Works Director shall provide the petition form to the utility customer.

Section 11. Petition for Relief.

A. The petition must be accompanied with a $25.00 fee that will be used to partially defray the costs incurred in connection with the administration of petitions filed pursuant to this section.

B. The Construction Board of Adjustment and Appeals shall hear the petition to determine if the annual stormwater management utility fee does not apportion the fee with approximate equality, based upon a reasonable basis of classification and with due regard to the benefits conferred by providing stormwater management services to the utility customer and the requirements of public health, safety or welfare. The determination of the annual fee by the Construction Board of Adjustment and Appeals is entitled to a presumption of correctness, and the petitioner has the burden of rebutting the presumption of correctness.

C. The Construction Board of Adjustment and Appeals shall render a written decision on each petition that is heard, and such written decision shall be issued within twenty (20) calendar days from the day the Board heard the petition. The decision of the

Construction Board of Adjustment and Appeals shall contain findings of fact and conclusions of law, and the decision shall be sent to the petitioner by first class mail.

D. The decision of the Construction Board of Adjustment and Appeals shall be final unless the petitioner appeals the decision to the circuit court in Charleston County within thirty (30) days after the date of the decision of the Construction Board of Adjustment and Appeals. Prior to bringing an action to contest an annual fee, the petitioner shall pay to the treasurer not less than the amount of the annual fee which he admits in good faith is owing. Payment of the fee shall not be deemed an admission that the annual fee was due and shall not prejudice the petitioner in bringing an action as provided herein.

Section 12. Enforcement and Penalties.

A. The Public Works Director, and/or such other official(s) as the County Administrator shall designate, shall be the Enforcement Officer(s) to enforce the provisions of this Ordinance.

B. In addition to any other penalties provided in this Ordinance, the County may assess a civil penalty not to exceed one thousand dollars ($1,000), against any person violating any provision of this Ordinance. Each day a violation continues constitutes a separate violation that may be the subject of such a penalty. The Enforcement Officer shall make a written demand for payment upon the person responsible for the violation and set forth in detail the violation for when the penalty has been invoked. If full payment of the penalty is not made within thirty (30) days after such demand is made, a civil action may be filed in the circuit court of Charleston County to recover the amount of the penalty.

C. When the County has reasonable cause to believe that any person is violating or is threatening to violate the requirements of this ordinance, it may, either before or after the institution of any other action or proceeding authorized by this Ordinance, institute a civil action in circuit court for injunctive relief to restrain the violation or threatened violation. The institution of an action for injunctive relief under this subsection does not relieve any party to the proceeding from any civil penalty prescribed for violations of this Ordinance.

D. The amount of the fee shall be pursuant to the Charleston County Stormwater Management Utility Fee Ordinance.

Section 13. Liability.

Nothing in this article and any action or failure to act under this article shall or may be construed to;

A. Impose any liability on the County, or its departments, agencies, offices or employees for the recovery of damages; or

B. Relieve any person engaged in a land disturbing activity of duties, obli gations, responsibilities, or liabilities arising from or incident to operations associated with such

activity or imposed by provisions of this article or the laws and regulations pursuant to which it was adopted.

Section 14. Severability.

If any one or more of the provisions or portions of this Ordinance are determined by a court of competent jurisdiction to be contrary to law, then that provision or portion shall be deemed severable from the remaining terms or portions and the invalidity shall in no way affect the validity of the other provisions of this Ordinance. If any provisions of this Ordinance shall be held or deemed to be or shall, in fact, be inoperative or unenforceable or invalid as applied to any particular case in any jurisdiction or in all cases because it conflicts with any constitution or statute or rule of public policy, or for any other reason, those circumstances shall not have the effect of rendering the provision in question inoperative or unenforceable or invalid in any other case or circumstance, or of rendering any other provision or provisions inoperative or unenforceable or invalid to any extent whatsoever.

This Ordinance shall be construed and interpreted in accordance with the laws of the State of South Carolina.

THIS ORDINANCE SHALL BECOME EFFECTIVE IMMEDIATELY UPON ITS RATIFICATION AT THIRD READING BY CHARLESTON COUNTY COUNCIL .

Ord. #1518

adopted 8/14/07

AN ORDINANCE
PROVIDING FOR THE CREATION OF A STORMWATER MANAGEMENT PROGRAM FOR CHARLESTON COUNTY; AUTHORIZING THE ESTABLISHMENT OF PERMITTING STANDARDS AND PROCEDURES; PROVIDING FOR COORDINATION, IMPLEMENTATION AND ENFORCEMENT OF THIS ORDINANCE AND THE STANDARDS AND PROCEDURES OF THE PROGRAM, AND OTHER MATTERS RELATED THERETO.

TABLE OF CONTENTS

CHARLESTON COUNTY STORMWATER MANAGEMENT ORDINANCE

DIVISION 1 GENERAL PROVISIONS

Sec. 1.1 Title.

This Ordinance shall be known as the "Charleston County Stormwater Management Ordinance".

Sec. 1.2 Authority.

This Ordinance is adopted pursuant to the authority conferred upon Charleston County by applicable Federal and State laws and regulations.

Sec. 1.3 Jurisdiction.

The boundaries and jurisdiction of this Ordinance shall encompass those portions of the unincorporated Charleston County, as they may exist from time to time and may include additional areas lying inside those jurisdictions within Charleston County as approved by Charleston County Council.

Sec. 1.4 Findings.

The Charleston County Council makes the following findings:

(a) Uncontrolled stormwater runoff may have significant, adverse impact on the health, safety and general welfare of Charleston County and the quality of life of its citizens. The potential impacts of uncontrolled stormwater can lead to the degradation of water quality and general riverine ecosystem through excessive or illegal pollutant discharges, erosion, and flooding thereby limiting or removing its designated and potential uses.

(b) Charleston County is required by federal law to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the South Carolina Department of Health and Environmental Control (SCDHEC) for stormwater discharges from the Charleston County Stormwater system. The NPDES permit requires Charleston County to impose controls to reduce the discharge of pollutants in stormwater to the maximum extent practicable using management practices; control techniques and system, design and engineering methods; and such other provisions which are determined to be appropriate for the control of such pollutants.

(c) Additionally, certain facilities that discharge stormwater associated with an industrial activity, including construction activities, are required by the South Carolina Code of Regulations 61-9-122 to obtain NPDES permits for construction activities.

Sec. 1.5 Purpose.

(a) It is the purpose of this Ordinance to protect, maintain, and enhance water quality and the environment of Charleston County and the short-term and long-term public health, safety, and general welfare of the citizens of Charleston County. This Ordinance is also designed to minimize property damage by establishing requirements and procedures to control the potential adverse effects of increased stormwater runoff and related pollutant loads associated with both future development and existing developed land. Proper management of stormwater runoff will further the purpose of this Ordinance to insure a functional drainage system, reduce the effects of development on land and stream channel erosion, attain and maintain water quality standards, enhance the local environment associated with the drainage system, reduce local flooding, maintain where necessary pre-developed runoff characteristics

of the area in terms of flow rate, volume and pollutant concentration, and facilitate economic development while mitigating associated pollutant, flooding, erosion, and drainage impacts.

(b) It is further the purpose of this ordinance to direct the development and implementation of a Stormwater Management Program (SWMP) and to establish authority which authorizes or enables Charleston County at a minimum to:

(1) Comply with State and Federal requirements related to stormwater management developed pursuant to the Clean Water Act;

(2) Prohibit illicit discharges to Charleston County stormwater systems and facilities and receiving waters;

(3) Control to the maximum extent practicable the discharge to Charleston County stormwater systems and facilities and receiving waters of spills, dumping, or disposal of materials other than stormwater;

(4) Address specific categories of non-stormwater discharges and similar other incidental non-stormwater discharges listed in the SWMP;

(5) Require erosion and sediment controls to protect water quality on all applicable new and re-development projects both during and after construction;

(6) Where necessary, require stormwater discharge rate and volume control during and following development, redevelopment, or construction;

(7) Define and implement procedures of site plan review and site inspection of all applicable construction projects within Charleston County;

(8) Control the discharge from Charleston County stormwater systems and facilities and receiving waters of pollutants in such quantity that water quality standards are met or to otherwise address post-construction, long-term water quality. This includes the necessary means needed to comply with State and Federal regulations regarding stormwater management quantity and quality;

(9) Define procedures for addressing citizen complaints of stormwater-related issues within Charleston County;

(10) Provide for adequate long term operation and maintenance of existing stormwater systems and facilities.

(11) Carry out inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the Charleston County stormwater system and receiving waters;

(12) Encourage the creation of stream buffers and preservation of natural spaces to provide areas that could be used for flood storage, stormwater treatment and control, and recreation. Such areas may be required in special protection areas needed to protect, maintain, or enhance water quality and protect property from flooding problems;

(13) Develop, implement, and enforce action plans to address pollutant load reductions required in impaired waterbodies and to work towards compliance with Total Maximum Daily Loads (TMDLs) established by EPA or SCDHEC and to work towards meeting water quality standards.

(14) Enable enforcement of all of the authorizations noted herein.

(c) It is the purpose of this Ordinance to establish review authority for the Charleston County Public Works Director to provide consistency of construction projects with the Charleston County SWMP.

Sec. 1.6 Construction and Scope.

(a) The Public Works Director shall be primarily responsible for the coordination and enforcement of the provisions of this Ordinance and the SWMP.

(b) The application of this Ordinance and the provisions and references expressed herein shall be the minimum stormwater management requirements and shall not be deemed a limitation or repeal of any other ordinances of Charleston County or powers granted Charleston County by the State of South Carolina statutes, including, without limitation, the power to require additional stormwater management requirements, as defined by Section 3.1(a)(3). If site characteristics on new development, redevelopment, and existing developments indicate that complying with these minimum requirements will not provide adequate designs or protection for real property, residents, or the environment, the property owner, operator, or person responsible for land disturbing activities is required to provide additional and appropriate management practices, control techniques, system design, and engineering methods to attain an adequate level of protection, in accordance with the Charleston County Stormwater Program Permitting Standards and Procedures Manual (Manual).

Sec. 1.7 Severability.

Should any word, phrase, clause or provision of this Ordinance be declared invalid or unconstitutional by a court of competent jurisdiction, such declaration shall not affect this Ordinance as a whole or any part hereof except that specific provision declared by such court to be invalid or unconstitutional.

Sec. 1.8 Reserved.

Sec. 1.9 Relationship with other Laws, Regulations and Ordinances.

Whenever the provisions of this Ordinance impose more restrictive standards than are required in or under any other law, regulation or ordinance, the requirements contained in the provisions of this Ordinance shall prevail. Whenever the provisions of any other law, regulation or ordinance impose more restrictive standards than are required in the provisions of this Ordinance, the requirements of such law, regulation or ordinance shall prevail.

Sec. 1.10 Amendments.

Charleston County Council may adopt additional regulations or resolutions to implement this Ordinance, implement the SWMP, or to otherwise further the goal of protecting the quality of the waters which the Charleston County stormwater system drains into.

Sec. 1.11 Reserved.

Sec. 1.12 Definitions.

"Applicant" is a person, firm, governmental agency, partnership, or any other entity who seeks to obtain approval under the requirements of this Ordinance and who will be responsible for the land disturbing activity and related maintenance thereof.

"As-built drawings" are revised construction drawings that depict final installed location of the new facilities on a project, including the stormwater system. This term and "record drawings" shall be synonymous.

"Best Management Practices (BMPs)" are any structural or non-structural measure or facility used for the control of stormwater runoff, be it for quantity or quality control. BMPs also includes schedules of activities, prohibitions of practices, maintenance procedures, treatment requirements, operating procedures, and other management practices to control site runoff, spillage or leaks, sludge or waste disposal, drainage from raw material storage, or otherwise prevent or reduce the pollution of waters of the State.
"Charleston County Administrator" means the Administrator of Charleston County, South Carolina

"Construction" or "Construction Activity" is activity involving clearing, grading, transporting, filling, or any other activity which causes land to be exposed to the

danger of erosion, or which might create an alteration to and existing drainage way or other component of the stormwater system or facility.

"Construction Activity Application" means the application, set of drawings, specifications, design calculations, SWPPP, and other documents necessary to demonstrate compliance with this Ordinance.

"Director" means the Public Works Director of the Charleston County Public Works Department.

"Developer" means any person, or others who acts in his own behalf, that is required to submit an application for approval to disturb land or encroachment and is thereafter responsible for maintaining compliance with this Ordinance and conditions of the approved application.

"Erosion" means the general process by which soils or rock fragments are detached and moved by the action of wind, water, ice, and gravity.

"Easement" is an authorization by a property owner to the general public, a corporation, or a certain person or persons for the use of any designated part of his property for a specific purpose.

"Flood/flooding" is a temporary rise in the level of water which results in the inundation of areas not ordinarily covered by water.

"Illicit Connection" means a connection to a Charleston County stormwater management system or facility which results in a discharge that is not composed entirely of stormwater runoff except discharges pursuant to an NPDES permit (other than the NPDES MS4 permit for Charleston County).

"Improper Disposal" means any disposal other than through an illicit connection that results in an illicit discharge, including, but not limited to the disposal of used oil and toxic materials resulting from the improper management of such substances.

"Illicit Discharge" or "Illegal Discharge" means any activity which results in a discharge to a Charleston County stormwater management system or facility or receiving waters that is not composed entirely of stormwater except (a) discharge pursuant to an NPDES permit (other than the NPDES for Charleston County) and (b) discharges resulting from the fire-fighting activities.

"Maintenance" means any action necessary to preserve any stormwater system component, including conveyances, facilities and BMPs in proper working condition, in order to serve the intended purposes set forth in this ordinance and to prevent structural failure of such components.

"MS4" means municipal separate storm sewer system and includes all conveyances

or system of conveyances (including roads with drainage systems, highways, right-of-way, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, storm drains, detention ponds, and other stormwater facilities) which inlets, transports, stores, or treats stormwater runoff and which is (a) owned or operated by Charleston County; (b) designed or used for collecting or conveying stormwater; (c) not a combined sewer system; and (d) not part of a Publicly Owned Treatment Works (POTW).

"New Development" or "Re-Development" means any of the following actions undertaken by any person, including, without limitation, any public or private individual or entity:

(a) division or combination of lots, tracts, or parcels or other divisions by plat or deed;

(b) the construction, installation, or alteration of land, a structure, impervious surface or drainage facility;

(c) clearing, scraping, grubbing or otherwise significantly disturbing the soil, vegetation, mud, sand or rock of a site, or changing the physical drainage characteristics of the site; or

(d) adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging, or otherwise disturbing the soil, vegetation, mud, sand or rock of a site.

"NPDES" means National Pollutant Discharge Elimination System.

"NPDES Permit" means the NPDES permit for stormwater discharges issued by SCDHEC pursuant to the Clean Water Act and the federal stormwater discharge regulations that allows for restricting pollutant loads as necessary to meet water quality standards.

"Operator" means the person who has operational control of the real property, including an operator or person who is in charge of any activity related to land disturbance, construction, or post- construction stormwater quality or quantity.

"Outfall" or "Discharge Point" means the point where a Charleston County stormwater management system or facility, or other municipal and private system, discharges into waters of the State or United States.

"Owner" means the property owner, or any person who acts in his own behalf, that submits an application for approval to disturb land or vegetation or for encroachment, and the person, if so designated by default or on legal documents, as the responsible party for maintenance of a stormwater system(s) and facility(s).

"Person" means any and all persons, natural or artificial and includes any individual,

association, firm, corporation, business trust, estate, trust, partnership, two or more persons having a joint or common interest, state or federal or an agent or employee thereof, or any other legal entity.

"Pollutant" means anything which may cause or contribute to violation of water quality standards, including but not limited to sediment, bacteria, nutrients, dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

"Property Owner" means the record owner of the real property.

"Public Works Director" means the director of the Department of Public Works of Charleston County, South Carolina or an authorized representative or designees.

"Receiving Waters" means any lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of South Carolina, and all other bodies of surface or underground water, whether natural or artificial, public or private, inland or coastal, fresh or salt.

"Regulation" means any regulation, rule or requirement prepared by and/or adopted by the Charleston County Council pursuant to this Ordinance.

"Spill" means any accidental or purposeful discharge of any pollutants, hazardous materials, or other substance which is otherwise potentially detrimental to the designated use of a receiving water.

"SWMP" means the Charleston County Stormwater Management Program, which may describe the components to be used by Charleston County to control stormwater discharges, address flooding, and meet water quality standards.

"Stormwater" means stormwater runoff, snowmelt runoff, and surface runoff and drainage.

"Stormwater Management" means the collection, conveyance, storage, treatment and disposal of stormwater runoff in a manner to meet the objectives of this Ordinance and its terms, including, but not limited to, measures that control the increased volume and rate of stormwater runoff and water quality impacts caused by man-made changes to the land.

"Stormwater Systems and Facilities" means those natural and man-made channels, swales, ditches, swamps, rivers, streams, creeks, branches, reservoirs, ponds, drainage ways, inlets, catch basins, pipes, head walls, storm sewers, lakes and other physical works, properties, and improvements which transfer, control, convey, or

otherwise influence the movement of stormwater runoff, be it for quantity or quality control.

"TMDL means the Total Maximum Daily Load which is the regulatory value developed to represent the amount of a pollutant that a water body can incorporate while meeting water quality standards. TMDL is further defined as the pollutant load developed by the Enviroanmental Protection Agency (EPA) and SCDHEC that designates the permitted amount of discharge allowed to flow into a water body of the State or United States.

"Variance" means the modification of the minimum stormwater management requirements contained in this Ordinance and the SWMP for specific circumstances where strict adherence to the requirements would result in unnecessary hardship and not fulfill the intent of this Ordinance.

"Watercourse" is a conveyance used to transport runoff from one location to the next.

"Watershed" is a drainage area or drainage basin contributing to the flow of stormwater into a receiving watercourse or water body."

"Water Quality" means those characteristics of stormwater runoff that relate to the physical, chemical, biological, or radiological integrity of water.

"Water Quantity" means those characteristics of stormwater runoff that relate to the rate and volume of the stormwater runoff.

DIVISION 2ORGANIZATION AND ADMINISTRATION

Sec. 2.1 Charleston County Stormwater Management Program (SWMP).

The SWMP which has been developed by Charleston County to implement the purposes of this Ordinance shall serve as the basis for directing Charleston County's efforts to control stormwater runoff and discharge. The SWMP is incorporated by reference and is hereby a part of this Ordinance. The SWMP requirements are to be complied with and shall be enforced in accordance with the provisions of this Ordinance.

Sec. 2.2 Coordination with Other Agencies.

The Charleston County Public Works Director may coordinate Charleston County's activities with other Federal, State, and local agencies, which manage and perform functions relating to the protection of receiving waters, through a written agreement with those other agencies. Authority not expressly reserved for other agencies or restricted by statute is placed with the Public Works Director for the protection and preservation of receiving waters. The Public Works Director should coordinate with Federal, State and local agencies having jurisdiction of those receiving waters.

Sec. 2.3 Right-Of-Entry.

(a) The Public Works Director may with the consent of the property owner enter upon the real property of any Person subject to this Ordinance. The Public Works Director shall be provided immediate access to the necessary portion of the real property for the purposes of inspecting, monitoring, sampling, inventorying, examining and copying of records, and performing any other duties necessary to determine compliance with this Ordinance.

(b) Where the property owner or operator has security measures in place requiring proper identification and consent before entry upon the real property, the property owner, operator, or person shall make the necessary arrangements with the necessary parties so that the Public Works Director will be permitted to enter on to the property without delay for the purposes of performing such responsibilities identified in (a).

(c) In addition to any other remedies allowed by law, the Public Works Director shall seek the consent of the property owner before entry upon the real property. If such consent is denied or unable to be obtained from the property owner, operator or person, in addition to any other remedies allowed by law, the Public Works Director shall by affidavit based upon the reasonable suspicion that a violation exists, obtain an ex parte order from a court of competent jurisdiction to enter upon the property for the limited purposes stated in (a).

DIVISION 3 STORMWATER QUANTITY AND QUALITY MANAGEMENT REQUIREMENTS

Sec. 3.1 Regulations.

(a) The Public Works Director shall be responsible for the coordination, implementation, and enforcement of this Ordinance and the SWMP, as well as the long-term management of the Charleston County's drainage systems. Without limitation, the Public Works Director shall have the following authority:

(1) To issue any approval, certification, or license that may be required to comply with this Ordinance.

(2) To deny a facility connection to Charleston County stormwater systems or facilities or discharge to waters of the State if State, Requirements and this Ordinance are not met.

(3) To create the Charleston County Stormwater Program Permitting Standards and Procedures Manual. The Manual may be used to convey

design and engineering standards, construction management processes and procedures, and other aspects necessary for compliance with this Ordinance.

The Charleston County Administrator is authorized to approve the adoption and subsequent revisions of the Manual.

(4) To require the submittal of an application for all applicable construction activities that alter any portion of land for development or alter the storm drainage characteristics of the land.

The application shall include the information required to control stormwater pollutants and other components in accordance with the Manual.

(5) To require the development and enforcement of a Stormwater Pollution Prevention Plan (SWPPP) for all new and re-development projects.

(6) To require proper long-term maintenance of stormwater management systems and facilities through the use of an operating permit or other applicable measures in accordance with the manual.

(7) To approve construction activities and to require as a condition of such approval, structural or non-structural controls, practices, devices, operating procedures, or other mechanisms to protect public and private property from flooding and erosion and attain TMDL pollutant load reductions and water quality standards.

(8) To require performance bonds as necessary of any Person to secure that Person's compliance with approvals, certificates, licenses, or authorizations issued by the Public Works Director pursuant to this Ordinance, the SWMP, and Federal and State laws. The Public Works Director shall develop a process that organizes the closure of bonds and construction projects to accommodate phases of development and the transfer of the ownership of real property.

(9) To conduct all activities necessary to carry out the SWMP and other requirements included in this Ordinance and to pursue the necessary means and resources required to properly fulfill this responsibility.

(10) To require appropriate post construction best management practices and appropriate continued maintenance of those best management practices.

(11) To determine appropriate fees, to impose penalties, and to take necessary and appropriate actions to enforce this Ordinance.

(12) To require encroachment permits as necessary.

Sec. 3.2 Prohibitions and Exemptions.

No person shall (1) develop any land, (2) engage in any industry or enterprise, (3) construct, operate or maintain any landfill, hazardous waste treatment, disposal, or recovery facility, or any other industrial or related facility, (4) dispose of any hazardous material or toxic substance or other pollutant, or (5) prevent the transport of sediment and other pollutants associated with stormwater runoff beyond the real property boundary lines without compliance with this Ordinance.

In instances where an imminent threat to the health, safety, or general welfare of the public or the environment is suspected, the Public Works Director shall determine if immediate action is necessary. Such action may be taken with or without the consent of the owner, operator or person. If such consent is denied, the Public Works Director shall follow the provisions in Section 2.3 for entry upon the real property to remove such threat. In such instances, the owner, operator, or person shall reimburse Charleston County for any and all expenses associated with removal of such threat If the owner, operator or person fail to reimburse Charleston County for such expenses, the County may recover the expenses from the owner, operator, or person through any remedies under the law. Any costs associated with any collection effort by the County are in addition to the recovery of the expenses.

The following development activities are exempt from the provisions of this Ordinance.

(a) Land disturbing activities undertaken on forestland for the production and harvesting of timber and timber products and conducted in accordance with best management practices and minimum erosion protection measures established by the South Carolina Forestry Commission pursuant to Section 48-18-70 of the Code of Laws of South Carolina 1976, as amended.

(b) Activities undertaken by persons who are otherwise regulated by the provisions of Chapter 20 of Title 48, the South Carolina Mining Act. livestock, including beef cattle, sheep, swine, horses, ponies, mules, or goats, including the breeding and grazing of these animals; bees, fur animals, and aquaculture. The construction of an agricultural structure that requires the disturbance of one or more acres, such as, but not limited to, broiler houses, machine sheds, repair shops, coops, barns, and other major buildings shall require the submittal and approval of an application in accordance with the Manual prior to the start of the land disturbing activity.

(c) Land disturbing activities on agricultural land for production of plants and animals, including but not limited to: forages and sod crops, grains and feed crops, tobacco, cotton, and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including beef cattle, sheep, swine, horses,

ponies, mules, or goats, including the breeding and grazing of these animals; bees, fur animals, and aquaculture. The construction of an agricultural structure that requires the disturbance of one or more acres, such as, but not limited to, broiler houses, machine sheds, repair shops, coops, barns, and other major buildings shall require the submittal and approval of a Land Disturbance Application prior to the start of the land disturbing activity.

Sec. 3.3 Design and Engineering Standards.

Design and engineering standards must define the desired level of quality and performance for stormwater management systems on all applicable construction activities in order to meet the purpose of this Ordinance. The standards establish the minimum technical requirements needed to demonstrate compliance.

The Public Works Director is authorized to develop and adopt policies, criteria, specifications, and standards for the proper implementation of the requirements of this Ordinance, Federal and State laws and the SWMP; and to provide a sound technical basis for the achievement of stormwater management, including water quality and quantity objectives. These standards may be provided in the Manual.

It shall be the responsibility of the property owner, operator, or person responsible for land disturbing activities to provide adequate controls to meet the design and engineering standards provided in the Manual.

Sec 3.4 Construction Activity Approval Process.

An application for review and approval shall be made for all applicable construction activities. Applications required under this Ordinance shall be submitted in a format and in such numbers as required by the Public Works Director. Applications may be initiated by the property owner, operator, or person responsible for construction activities. Applications that meet the requirements of this Ordinance, the SWMP, and State and Federal regulations are considered complete. The application process and requirements to establish a complete application will be provided in the Manual.

Sec. 3.5 Charleston County Stormwater Program Permitting Standards and Procedures Manual (Manual).

The Manual may include design standards, procedures and criteria for conducting hydrologic, hydraulic, pollutant load evaluations, and downstream impact for all components of the stormwater management system. It is the intention of the Manual to establish uniform design practices; however, it neither replaces the need for engineering judgment nor precludes the use of information not submitted. Other accepted engineering procedures may be used to conduct hydrologic, hydraulic and pollutant load studies if approved by the Public Works Director.

The Manual will contain at a minimum the following components:

(a) Construction Activity Application contents and approval procedures;

(b) Construction Completion and Closeout processes;

(c) Hydrologic, hydraulic, and water quality design criteria (i.e., design standards) for the purposes of controlling the runoff rate, volume, and pollutant load. Suggested reference material shall be included for guidance in computations needed to meet the design standards;

(d) Information and requirements for new and re-development projects in special protection areas necessary to address TMDLs, known problem areas and other areas necessary to protect, maintain, and enhance water quality and the environment of Charleston County and the public health, safety, and general welfare of the citizens of Charleston County.

(e) Construction document requirements;

(f) Long-term Maintenance & Maintenance Plan

(g) Minimum easement requirements;

(h) Required and recommended inspection schedules and activities for all components of the stormwater management system, including construction-related BMPs.

The Manual will be updated periodically to reflect the advances in technology and experience

Sec. 3.6 Reserved.

Sec. 3.7 Maintenance, Construction, Inspection, and Notice of Termination (NOT).

Maintenance of the stormwater management system is critical for the achievement of its purpose of controlling stormwater runoff quantity and quality and providing for the public health, safety, and general welfare of the citizens of Charleston County.

(a) In accordance with the Manual, a maintenance plan for the stormwater management system shall be included in an application to perform a construction activity to cover activities to be conducted during and after construction. As part of the maintenance plan, the property owner, operator, or person of such system or facility shall agree to be responsible for keeping the system and facility in working order. The Public Works Director shall develop procedures to provide reasonable assurances that maintenance activities are performed in accordance with the Manual for both Charleston

County and privately maintained stormwater systems and facilities. The Public Works Director will provide the procedures for transferring maintenance responsibilities to another entity.

(b) The Public Works Director will define procedures for conducting site inspections.

(c) As part of any application to perform a construction activity, the applicant shall submit construction and BMP maintenance and inspection schedules, and long-term maintenance plan shall be covered by an operating permit for new stormwater management systems and facilities. Required and recommended schedules for BMP maintenance and inspection and long-term plans are provided in the Manual.

(d) If the construction is to be phased, no phase of the work, related to the construction of stormwater management facilities shall commence until the preceding phase of the work is completed in accordance with an approved application to perform a construction activity. The procedure for construction phases beginning and ending and what constitutes such conditions shall be submitted with the application.

(e) The applicant shall notify the Public Works Director before commencing any work, in accordance with the Manual, and upon completion of any phase or designated component of the site. Notification schedules shall be provided for in the Manual. All self-inspections, maintenance actions, BMP replacements, and changes to the approved application shall be documented and presented upon request to the Public Works Director.

(f) The NOT process as identified in the Manual must be completed by the Public Works Director prior to any of the following actions, as applicable:

(1) The use or occupancy of any newly constructed components of the site.

(2) Final acceptance of any road into the Charleston County road maintenance system or designation of road owner and associated stormwater management system.

(3) Release of any bond held by Charleston County if applicable.

(4) Approval and/or acceptance for recording of map, plat, or drawing, the intent of which is to cause a division of a single parcel of land into two or more parcels.

Sec. 3.8 Watercourse Protection.

Every owner, operator, or person responsible for any land disturbance activity on

property through which a watercourse passes shall keep and maintain that portion of the watercourse within the property free of trash, debris, and other obstacles that would pollute, contaminate, or retard the flow of water through the watercourse. In addition, the owner, operator, or person shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not interfere with the use, function, or physical integrity of the watercourse.

To assist in the compliance with State and Federal laws and regulations, the Public Works Director may develop special protection areas which require additional control of stormwater quality and quantity than provided by minimum design standards. Such areas may consist of watersheds corresponding to adopted TMDLs, known flooding problems and pollution impairments, or other areas necessary to protect, maintain, and enhance water quality and the environment of Charleston County and the public health, safety, and general welfare of the citizens of Charleston County. These areas may change with time as development continues and as Federal and State law demands.

New stormwater systems created as the result of any new and re-development project shall be connected in a manner so as not to degrade the integrity of any existing stormwater system, whether natural or manmade, and shall have demonstrate this to the Public Works Director, in accordance with the Manual. Discharge points shall be confined to connections with an existing stormwater system. When stormwater discharges are to flow into collection systems not owned and maintained by Charleston County, the owners of these systems shall maintain the right to disapprove new connections to their system.

Sec. 3.9 Notification of Spills.

The owner, operator, or person responsible for any land disturbance activity shall notify the Public Works Director of any known or suspected release of materials or discharges that are currently resulting in or may result in any illegal discharges of pollutants to an existing stormwater system.

DIVISION 4DETECTION AND REMOVAL OF ILLICIT CONNECTIONS AND DISCHARGES AND IMPROPER DISPOSAL

Sec. 4.1 Illicit Connections, Illicit Discharges and Improper Disposal.

(a) It is unlawful for any owner, operator, or person to connect any pipe, open channel, or any other conveyance system that discharges anything, except stormwater or other approved discharges into Charleston County's stormwater system or facility, or waters of the State.

(b) It is unlawful for any owner, operator, or person to continue the operation of any illicit connection regardless of whether the connection was permissible when constructed. Improper connections in violation of this Ordinance must

be disconnected and redirected, if necessary, to the satisfaction of the Public Works Director in compliance with Federal, State, or local agencies or departments regulating the discharge.

(c) It is unlawful for any owner, operator, or person to throw, drain, or otherwise discharge to any existing stormwater system, the waters of the State or to cause, permit, or allow a discharge that is composed of anything except stormwater or other discharges authorized by the Public Works Director.

(d) The Public Works Director will develop procedures for detecting, tracking, and eliminating illicit discharges and improper disposals to the stormwater system.

(e) After a reasonable determination is made by the Public Works Director that the discharge is not a significant source of pollution, the Public Works Director may require controls for or exempt from the prohibition provisions in (a), (b), and (c) above the following:

(1) Unpolluted industrial cooling water, but only under the authorization and direction of the Public Works Director and if appropriate Industrial NPDES permit is in place.

(2) Water line flushing, diverted stream flows, rising ground waters, and uncontaminated pumped ground waters, and uncontaminated ground water infiltration.

(3) Discharges from potable water sources, foundation drains, air conditioning condensation, landscape irrigation, springs, water from crawl space pumps, footing drains, lawn watering, individual car washing, dechlorinated swimming pool discharges, flows from riparian habitats and wetlands, and street wash water.

(4) Discharges or flows from fire fighting.

(f) The Public Works Director may develop procedures for allowing other non-stormwater discharges.

Sec. 4.2 Detection of Illicit Connections and Improper Disposal.

(a) The Public Works Director will take appropriate steps to detect and eliminate illicit connections to the Charleston County stormwater system, including the adoption of a program to screen illicit discharges and identify their source or sources, perform inspections, and levy fines if not removed.

The Public Works Director will take appropriate steps to detect and eliminate improper discharges. These steps may include programs to screen for disposal, programs to provide for public education and public information, inspection, levying fines, and other

appropriate activities to facilitate the proper management and elimination of illicit discharges.

Sec 4.3 Waste Disposal Prohibitions.

This Ordinance prohibits non-authorized discharges, illicit dumping, or disposal of waste into any existing stormwater system or waters of the state.

Sec. 4.4 Discharges in Violation of NPDES General Permit for Storm Water Discharges Associated with Industrial Activity Permit.

Any owner, operator, or person subject to a violation of the NPDES General Permit for Storm Water Discharges Associated with Industrial Activity Permit (except construction activities) shall comply with all provisions of the permit. Proof of compliance with the permit will be required in a form acceptable to the Public Works Director prior to or as a condition of the issuance of approval of an application and/or a building permit.

DIVISION 5MONITORING AND INSPECTIONS

Sec. 5.1 Monitoring.

The Public Works Director may monitor the quantity and concentration of pollutants in stormwater discharges from the areas and/or locations designated in Charleston County's SWMP.

Sec. 5.2 Inspections.

(a) The Public Works Director subject to the provisions of Section 2.3 may enter upon and inspect all properties for regular inspections, periodic investigations, monitoring, observation measurement, enforcement, sampling and testing, to effectuate the provisions of this Ordinance and the SWMP programs.

(b) Upon refusal by any property owner, operator, or person to permit an inspector to enter upon the property or continue an inspection on the property, the inspector shall terminate the inspection or confine the inspection to portions of the property to which no objection is raised. The Public Works Director will document the refusal and proceed according to the provisions of Section 2.3.

(c) In the event that the Public Works Director reasonably believes that discharges from the property into an existing stormwater system may cause an imminent and substantial threat to the health, safety or welfare of the public or the environment, an inspection may take place.

(d) Inspection reports will be maintained in a permanent file located in the Public Works Department.

(e) At any time during an inspection or at such other times as the Public Works Director may request information from an owner, operator, or person, that owner, operator, or person may identify areas of his system or facility, any material, processes, or information that contain or might reveal a trade secret. If the Public Works Director has no reason to question such identification, all material, processes and information obtained within such areas shall be conspicuously labeled "CONFIDENTIAL – TRADE SECRET." The trade secret designation shall be freely granted to any material claimed to be such by the owner or representative unless there is clear and convincing evidence for denying such designation. In the event the Public Works Director does not agree with the trade secret designation, the material shall be temporarily designated a trade secret and the owner or representative may appeal the Public Works Director's decision in the manner in which all such appeals are handled in this Ordinance.

DIVISION 6ENFORCEMENT, PENALTIES AND ABATEMENT

Sec. 6.1 Enforcement.

(a) In the instance the Public Works Director discovers that work performed for new development and re-development fails to conform to the approved application, or that the work has not been performed, the Public Works Director may direct conformity by sending written Notice of Violation (NOV) to the property owner, operator, or person. Such notice of violation will be in accordance with the Manual. The actions of the Public Works Director may include:

(1) issuing a written order to comply, to suspend work, or to revoke the approval issued;
(2) withholding or revoking other permits related to the site
(3) withholding the release of permanent electric power to the site or certificate of occupancy; and/or
(4) seeking redress through legal action.

The NOV shall serve as notice to remove the violation(s). The NOV shall be provided to the owner, operator, or person responsible for the land disturbing activities stating the nature of the violation, the amount of time to correct deficiencies, the date on which an inspection will be made to ensure that corrective action has been performed, and the applicable penalty or fine if corrective action is not taken by the inspection date. After the issuance of the NOV, the Public Works Director may issue a uniform summons citation in accordance with the Manual.

(b) When the Public Works Director determines that an owner, operator, or person has failed to maintain a stormwater system or facility, the NOV shall be provided to the owner, operator, or person stating the nature of the violation, the amount of time in which to correct deficiencies, the date on which an

inspection will be made to ensure that corrective action has been performed, and the applicable penalty or fine if corrective action is not taken. It shall be sufficient notification to deliver the notice in accordance with the Manual.

(c) When the Public Works Director determines that an owner, operator, or person of any property is causing or partially causing flooding, erosion, or is in non-compliance with water quality standards or this Ordinance, the Public Works Director may require the owner, operator, or person to remedy the violation and restore the impacted property. A NOV will be issued in accordance with the Manual.

(d) This Ordinance may be enforced by any remedy at law or in equity available to the Director under any Federal and State laws and regulations. The penalties and remedies provided in this Ordinance are cumulative and not exclusive, and may be independently and separately pursued against the same Person for the activity constituting a violation.

Sec. 6.2 Penalties.

(a) Civil: Any person violating any provision of this Ordinance shall be subject to a civil penalty of up to one thousand dollars ($1,000) for each violation. Each separate day of a violation, constitutes a new and separate violation.

(b) Criminal: In addition to any applicable civil penalties, any owner, operator, or person who willfully, with wanton disregard, or intentionally violates any provision of this Ordinance shall be guilty of a misdemeanor and shall be punished within the jurisdictional limits of magistrate court. The Public Works Director may issue a uniform summons citation for a violation of this Ordinance. Fines imposed under the NOV may not exceed $500.00 per violation and/or thirty (30) days in jail. Each day a violation remains constitutes a separate violation.

Sec. 6.3 Additional Legal Measures.

(a) Where Charleston County is fined and/or subjected to a compliance schedule by the State or Federal government for a violation of its NPDES permit by any owner, operator, or person, the owner, operator, or person becomes liable to Charleston County for any and all penalties, expenses and costs of compliance associated therewith.

Sec. 6.4 Reserved.

Sec. 6.5 Corrective Action.

In the event a violation of this Ordinance has not been corrected within the applicable time period for correction, Charleston County may subject to the provisions

of Section 2.3 enter upon the real property and correct the violation. Any penalties, expenses and costs incurred as a result of such action, including but not limited to the inspection, administration, labor and equipment costs, shall be forfeited from any bond issued for the project.

Sec. 6.6 Stop Work Order.

The Public Works Director may issue a stop work order if any construction activity conducted in violation of this Ordinance. The stop work order shall require correction of the NOV. Any owner, operator, or person in violation of a stop work order is subject to payment of all fees, bonds, and penalties prior to the lifting of the stop work order.

Sec. 6.7 Approval Suspension and Revocation

An approved application_may be suspended or revoked if one or more of the following violations have been committed:

(a) violations of the conditions of the approved application,

(a) construction is not in accordance with the letter or intent of the approved plans,

(b) non-compliance with correction notice(s) or stop work order(s), or

(c) the existence of an immediate danger to a downstream area.

DIVISION 7 VARIANCES

Sec. 7.1 Design Criteria.

The Public Works Director may grant a variance from the requirements of this Ordinance if exceptional circumstances exist such that strict adherence to the provisions of the Ordinance will result in unnecessary hardship to the owner, operator, or person and will not fulfill the intent of the Ordinance.

A written request for a variance shall be required and shall be submitted in accordance with the Manual.

DIVISION 8APPEALS

Sec. 8.1 Appeals Process.

An applicant may appeal the decision of the Public Works Director to the Charleston County Construction Board of Adjustment and Appeals within thirty (30) days after the date of the Public Works Director's response. The Public Works Director shall provide the petition form to the utility customer.

(a) The petition must be accompanied with a $25.00 fee that will be used to partially defray the costs incurred in connection with the administration of petitions filed pursuant to this section.

(b) The Construction Board of Adjustment and Appeals shall hear the petition to determine if the annual stormwater management utility fee does not apportion the fee with approximate equality, based upon a reasonable basis of classification and with due regard to the benefits conferred by providing stormwater management services to the utility customer and the requirements of public health, safety or welfare. The determination of the annual fee by the Construction Board of Adjustment and Appeals is entitled to a presumption of correctness, and the petitioner has the burden of rebutting the presumption of correctness.

(c) The Construction Board of Adjustment and Appeals shall render a written decision on each petition that is heard, and such written decision shall be issued within twenty (20) calendar days from the day the Board heard the petition. The decision of the Construction Board of Adjustment and Appeals shall contain findings of fact and conclusions of law, and the decision shall be sent to the petitioner by first class mail.

(d) The decision of the Construction Board of Adjustment and Appeals shall be final unless the petitioner appeals the decision to the circuit court in Charleston County within thirty (30) days after the date of the decision of the Construction Board of Adjustment and Appeals. Prior to bringing an action to contest an annual fee, the petitioner shall pay to the treasurer not less than the amount of the annual fee which he admits in good faith is owing. Payment of the fee shall not be deemed an admission that the annual fee was due and shall not prejudice the petitioner in bringing an action as provided herein.

DIVISION 9CHARGES AND FEES

Sec. 9.1 Funding.

In addition to all other charges, fees, and penalties, Charleston County shall have the right to develop and impose a stormwater service fee to fund implementation of the Charleston County Stormwater Management Ordinance and its associated programs and plans.

Sec. 9.2 Connection to Conveyances.

The Public Works Director shall have the right to establish a schedule of appropriate fees for any owner, operator, or person establishing a new discharge to waters of the State within Charleston County. Such fees shall be payable as part of any application related to the discharge of stormwater runoff. Application fees shall

be established on the basis of facility classes relating to the quantity and quality of approved discharge. Establishment and revision of such fees shall be approved by the Charleston County Council.

Sec. 9.3 Plan review.

A fee associated with the plan review of land development construction documents may be assessed. Establishment and revision of such fees shall be approved by the Charleston County Council.

Sec. 9.4 Field inspection.

A fee associated with the field inspection and re-inspections of land development or construction activities may be assessed. Establishment and revision of such fees shall be approved by the Charleston County Council.

SWMP Appendix E
Field Screening Procedures

Standard Operating Procedures For Use In Field Investigations For Illicit Discharges

Charleston County Public Works
Stormwater Division

Table of Contents

1. INTRODUCTION

The State of South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SMS4), SCR030000, was issued with an effective date of January 1, 2014. This second cycle permit outlines tasks to be completed for compliance with the terms and conditions of the federal NPDES program and has a five-year term ending December 31, 2018. The Permit requires that Charleston County implement, manage, and oversee all provisions of its Storm Water Management Plan (SWMP) to control, to the maximum extent practical (MEP), the discharge of pollutants from its municipal storm sewer system associated with stormwater runoff and illicit discharges, including spills and illegal dumping.

This document presents Charleston County's plan for illicit discharge detection and elimination in compliance with NPDES SMS4 Permit. The NPDES SMS4 Permit requires that the County develop an Illicit Discharge Detection and Elimination (IDDE) program that contains a set of standard investigative procedures to identify the source of illicit connections or discharges and enforce their removal. Although the permit does not specifically dictate these procedures, the IDDE program must, to the MEP, increase knowledge of the County's stormwater management system and pollutants of concern. An understanding of the nature of illicit discharges in both urban and rural watersheds is essential to find, fix, and prevent them.

The remaining portions of this document provide the specific requirements from the NPDES Phase II permit and definitions. Section 2 provides a summary of the state of the County's IDDE program and the various procedures. The appendices provide supplemental and detailed information for sampling procedures, GIS applications, reporting forms, and technical references.

1.1 Permit Requirements

- In the SMS4 permit, SCDHEC requires that the Illicit Discharge Detection and Elimination (IDDE) Program include the following measures:
- Develop a system map
- Identify priority outfalls
- Field screening to detect illicit discharges
- Procedures for tracing the source of an illicit discharge
- Minimum investigation requirements
- Determining the source of the illicit discharge
- Corrective action to eliminate illicit discharges
- Public reporting mechanism, and
- Employee training

This document focuses on standard operating procedures for field investigations for illicit discharge identification, detection and elimination.

1.2 Important Terminology and Key Concepts

An *illicit discharge* is defined by the U.S. EPA as "… any discharge into a separate storm sewer system that is not composed entirely of stormwater, except for discharges allowed under a NPDES permit or waters used for firefighting operations." Typically, illicit discharges enter a storm sewer

system either through direct connections, e.g., sanitary sewer piping, or indirectly from cracked sanitary sewer conveyance systems, spills collected by storm drains, or from contaminants dumped directly into a storm sewer inlet. Pollutants from these sources can include heavy metals, toxics, oils and grease, solvents, nutrients, viruses, and harmful bacteria. Substantial levels of these contaminants can damage fish and wildlife habitats, decrease aesthetic value, prevent or eliminate recreational benefits, and more importantly threaten public health.

The field procedures for detecting illicit discharges include:

- Observations at stormwater outfalls for signs of possible contamination from illicit connections,
- Observing the physical characteristics of stormwater outfalls,
- Performing elementary chemical analysis, and
- Collecting samples for comprehensive laboratory analyses (if necessary).

The *dry weather screening program* is an initial screening process to locate outfalls with dry weather flows within the Charleston County SMS4 and determine if there is an indication that the flow is a potential illicit discharge. The procedures outlined in this guidance document are used to detect and eliminate illicit discharges. Contact information for the Charleston County Stormwater Division can be found on their website:

http://www.charlestoncounty.org/departments/public-works/stormwater.php

Minor and Major Illicit Discharges

For the purposes of reporting and enforcement, illicit discharges shall be classified as either minor or major.

Minor Illicit Discharge: A minor illicit discharge offense involves a discharge that is prohibited by the Charleston County Stormwater Management Ordinance but is unlikely to cause danger to public health and safety or violate water quality standards. In order to be considered a minor illicit discharge, the illicit must be addressed in a manner and time frame that is compliant with the Enforcement Response Plan (ERP) and any notifications made by Charleston County.

Examples: Provided they meet the above requirements, the following would be examples of minor illicit discharges. Minor illicit discharges may include, but are not limited to:

- Leaking septic systems
- Leaking sewer pipe*
- Prohibited drain pipe from residential lot
- High nutrient loading from residential fertilizer use
- Discharge from small-scale car washing activities
- Improper installation or use of erosion prevention and sediment control Best Management Practices (BMPs)
- Spills of known material that is not highly toxic and can be safely cleaned up

Indicators: Indicators of minor illicit discharges may be:

- Observed spills, dumping, or pipe discharge
- Minor odors
- Staining at outfalls

- Bacterial or algal growth
- Small amounts of discoloration, oil sheen, floatables, turbidity, or visible plumes

Major Illicit Discharge: A major illicit discharge offense involves one or more of the following:

- Certain or likely danger to public health and safety
- Certain or likely violation of water quality standards
- Repeated non-compliance with notifications and requests for action

Examples: Major illicit discharges may include, but are not limited to:

- Minor illicit discharges for which the responsible party does not comply with the ERP or notifications made by Charleston County
- Sewer overflow or system failure*
- Spills of petroleum or other hazardous materials
- Prohibited drain pipe from commercial or industrial facility
- Illegal dumping of waste or trash
- Failure of improper erosion prevention and sediment control BMPs
- Spills which cause hazardous or unknown and potentially hazardous material to enter Waters of the State

Indicators: Indicators of major illicit discharges may include:

- Observed spills, dumping, or pipe discharge
- Intense odors
- Ecosystem damage (excessive sedimentation, dying plants, fish kills)
- Significant discoloration, oil sheen, floatables, turbidity, or visible plumes

*Sewage from a leaking or failing sewer system could potentially be a minor or major illicit discharge. The designation will vary with amount of sewage spilled, duration of the spill, and the presence of a threat to human health or water quality standards.

Pollutants of Concern

Pathogenic or toxic, and nuisance pollutants should be prioritized in a manner that ensures prompt action in the source identification process as these types of pollutants have the most harmful effects to the environment. In areas containing no industrial or commercial sources, sanitary wastewater is probably the most severe dry-weather contaminating source of storm drain flows. **The pathogenic and toxic pollutants should be considered the most severe since contact or consumption of storm water contaminated by these pollutants could cause illness and significant water treatment problems for downstream users.** Refer to Table A.1 and A.2 in Appendix A for more information on identifying pathogenic, toxic and/ or nuisance pollutants.

Nuisance pollutants contribute to conditions that may threaten aquatic life in or downstream of the storm drainage system. These pollutants can cause excessive dissolved oxygen depletions, tastes, odors, and color in downstream water supplies, algal blooms, offensive floatables, and noticeably turbid water. These pollutants may originate in residential areas from:

- Sanitary wastewaters
- Laundry wastewaters
- Lawn irrigation runoff
- Automobile wash waters
- Construction site dewatering

- Washing of concrete ready-mix trucks
- Ready-mix trucks

Clean water: A number of tracer parameters may be useful for distinguishing treated potable water from natural waters. Water from potable water supplies (that test positive for fluorides, or other suitable tracers) can be relatively uncontaminated, e.g., potable waterline leakage or irrigation runoff, or heavily contaminated, e.g., sanitary wastewater. Field screening and testing may be necessary to determine if a flow is allowable or illicit. Refer to Section A.2 in Appendix A for more information on identifying clean water flows.

Allowable Discharges

Non-storm water discharges that are determined to be non-significant sources of pollutants to the SMS4, due to either the nature of the discharges or because there are conditions Charleston County has established for allowing these discharges to their SMS4 (e.g. a non-commercial or charity car wash with appropriate controls on frequency, proximity to sensitive water bodies, BMPs on the wash water, etc.), are allowed. Water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR §35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, street wash water, and discharges or flows from fire-fighting activities, are excluded from the effective prohibition against non-storm water discharges, provided that they are determined to be non-significant sources of pollutants to the SMS4.

SMS4

Charleston County's SMS4 includes all conveyances or system of conveyances (including roads with drainage systems, highways, right-of-way, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, storm drains, detention ponds, and other stormwater facilities) which inlets, transports, stores, or treats stormwater runoff and which is (a) owned or operated by Charleston County; (b) designed or used for collecting or conveying stormwater; (c) not a combined sewer system; and (d) not part of a Publicly Owned Treatment Works (POTW). The Charleston County SMS4 is further refined to be contained within the Urbanized Area of the County, as defined by the 2010 Census. This definition also applies to SMS4s with an Inter-Governmental Agreement to be part of Charleston County's Stormwater Program (IGA SMS4s), which as of the date of this manual include: City of Folly Beach, City of Isle of Palms, Town of James Island, Town of Lincolnville, and Town of Sullivan's Island.

Source Identification

These are the office and field tasks used to track potential illicit discharge to the source.

Discharge Frequency

The **frequency** of dry weather discharges in storm drains is important, and can be classified as c*ontinuous, intermittent or transitory.*

> **Continuous** discharges occur most or all of the time, are usually easier to detect, and typically produce the greatest pollutant load.

Intermittent discharges occur over a shorter period of time (e.g., a few hours per day or a few days per year). Because they are infrequent, intermittent discharges are hard to detect, but can still represent a serious water quality problem, depending on their flow type.

Transitory discharges occur rarely, usually in response to a singular event such as an industrial spill, ruptured tank, sewer break, transport accident, or illegal dumping episode. These discharges are extremely hard to detect without continuous monitoring, and can exert severe water quality problems on downstream receiving waters.

Discharge Flow Types

Dry weather discharges may be composed of one or more possible flow types:

Sewage and septage flows are produced from sewer pipes and septic systems.

Wash water flows are generated from a wide variety of activities and operations. Examples include discharges of gray water (laundry) from homes, commercial carwash wash water, fleet washing, commercial laundry wash water, and floor washing which may drain to shop drains.

Liquid wastes refer to a wide variety of flows, such as oil, paint, and process water (radiator flushing water, plating bath wastewater, etc.) that enter the storm drain system.

Potable water flows are derived from leaks and losses that occur during the distribution of drinking water in the water supply system. Tap water discharges in the storm drain system may be more prevalent in communities with high loss rates and/ or aging infrastructure.

Landscape irrigation flows occur when excess potable water used for residential or commercial irrigation ends up in the storm drain system.

Groundwater and spring water flows occur when the local water table rises above the bottom elevation of the storm drain (known as the invert) and enters the storm drain either through cracks and joints, or where open channels or pipes associated with the SMS4 may intercept seeps and springs.

Based on location and site characteristics, field crews will first need to determine if water in an outfall is legitimate flow, as opposed to stagnant or tidal water. The U.S. EPA and SCDHEC recommend testing for specific parameters to detect the major pollutants found in stormwater runoff from major land use categories. Each flow type has a distinct chemical fingerprint. The chemical fingerprint for each flow type can differ regionally, so it is a good idea to develop a "fingerprint" library by sampling each local flow type. Refer to Section 2.3.1 for the selection of indicator parameters and the standard operating procedures for testing.

Mode of Entry

Illicit discharges may be classified based on their mode of entry. The mode of entry can either be direct or indirect.

Direct entry means that the discharge is directly connected to the storm drain pipe through a sewage pipe, shop drain, or other kind of pipe. This occurs when two different kinds of plumbing are improperly connected. Direct entry usually produces discharges that are continuous or intermittent.

1. Sewage cross-connections: A sewer pipe that is improperly connected to the storm drain system produces a continuous discharge of raw sewage to the pipe. Sewage

cross-connections can occur in catchments where combined sewers or septic systems are converted to a separate sewer system, and a few pipes get "crossed."

2. Straight pipe: This term refers to relatively small diameter pipes that intentionally bypass the sanitary connection or septic drain fields, producing a direct discharge to the storm sewer system.

3. Industrial and commercial cross connections*:* These occur when a drain pipe is improperly connected to the storm drain system producing a discharge of wash water, process water or other inappropriate flows into the storm drain pipe. Older industrial areas tend to have a higher potential for illicit cross-connections.

Indirect entry means that flows generated outside the storm drain system enter through storm drain inlets or by infiltrating through the joints of the pipe. Generally, indirect modes of entry produce intermittent or transitory discharges, with the exception of groundwater seepage. The five main modes of indirect entry for discharges include:

1. Groundwater seepage into a storm drainage pipe*:* Seepage frequently occurs in storm drains after long periods of above average rainfall. Seepage discharges can be either continuous or intermittent, depending on the depth of the water table and the season. Groundwater seepage usually consists of relatively clean water that is not an illicit discharge by itself, but can mask other illicit discharges. If storm drains are located close to sanitary sewers, groundwater seepage may intermingle with diluted sewage.

2. Spills that enter the storm drain system at an inlet: These transitory discharges occur when a spill travels across an impervious surface and enters a storm drain inlet. Spills can occur at many industrial, commercial and transport-related sites. A common example is an oil or gas spill from an accident that travels across the road and into the storm sewer system.

3. Dumping a liquid into a storm drain inlet*:* This type of transitory discharge is created when liquid wastes such as oil, grease, paint, solvents, and various automotive fluids are purposely dumped into the storm drain. Liquid dumping occurs intermittently at sites that improperly dispose of rinse water and wash water during maintenance and cleanup operations. A common example is cleaning deep fryers in the parking lot of fast food operations.

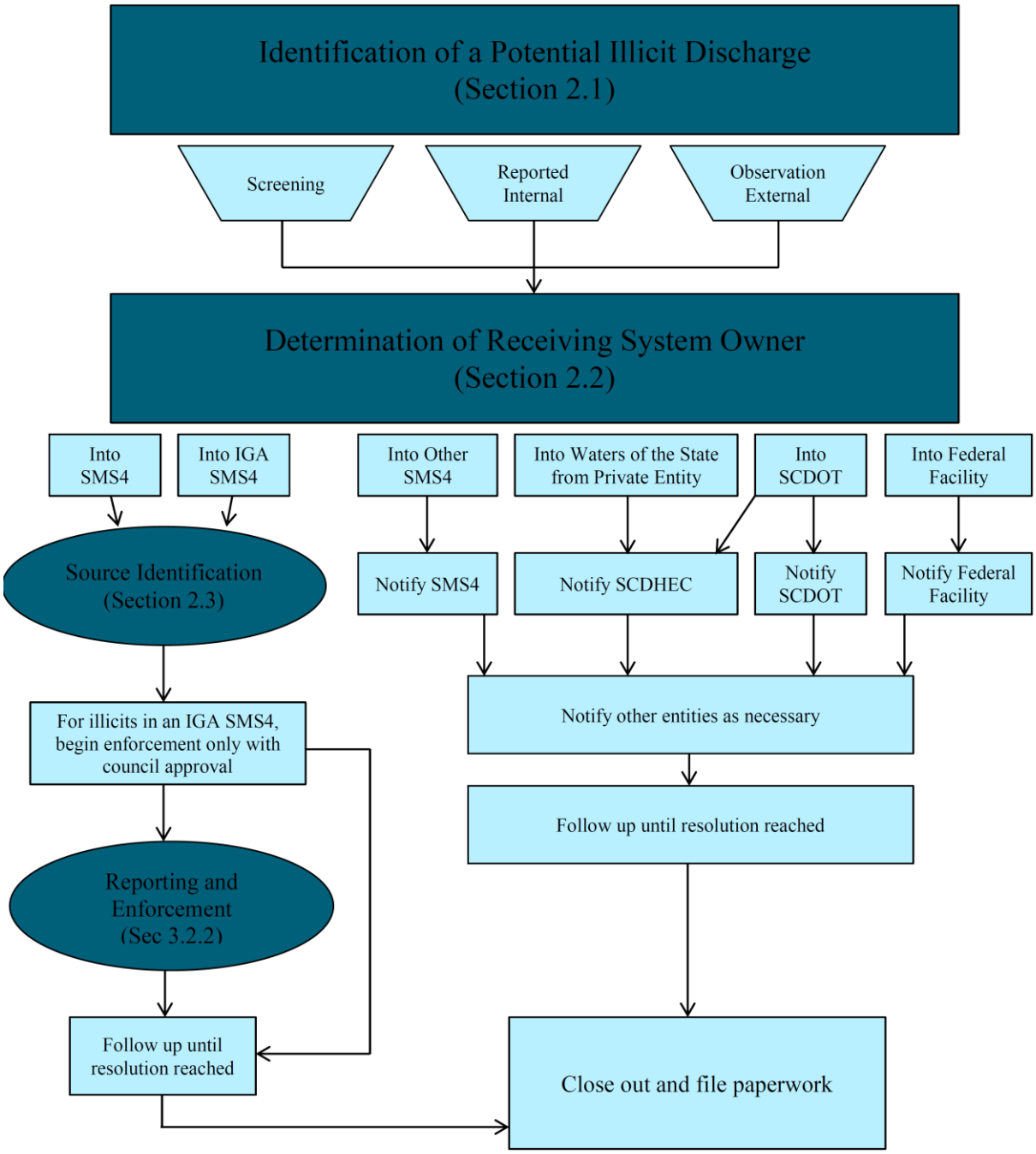
4. Outdoor washing activities that create flow to a storm drain inlet: Outdoor washing may or may not be an illicit discharge, depending on the nature of the generating site that produces the wash water. For example, hosing off individual sidewalks and driveways may not generate significant flows or pollutant loads. On the other hand, routine power washing of construction equipment, fueling areas, outdoor storage areas, and parking lots may result in unacceptable pollutant loads and should be considered illicit in nature.

5. Non-target irrigation from landscaping or lawns that reaches the storm drain system: Irrigation can produce intermittent discharges from over-watering or misdirected sprinklers that send water over impervious areas. In some instances, non-target irrigation can produce unacceptable loads of nutrients, organic matter or pesticides.

2. SUMMARY OF COUNTY IDDE PROCEDURES

This section provides a summary of the County's program. There are several major topics that will be discussed that provide a systematic approach to eliminating illicit discharges. These include notification to the Stormwater Division of a potential illicit discharge, determination and notification of the owner of the system receiving the discharge, source identification of the discharge, and enforcement. Figure 1 provides a flowchart summarizing the County's IDDE Procedures.

Figure 1: Flowchart of Charleston County IDDE Procedures



2.1 Documenting and Reporting of Potential Illicit Discharges

The reporting process begins through the identification of a potential illicit. Identification is expected to be achieved by outfall screening by Stormwater Division personnel, internal reporting from other County personnel, external reporting/citizen complaints, or other watershed planning efforts by the field investigations of prioritized watersheds and land uses. The County has created an Enforcement Response Plan containing standard procedures for responding to illicit discharges. This document can be found in Appendix E. The County has also outlined particular response times for certain aspects of their IDDE program.

2.1.1 Outfall Screening

The Stormwater Management Program expects to find some potential illicit discharges through system inventory efforts for the County's SMS4, as well as that of the IGA SMS4s (City of Folly Beach, City of Isle of Palms, Town of James Island, Town of Lincolnville, and Town of Sullivan's Island). They also expect to find potential illicit discharges through reports from various County Departments whose employees regularly work in the field (e.g. Law Enforcement, Public Works, etc.).

2.1.2 Internal Reporting

The County will document illicit discharges as soon as practicable, but within three (3) business days from discovery. County stormwater division staff will store documentation of the illicit discharge, and any supporting information, both in hard copy form and electronically on the County's server.

2.1.3 Citizen Reporting/ External Observation

County citizens, visitors, and others are also expected to notify the Stormwater Division of some potential illicits. The County operates a website for disseminating information to its citizens. The website includes contact information for the stormwater department, as well as general stormwater information for the County. The website directs any complaints or reports of illicit discharges to the main stormwater department phone number, (843) 202-7639. Any complaints that are sent in writing, electronically by email (stormwater@charlestoncounty.org), or by phone are logged in as a work order by County staff on the Public Works Department Work Order Request Form, and sent to the appropriate staff member to be addressed. Complaints will be addressed as soon as possible, but no later than three (3) business days from the initial complaint. The County website also enables citizens to report a problem by email to any County department, including stormwater. This reporting information is located on the Charleston County webpage at:
http://www.charlestoncounty.org/departments/public-works/stormwater.php

2.1.4 Watershed-Based Planning

The County is currently exploring other potential ways to identify potential illicit discharges. These include watershed planning and prioritization tasks to systematically address potential illicits at perceived hotspots such as restaurants, dry cleaners, auto shops, and car washes. The County has prioritized their TMDL watersheds and identified areas within these locations that may have a higher likelihood of potential illicit connections. Refer to the Stormwater Management Plan for more information on the watershed priority areas in the Charleston County SMS4.

2.2 Determination of Receiving System Owner

Once a potential illicit identified, the Charleston County Stormwater Management Program will follow standard procedures to determine the source of the discharge.

Tracing the Source of Illicit Discharges

The County will follow standard operating procedures for identifying and tracking any instances of illicit discharges in their SMS4. Once identified, the County will begin tracing the source of the illicit as soon as practicable, but no later than three (3) business days.

Identifying the Source of the Illicit Discharge

Once the source of the illicit discharge has been discovered, the County will notify the discharger as soon as practicable, but no later than three (3) business days. See the Enforcement Response Plan (ERP) in Appendix E for more information.

Notifying Other MS4s

If the County discovers an illicit discharge or connection that originates in a traditional permittee's MS4, they will notify the operator as soon as practicable, but no later than three (3) business days. Enforcement procedures will be implemented if necessary, to include follow-up field visits.

Notifying Non-traditional Parties

If illicit connections or discharges are discovered in other areas, the County will notify the other operator as soon as practicable, but no later than three (3) business days. If the illicit source is a MS4 or a federal facility, that owner will be notified through a certified letter. The County will implement follow-up procedures for the potential illicits. See the ERP in Appendix E for more information.

If the receiving system is a Water of the State, SCDHEC/OCRM will be notified through a letter. See Section 2.2.1 below for more detail.

Given the topography of Charleston County and the interconnectivity of the various drainage systems, the County expects some illicits to flow through multiple systems and therefore affect multiple owners. By first establishing the receiving system owner, the enforcement process can then begin, either by the County, SCDHEC, or other MS4s. If a discharge is tracked by one of these parties, it is possible that the responsibility for the discharge may fall back to Charleston County or another permittee. In some cases, this may cause a roundabout approach to identifying illicit discharges, but is the most systematic way to identify discharge sources and foster communication among the various MS4s.

2.2.1 Notification to MS4s, SCDHEC, and Federal Facilities

If the receiving system owner of the potential illicit discharge is neither the Charleston County SMS4 nor one of its IGA SMS4s, then the Stormwater Division will notify the determined owner through a certified letter. The list below provides contact information for the potential entities. If the potential illicit discharge is considered hazardous to public health or the environment, SCDHEC-EQC should be contacted. Table 1 includes contact information for various NPDES permittees within the vicinity of Charleston County, and also water and sewer authority contact information.

Contact Information

Table 1: Contact Information

SMS4s with Inter-Governmental Agreement (IGA SMS4s)	
City of Isle of Palms	**City of Folly Beach**
City Hall Post Office Box 508 (City Hall is located at 1207 Palm Blvd.) Isle of Palms, SC 29451 (843) 886-6428 (Main Office) (843) 886-8956 (Public Works Dept) (843) 886-8005 (Fax) Office Hours: Monday-Friday, 8:00 a.m.-5:00 p.m. www.iop.net	City Hall Post Office Box 48 (City Hall is located at 21 Center Street) Folly Beach, SC 29439 (843) 588-2447 (Main Office) Extension 8 (Public Works Dept) (843) 588-7016 (Fax) Office Hours: Monday-Friday, 9:00 a.m.-5:00 p.m. Public Works Dept: 7:00 a.m.-3:00 p.m. www.cityoffollybeach.com
Town of Lincolnville	**Town of James Island**
Town Hall Post Office Box 536 (Town Hall is located at 141 W. Broad Street) Lincolnville, SC 29485 (843) 873-3261 (843) 873-3267 (Fax) Office Hours: Monday-Friday, 9:00 a.m.-3:30 p.m. www.lincolnvillesc.com	Town Hall Post Office Box 12240 James Island, SC 29422 Physical Address: 1238-B Camp Road James Island, SC 29412 (843) 795-4141 (843) 795-4878 (Fax) www.jamesislandsc.us
Town of Sullivan's Island	
Town Hall Post Office Box 427 (Town Hall is located at 2050-B Middle Street) Sullivan's Island, SC 29482	(843) 883-3198 (Town Hall) (843) 883-3947 (Water and Wastewater Dept.) (843) 883-3009 (Fax) www.sullivansisland-sc.com/
Other Local SMS4s and MS4s	
City of Charleston	**Town of Summerville**
Stormwater Department 2150 Milford Street Charleston, SC 29405 (843) 724-7367 (843) 965-4128 (Fax) www.charleston-sc.gov	Engineering and Public Works Department 200 S. Main Street Summerville, SC 29483 (843) 851-4225 (843) 832-8182 (Fax) www.summerville.sc.us
City of North Charleston	**Georgetown County**
Public Works Department 1021 Aragon Avenue North Charleston, SC 29406 (843) 745-1026 After Hours Emergency (843) 554-5700 www.northcharleston.org	Stormwater Department 129 Screven Street Georgetown, SC 29440 (843) 545-3524 (843) 545-3005 (Fax) www.georgetowncountysc.org
Town of Mount Pleasant	**SCDOT (large MS4)**
Public Service Department 100 Ann Edwards Lane Mt Pleasant, SC 29464 (843) 849-2022 (843) 849-2760 (Fax) www.tompsc.com	Main Office 955 Park Street P.O. Box 191 Columbia, SC 29201 (803) 737-2314 www.scdot.org

Dorchester County	Berkeley County
Public Works 2120 East Main Street Dorchester, SC 29437 (843) 832-0070 (843) 832-0090 (Stormwater Dept) www.dorchestercounty.net	Stormwater Management 1003 Highway 52 Moncks Corner, SC 29461 (843) 723-3800 ext 4127 (843) 719-4695 (Fax) www.berkeleycountysc.gov
Federal Facilities	
Air Force Base	Naval Weapons Station
Local Water and Sewer Authorities	
Charleston Water System (CWS)	**Isle of Palms Water and Sewer Commission**
103 St. Philip Street Charleston, SC 29403 or 6296 Rivers Avenue North Charleston, SC 29418 (843) 727-6800 www.charlestonwater.com	Post Office Box 528 (Office is located at 1300 Palm Blvd.) Isle of Palms, SC 29451 (843) 886-6148 www.iopwsc.com
St. Johns Water Company, Inc.	**Mount Pleasant Waterworks**
3362 Maybank Highway Johns Island, SC 2945 (843) 559-0186 sjwc@bellsouth.net	1619 Rifle Range Road Mt. Pleasant, SC 29464 (843) 884-9626 www.mountpleasantwaterworks.com
Sullivan's Island Water and Sewer Department	**North Charleston Sewer District**
2051 Gull Dr. Sullivan's Island, SC 29482 (843) 883-3947 (843) 883-3662 (Fax) www.sullivansisland-sc.com	Post Office Box 63009 (Office is located at 7225 Stall Rd.) North Charleston, SC 29419 (843) 764-3072 www.ncsd-sc.com
Town of Ravenel	**Town of Hollywood**
5962 Highway 165 Suite 100 Ravenel, SC 29470 (843) 889-8732 www.townofravenel.com	Post Office Box 519 (Town Hall is located at 6322 Highway 162) Hollywood, SC 29449 (843) 889-3222 www.townofhollywood.org
Kiawah Island Utility	**Town of Meggett**
31 Sora Rail Rd. Kiawah Island, SC 29455 (843) 768-0641 www.kiawahislandutility.com	4776 Highway 165 Meggett, SC 29449 (843) 889-3622 www.townofmeggettsc.org

Discharges to Waters of the State

SCDHEC-EQC should be notified of any discharges to waters of the state. Their contact information is below:

SCDHEC-EQC
2600 Bull Street
Columbia, SC 29201
(803) 896-8986

Follow-up Procedures

The Stormwater Division will follow-up on notifications sent to other entities each month. Follow-up procedures will include a periodic check of the illicit discharge database, phone calls to the appropriate entity to check for resolution, and if necessary, re-visiting a location to clarify ownership and/or source.

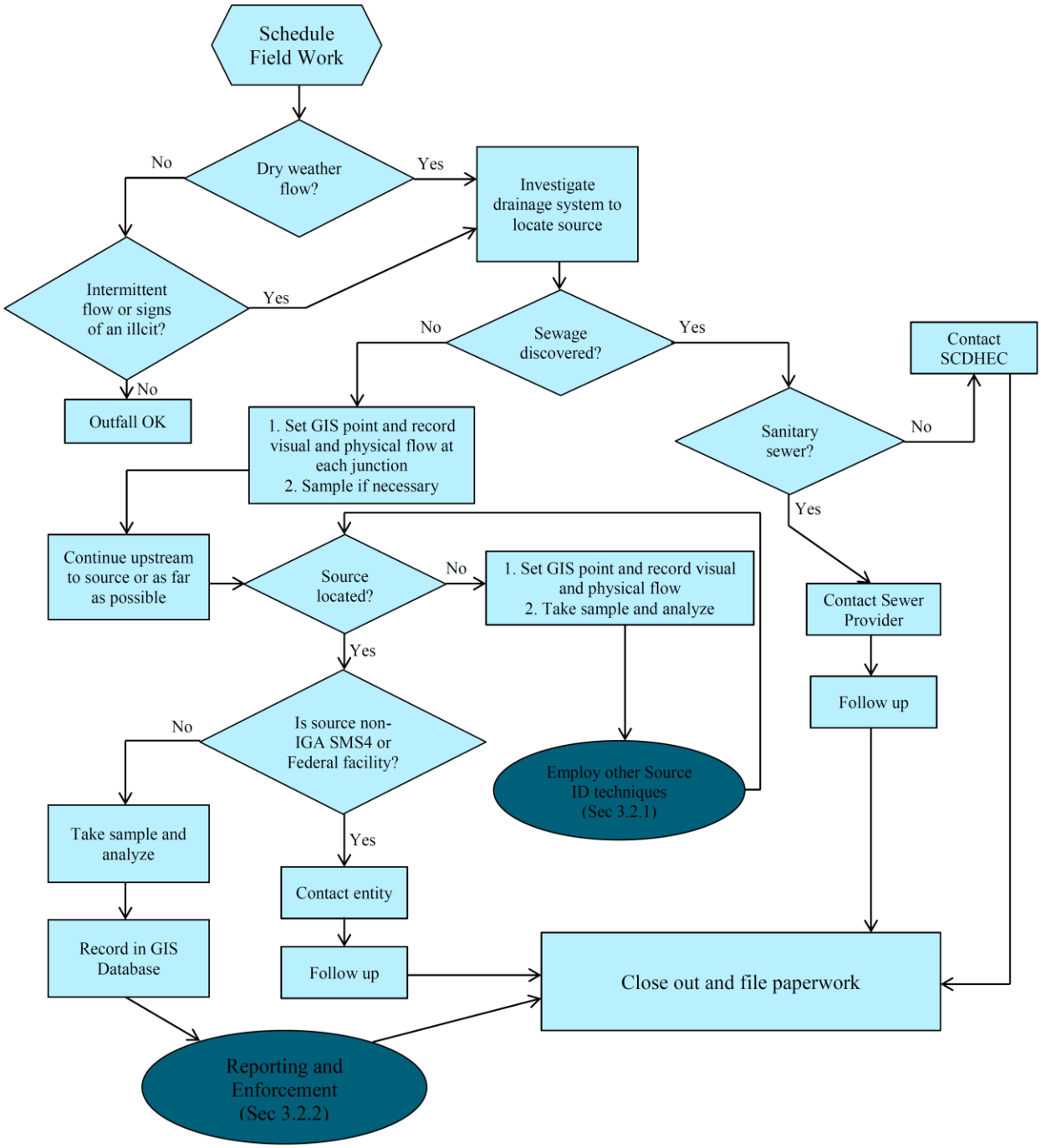
2.3 Illicit Source Identification

Illicit discharge source identification consists of three primary components:

1. Dry weather flow field screening,
2. Illicit tracking to identify the source, and
3. Source identification and elimination through enforcement or notification. (These steps apply only to the instances in which the potential illicit discharge is flowing into Charleston County SMS4 or an IGA SMS4).

Figure 2 on the following page provides a flowchart summarizing the County's Source Identification Procedures.

Figure 2: Flowchart for Charleston County Source Identification Procedures



2.3.1 Selection of Indicator Parameters

Flow Parameters

Based on location and site characteristics, crews will first need to determine if water in an outfall is legitimate flow, as opposed to stagnant, non-flowing or tidal water that hasn't drained from the storm sewer system.

Chemical Parameters

The U.S. EPA and South Carolina Department of Health and Environmental Control (SCDHEC) recommend testing for the following parameters to detect the major pollutants found in stormwater runoff from major land use categories:

- pH
- Temperature
- Copper
- Phenols
- Surfactants
- Chlorine

It is also recommended to test for the pollutant of concern (POC) for outfalls discharging to impaired waters or within a TMDL watershed.

pH

The normal pH of ground water typically ranges from 6.0 to 9.0. Values outside of this range may be an indicator of an illicit discharge. pH alone is not a sufficient indicator of an illicit discharge and is only considered in relation to other parameters that are out of range for a particular sample. Water with pH values less than 6.0 is acidic and may indicate discharges from textile mills, pharmaceutical manufacturers, metal fabricators, and companies that produce resins, fertilizers, or pesticides. Wastes containing sulfuric, hydrochloric, or nitric acids are a common source of contamination. Water with pH values greater than 9.0 is alkaline and may indicate discharges from industries such as textile mills, metal plating facilities, steel mills, ready mix concrete plants (including concrete truck wash out areas), and producers of rubber and plastic. Wash water used to clean floors and industrial machinery may also produce alkaline wastewater.

Water Temperature

Water temperature can vary widely and this parameter is best considered in relation to other characteristics. Any extreme temperatures (hot or cold) may indicate the presence of an illicit discharge. Extremely warm temperatures can be indicative of industrial or sanitary sewer discharges.

Copper

Elevated levels of copper may indicate discharges from cooling, boiler, or industrial re-circulation systems. Copper sulfate is typically used as an algaecide in all of these systems. Copper can also be an indicator of discharges from an automobile manufacturing or maintenance facility. The normal/allowable range for copper is 0.0 – 0.5 mg/L.

Phenols

Elevated levels of phenols may indicate industrial wastewater discharges such as those from plastics production, pharmaceuticals, and also herbicides. Consider phenols in relation to other parameters in determining the potential source. The normal/allowable range for phenols is 0.000 – 0.399 mg/L.

Surfactants/Detergents

Typically, the presence of surfactants and detergents indicate a connection to either an automobile wash facility or a laundry facility. High surfactants/detergents combined with elevated temperatures are a good indicator of commercial or institutional laundry facilities. Lower levels of surfactants/detergents may indicate a connection to a residential laundry, industrial facility, or possibly an illicit sewer connection or failing/improperly functioning septic system. A normal range is 0.0 – 0.5 mg/L. Regardless of the results, however, there should be no persistent visible foam at the discharge.

Chlorine

The absence of chlorine may indicate a natural water source. However, due to chlorine's ability to quickly dissipate with exposure to ultra violet light (UV), use caution when making judgments based on its absence. Generally, only potable water sources contain chlorine. Therefore, the presence of chlorine indicates that the source is not a natural water source. Very high levels (above 5.0 mg/l) of chlorine typically indicate connection to a swimming pool or other potable water source. A normal range for surface water is 0.0 – 0.5 mg/L.

2.3.2 Physical Parameters

The detection of a variety of other parameters during the physical inspection can be useful indicators of outfall problems. The types of illicit discharges that can be identified through visual identification and physical data include:

- Sanitary sewer overflows/leaks;
- Broken manholes;
- Septic tank leaks;
- Gray water discharges from residences;
- Erosion and sediment control problems;
- Public dumping of trash; and
- Unnatural volume, temperature, color or odor issues involving drainage flows.

The following is a description of these physical parameters:

Odor

The odor of stormwater discharges will vary widely. Odor can be a good indicator of the type of pollutant in the water. For instance, stormwater discharges may smell like sewage, oil, gasoline, or

may contain a chemical smell. Decomposition of organic materials can also cause a distinctive sulfur odor. Odors may vary greatly with changes in temperature and time of year.

Color

Color can be an important factor in determining the source of an illicit discharge. The particular color should be noted and tracked upstream as far as possible. Sewage will typically have a gray or brown color, whereas industrial wastes may have a variety of colors.

Turbidity

Turbidity is a measure of the amount of suspended matter in the water and affects the clarity of the discharge, as opposed to the color. Discharges from industrial facilities are often highly turbid. Although erosion can also create highly turbid water, this should not be the case during dry weather flows. Each inspection should note the relative degree of turbidity.

Oil Sheen

An oily sheen on water near a storm water outfall can be an indicator of illicit discharges from petroleum refineries, storage facilities, vehicle service facilities including vehicle wash facilities, and/or dumping of used oil products into the SMS4.

Floatables

Floatables are solids and liquids that float on the surface of the water. Floatables may include substances such as animal fats, food products, trash, oils, plant materials, solvents, foams, hydrocarbons, or gasoline. Floatables can often lead directly to the manufacturing process or other source of the illicit discharge. A full description of the type and quantity of the floatables and a photograph of the discharge should be included in the current reporting form.

Residue

Residue left on the conveyance system can be an indicator of an illicit discharge. Discoloration of the pipe or channel should be tracked upstream. It is also important to note the location of the discoloration or stain within the conveyance system. For example, is it just a line of residue half way up the pipe or is the pipe completely stained for some depth? Harmful and excessive growths of algae are generally caused by excessive nutrients.

Sediment/ Debris

Excessive sediment and debris near a stormwater outfall can be indicative of construction site runoff problems.

Vegetation

Vegetation growing in the immediate discharge area should be noted in relation to vegetation growing in the general vicinity of the outlet. Certain discharges can cause substantial changes in plant growth. Discharges containing a high nutrient content may cause increased growth while discharges with severe changes in pH may cause a decrease in growth. Although vegetation patterns may serve as an indicator of non-stormwater discharges, they are also difficult to interpret. Time of year, rainfall patterns, and exposures to sun all, affect plant growth and may be contributing factors to the changes in vegetation patterns. Caution should be used when considering vegetation as an indicator of an illicit discharge.

Structural Damage

Like residue, structural damage to the conveyance system can also be an indicator of an illicit discharge. Structural damage is typically more noticeable in concrete pipes. Acidic discharges may cause cracking, spalling, or deterioration of the concrete. The location of the damage within the pipe and the distance upstream will be important in determining the type of pollutant and the source of the discharge.

Table A.1 in Appendix A describes these physical observation parameters and the potential associated illicit flow sources.

3. DRY WEATHER FIELD SCREENING AND ILLICIT TRACKING

The Standard Operating Procedure (SOP) in Section 3.1 and 3.2 outlines the procedures for Dry Weather Screening and Illicit Discharge Tracking. The IDDE program is composed of investigative procedures to be conducted once a potential illicit discharge is identified under the dry weather screening program. Field crews should be familiar with the job hazards associated with dry weather screening, and should always use appropriate Personal Protective Equipment (PPE) when performing screening activities and collecting samples. Refer to Appendix B for job safety information **before** starting work.

3.1 Dry Weather Screening Standard Operating Procedures

Dry weather field screening is the examination of dry weather discharge from outfalls to attempt to determine if the discharge is allowable or if it is a potential illicit discharge. Dry weather field screening includes the documentation of the physical parameters of a discharge and may include chemical analysis as well. Dry weather field screening may consist of, but is not limited to:

- Visual observations
- Field screening activities
- Analytical monitoring at selected points to the extent necessary to identify and eliminate, to the MEP, an illicit discharge

Dry weather field screening can either be done in conjunction with outfall inventory, or separate from an outfall inventory if the locations of discharge points are already available. Conduct dry weather screening at least 72 hours after a storm event greater than 0.1 inch. Dry weather flows must be screened two times with the second screening occurring at least 4 hours but no more than 24 hours after the first. Due to the potential for tidal influences, dry weather field screening is best performed during low tide.

The following standard operating procedures should be used to screen outfalls for dry weather flow:

1. Prepare for screening activities. Refer to Appendix B for a list of items that field crews should have before starting work.

2. Screen outfalls for dry weather flow (ensure that the antecedent dry period of 72 hours after a storm event of 0.1 inch has been satisfied). Determine if flow is stagnant, tidal or another source.

   If there is no flow present at the outfall, it is considered dry and no further immediate action is necessary.

   If there is dry weather flow, the outfall must be evaluated and categorized with on-site screening procedures.

   a. Collect information for physical characteristics on the Illicit Discharge Detection and Elimination Field Sheet (located in Appendix C) or an approved digital field data collection method. Record (at minimum) the following information for the physical characteristics:

      i. Inspection date and time

ii. Initials or name of inspector

iii. Picture or digital image of the site

iv. Site description

v. Outfall size

vi. Outfall condition

vii. Presence or absence of flow

viii. Discharge color

ix. Discharge odor

x. Presence and type of floatables

xi. Discharge turbidity (visual not measured)

xii. Deposits/stains

xiii. Vegetative condition

b. Measure pH and temperature at a flowing outfall using a handheld meter or test paper. Use the procedure in the device instruction manual to ensure accurate testing results. Ensure that equipment is calibrated before use (if necessary, refer to device instruction manual). **Measure pH and temperature within 15 minutes of sample collection.**

c. Use physical observations and pH and temperature test results to determine if the discharge is illicit in nature. If dry weather screening suggests a potential illicit discharge, then attempt to track the illicit upstream to its source (See Section 3.2). If additional testing is needed to identify the illicit, proceed with the following steps.

d. If necessary, collect samples for additional parameters in laboratory supplied containers. Additional parameters may include but are not limited to Copper, Phenols, Detergents/ Surfactants and E coli. Determine the best area of the discharge to collect screening samples. An ideal sample is one that is representative of the entire flow (e.g. in the middle of the discharge) and that can be collected without interference from objects or debris in the flow. Refer to Appendix B for information on proper sample collection techniques. Typically it will be more efficient to take samples from several different locations before testing or delivering samples to a contract laboratory, however specific parameters have different holding times that must be satisfied. See Code of Federal Regulations Title 40, Part 136 (40 CFR 136), Guidelines for Establishing Test Procedures for the Analysis of Pollutants, for sample collection, preservation and transportation requirements.

e. Place the sample bottle directly into the stream, taking care not to touch the inside of the lid or bottle. Fill the container with the sample to the designated sample fill line (if specified) or to the top. Cap container immediately.

    i. Using a permanent marker, fill out the label on the sample container with any required information.

ii. Be careful not to touch the inside of the bottle or lid during sample collection. Some parameters require that the bottle remain sterile beforehand and uncontaminated afterwards. Take care in re-capping. Adhere to Code of Federal Regulations Title 40, Part 136 (40 CFR 136), Guidelines for Establishing Test Procedures for the Analysis of Pollutants, for sample collection, preservation and transportation requirements.

iii. After any screening activities have ended, deliver the sample(s) to the lab within the given holding times (if applicable) and on ice (if applicable). Fill out the chain of custody with sample information. Retain a copy of the chain of custody form for County records.

f. Return to the discharge between 4 and 24 hours later to obtain a second screening sample.

g. Repeat these dry weather screening procedures for all designated outfalls.

h. If an intermittent discharge is observed from the outfall, the SMS4 Permit requires that it be rechecked to observe the discharge while it is flowing. In the case of intermittent discharges, an outfall is considered dry when there have been non-flowing conditions on three separate visits. Since this is an ongoing program, it is recommended that suspected intermittent discharges be periodically rechecked.

3.2 Potential Illicit Discharge Tracking

Illicit Discharge Identification and Tracking Standard Operating Procedures

Illicit tracking procedures begin when dry weather screening results indicate a flow is a potential illicit or illegal discharge (through visual or chemical analysis). Illicit discharges may include but are not limited to sanitary wastewater and wash water discharges. The source can either be the actual pollution causing event (e.g. sanitary sewer overflow or leak, illegal connection of car wash drain to storm system) or a system owned by another entity (if tracking leads to another entity's system before the pollution causing event is encountered). If another entity is encountered, refer to Section 2.2.1 for notification procedures.

In most cases, the outfall is originally screened for dry weather flow (screened at least 72 hours after a storm event of 0.1 inch or greater). This identifies the potential illicit discharge and prompts illicit tracking activities. Using visual and physical observations, likely sources of the illicit discharge can be identified. Crosscheck these potential sources with known facility information to determine potential illicit discharges. Refer to the tables in Appendix A for additional information on identifying sources of illicit discharges. The following steps are a guide through illicit tracking.

1. **Is there flow in the outfall?** Identify if the water is stagnant, tidally influenced, or has a possible alternative source. Refer to tidal gauges and charts if water depth around the outfall appears to have fluctuated recently. At an outfall containing dry weather flow or at the initial point of discovery of the discharge, field crews will record physical data in a GIS Database from visual inspections. The GIS Database will guide the input of the needed information.

    a. If tidal water is suspected, crews should return to the site during low tide to determine if flow is still present. Handheld salinity or conductivity meters may also be used to determine if tidal water is present.

b. Does the discharge have a distinctive/unusual odor or color or quality?

c. Were any of the field analysis results extremely high or low (refer to Section 2.3)?

d. Is the discharge potentially toxic or harmful to human health or the environment? If so, these discharges should be reported to Charleston County immediately and SCDHEC must be notified of the discharge (SC DHEC Emergency Response 1-888-481-0125).

e. If the discharge appears to be a natural source (e.g. groundwater) and does not appear to have any negative affect on the receiving water, do not begin illicit tracking. Make a note to return to the outfall at a later time to check the discharge again.

f. A simple review of the outfall characteristics of a suspected illicit discharge outfall can present key indicators of contamination. Indicators of contamination (negative indicators) are often clearly apparent visual or physical parameters indicating obvious problems and are readily observable at the outfall during the field screening activities. This is the simplest method for identifying potential illicit dry-weather outfall flows.

g. If dry weather screening suggests an illicit discharge, then attempt to track the illicit upstream to its source. Move upstream in the direction of the discharge. Repeat step 1 at each intersection until the source is found, or the discharge can no longer be tracked.

2. Depending on the discharge, a source may or may not be obvious. Crews should use best judgment in tracking activities; common procedures may include:

    a. Driving around in the drainage area looking at businesses or industries that could be potential sources of the illicit. Crews should look for places where the discharge could enter the storm drain directly (e.g. a hose from an industrial building discharging directly into a storm drain).

    b. Walking upstream along the storm drainage line and opening manhole covers to follow the discharge. This can be helpful to pinpoint the discharge to a specific area or establishment.

3. At the source of the illicit discharge or last accessible area with dry weather flow, place a point in the GIS Database and record visual inspection information. Take the first grab sample, using a clean sample bottle. Procedures for collecting the sample are provided in Appendix B.

4. Perform analysis of the sample taken for water temperature and pH. Record all analysis results in GIS Database. Measure pH and temperature using a handheld meter or a thermometer and pH paper. Use the procedure in the device instruction manual to ensure accurate testing results. Ensure that equipment is calibrated before use (if necessary, refer to device instruction manual). **Measure pH and temperature within 15 minutes of sample collection.**

5. If visual observations and or pH/ temperature indicate that the discharge may be illicit in nature, the County may elect to collect samples for additional parameters in laboratory supplied containers. Additional parameters may include but are not limited to Copper, Phenols, Detergents/ Surfactants and E coli. Determine the best area of the discharge to collect screening samples. An ideal sample is one that is representative of the entire flow (e.g. in the middle of the discharge) and that can be collected without interference from objects or debris in the flow. Refer to Appendix B for information on proper sample collection techniques. Typically it will be more

efficient to take samples from several different locations before testing or delivering samples to a contract laboratory, however specific parameters have different holding times that must be satisfied. See Code of Federal Regulations Title 40, Part 136 (40 CFR 136), Guidelines for Establishing Test Procedures for the Analysis of Pollutants, for sample collection, preservation and transportation requirements.

6. After initial analysis has indicated the presence of an illicit discharge, further detailed analyses may be needed to identify and locate the specific source(s) (e.g., residential, commercial, and/or industrial) in the drainage area. Due to the extensive nature of most storm sewer systems, different lines will split off of the main drainage lines. To track illicit flows where there is a split in the line:

    a. Visually assess both flows; do they both have the same characteristics? Visual and olfactory characteristics are the easiest way to track illicits.

    b. Analyze grab samples at several manhole points along the storm drainage system to narrow the location of the contaminating source; this enables crews to delineate which side of the system is contributing to the discharge and eliminate areas that are not.

    c. Test for specific pollutants associated with the discharge at several points along the drainage system; this can clarify the upper area that might be contributing to the discharge. Once the discharge has been tracked as far upstream as possible, the discharge should be sampled and analyzed to determine the pollutant levels.

    d. Measure water flow rate and temperature. For example if crews were tracking an industrial discharge with an elevated temperature, collecting and analyzing grab samples along the drainage line would enable them to test temperature back up the drainage line until a source was identified.

    e. Pathogenic and toxic pollutants should be considered the most severe since contact or consumption of stormwater contaminated by these pollutants could cause illness and significant water treatment problems for downstream users. These discharges should be reported to Charleston County immediately, and SCDHEC must be notified of the discharge. If the source is raw sewage, tracking may lead to a determination of whether the source is a sanitary sewer system or a septic tank. If the source is a septic system, SCDHEC-EQC should be contacted. . If the source is a sanitary sewer system, the sewer authority should be notified immediately. Table 1 in Section 2.2.1 contains contact information for other MS4s and local sewer authorities. Contact information for local municipalities can also be found on the Charleston County website at:
    http://www.charlestoncounty.org/municipalities.php

7. Compare the results to the limits and note any exceedances of the limits the various parameters set in Section 2.3.
8. Return to the discharge between 4 and 24 hours later to obtain a second screening sample.
9. Repeat these dry weather screening procedures for all designated outfalls.

    a. If an intermittent discharge is observed from the outfall, the SMS4 Permit requires that it be rechecked to observe the discharge while it is flowing. In the case of

intermittent discharges, an outfall is considered dry when there have been non-flowing conditions on three (3) separate visits. Since this is an ongoing program, it is recommended that suspected intermittent discharges be periodically rechecked.

10. If both sample analysis resulted in an exceedance of the limits in Section 2.3 for the same parameters, then the flow is considered an illicit. Rerun the chemical analysis on this second sample. Record all analysis results in the GIS Database. If discharge is illicit in nature, begin enforcement procedures (see Appendix E).
11. If either sample analysis contained an exceedance of the set limits, but not for the same parameter, then a third sample and analysis needs to be performed. Repeat steps 3-8. Rerun the chemical analysis on this sample. Record all analysis results in the GIS Database.
12. If two exceedances of the set limits were observed in any of the three sample analyses for any one parameter, then the flow is considered an illicit. Record all analysis results in the GIS Database and begin enforcement procedures (see Appendix E).

3.2.1 Additional Illicit Tracking Efforts Dry Weather Screening

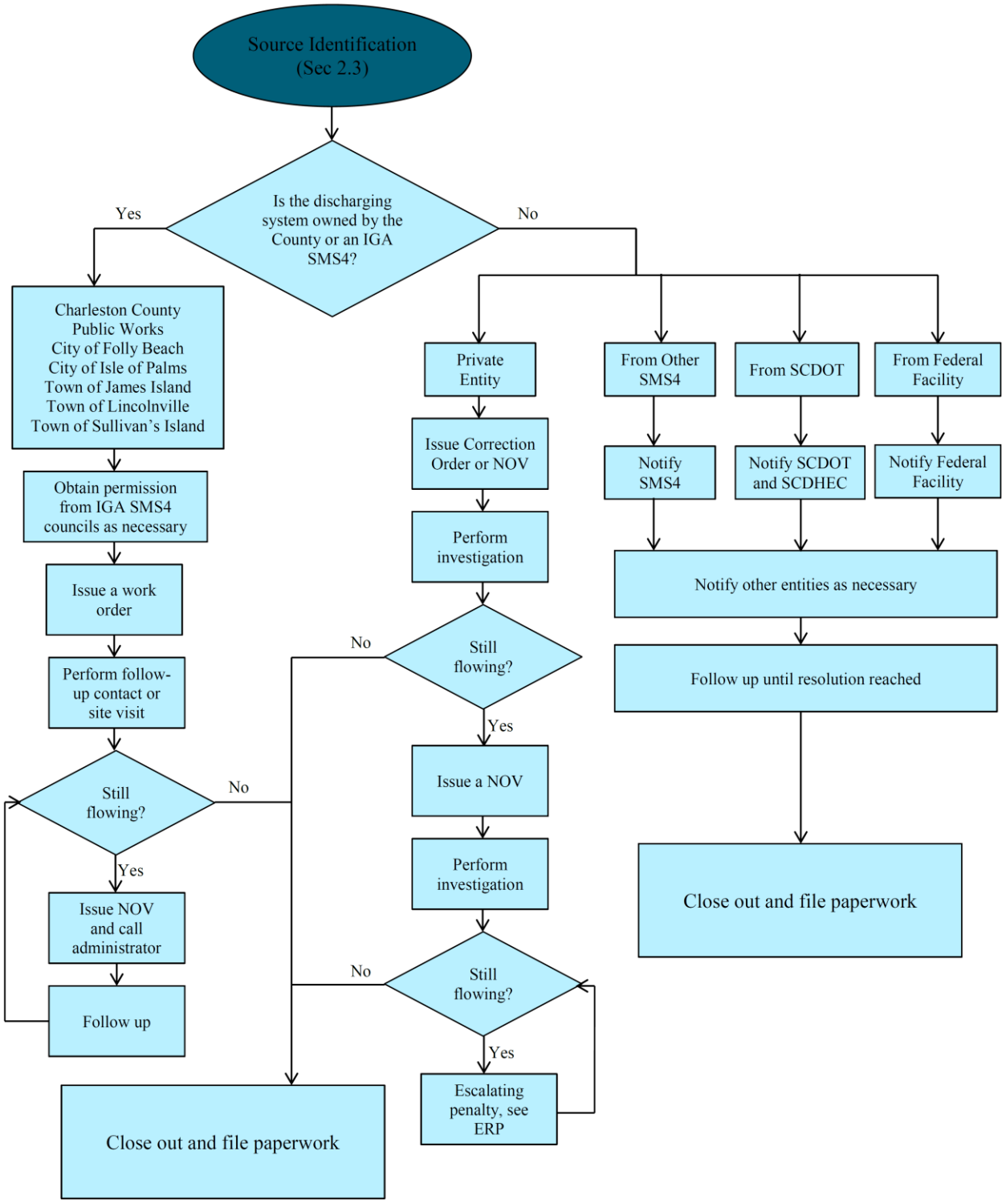
If a discharge has been identified as an illicit, additional tracking options should be considered. These include the use of a pole camera, a crawler camera, tracer dyes, or smoke tests. A pole camera is a camera on an extendable pole and a crawler camera is a camera attached to a rugged remote controlled vehicle designed to operate in pipe systems. Pole or crawler cameras are used to see parts of the system that would otherwise be difficult or impossible to see. Tracer dyes or smoke tests are used to evaluate system connectivity, as dye or smoke can be observed where it exits the system.

3.2.2 Reporting and Enforcement

Charleston County will utilize the ERP (see Appendix E) upon identification of the source of the illicit discharge or illegal dumping. Figure 3 on the following page provides an additional flowchart summarizing Reporting and Enforcement Procedures.

The responsible party will be notified to cease the improper practices and appropriate regulatory agencies will be notified of the discharge (this may vary depending on the type of discharge and its location). SCDHEC will be notified of enforcement actions taken. The County may order compliance by written notice of violation to the responsible entity. If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by Charleston County or by its designated contractor(s). All costs incurred including time, materials, and labor shall be charged to the violator. If the property owner or Lessee, as the case may be, fails to reimburse the County, the County is authorized to file a lien for said costs against the property or the Lessee's leasehold interest, as the case may be, and to enforce the lien by judicial foreclosure proceedings. Refer to sections 2.2 above for SMS4 notification deadlines. Template notification letters are provided in Appendix C.

Figure 3: Flowchart of Charleston County Reporting and Enforcement Procedures



Charleston County SMS4 Source

The following steps outline the procedures to be conducted if the source is from a County/public facility.

1. Determine owner(s) contact information and generate corrective action letter discussing County illicit requirements.
2. Generate a report of sample analysis data (see Appendix C).
3. Submit letter and report to appropriate entity.
4. Copy letter and report to SCDHEC- EQC.
5. Schedule a follow-up visit to the site to determine if illicit discharge has been removed in the time frame required by the County.
6. If flow is still present, issue a NOV (see Appendix C) and schedule another follow-up visit.
7. If flow is still present after third visit, the case may warrant a citation and a hearing in Magistrate Court.
8. Once flow has been removed, file paperwork and close case.

SMS4 with Charleston County IGA (IGA SMS4) Source

If enforcement procedures need to be conducted for an illicit discharge located in an IGA SMS4, then approval from Town and City Councils, as appropriate, is needed prior to commencement. Initial contact information for these entities is provided in Section 2.2. If permission is granted, perform steps in Appendix E.

Private Property Source

If the illicit originates from a private owner or operation within Charleston County, follow these steps.

1. Determine owner name(s) and address(s) and generate corrective action letter discussing County illicit requirements.
2. Generate a report of sample analysis data (see Appendix C).
3. Submit report to owner(s).
4. Schedule a follow-up visit to the site to determine if illicit discharge has been removed in the time frame required by the County.
5. If flow is still present, issue a NOV (see Appendix C) and schedule another follow-up visit.
6. If flow is still present after third visit, the case may warrant a citation and a hearing in Magistrate Court.
7. Once flow has been removed, file paperwork and close case.

Other SMS4s or Federal Facilities Source

Enforcement procedures for illicit discharges determined to come from other entities will essentially be notification and follow-up steps. These are listed below.

1. Determine owner name(s) and address(s) and generate corrective action letter discussing County illicit requirements
2. Generate a report of sample analysis data (see Appendix C)
3. Submit report to entity. See Section 2.2.1 for contact information
4. Schedule a follow-up phone call and/or site visit to determine if illicit discharge has been removed
5. Continue Step 4 until illicit resolved
6. Once flow has been removed, file paperwork and close case

Appendix A

Selection of Trace Parameters

A.1 Further Descriptions of Physical Parameters

Tables A.1 and A.2 on the following pages provide additional information on physical traits of potential illicit discharges. Table A.1 provides information on the physical characteristics that should be recorded and how to interpret those observed characteristics. Table A.2 provides information on physical properties of non-stormwater discharges from specific industrial sources.

Table A.1: Interpretations of Physical Observation Parameters and Likely Associated Flow Sources

Physical Observation Parameter	Description
Odor – Most strong odors, especially gasoline, oils, and solvents, are likely associated with high responses to the toxicity screening test. Typical obvious odors include: gasoline, oil, sanitary wastewater, industrial chemicals, decomposing organic wastes, etc.	
Sewage:	Smell associated with stale sanitary wastewater, especially in pools near outfall.
Sulfide (*rotten eggs*):	Industries (e.g. meat packers, canneries, dairies, etc.; and stale sanitary wastewater.
Oil and gas:	Petroleum refineries or facilities associated with vehicle maintenance and operation or petroleum product storage.
Rancid-sour:	Food preparation facilities (e.g. restaurants, hotels, etc.)
Color – Important indicator of inappropriate industrial sources. Industrial dry-weather discharges may be of various colors, but dark colors, such as brown, gray, or black, are most common.	
Yellow:	Chemical, textile, and tanning plants.
Brown:	Meat packers, printing plants, metal works, stone and concrete works, fertilizer application, and petroleum refining facilities
Green:	Chemical plants, and textile facilities
Red:	Meat packers
Gray:	Dairies
Turbidity – Often affected by the degree of gross contamination. Dry-weather industrial flows with moderate turbidity can be cloudy, while highly turbid flows can be opaque. High turbidity is often a characteristic of undiluted dry-weather industrial discharges.	
Cloudy:	Sanitary wastewater, concrete or stone operations, fertilizer facilities, and automotive dealers.
Opaque:	Food processors, lumber mills, metal operations, and pigment plants
Deposits and Stains – Refer to any type of coating near the outfall and are usually of a dark color. Deposits and stains often will contain fragments of floatable substances. These situations are illustrated by the grayish-black deposits that contain fragments of animal flesh and hair which often are produced by leather tanneries, or the white crystalline powder which commonly coats outfalls due to nitrogenous fertilizer wastes.	
Sediment:	Construction site erosion
Oily:	Petroleum refineries or storage facilities and vehicle service facilities
Vegetation – Vegetation surrounding an outfall may show the effects of industrial pollutants. Decaying organic materials coming from various food product wastes would cause an increase in plant life, while the discharge of chemical dyes and inorganic pigments from textile mills could noticeably decrease vegetation. It is important not to confuse the adverse scouring effects of high storm water flows on vegetation with highly toxic dry-weather intermittent flows.	
Excessive growth:	Food product facilities
Inhibited growth:	High storm water flows, beverage facilities, printing plants, metal product facilities, drug manufacturing, petroleum facilities, vehicle service facilities and automobile dealers.
Damage to Outfall Structures – Another readily visible indication of industrial contamination. Cracking, deterioration, and spalling of concrete or peeling of surface paint, occurring at an outfall are usually caused by severely contaminated discharges, usually of industrial origin. These contaminants are usually very acidic or basic in nature. Primary metal industries have a strong potential for causing outfall structural damage because their batch dumps are highly acidic. Poor construction, hydraulic scour, and old age may also adversely affect the condition of the outfall structure which are not indications of upstream contaminating entries.	
Concrete cracking:	Industrial flows
Concrete spalling:	Industrial flows
Peeling paint:	Industrial flows
Metal corrosion:	Industrial flows

Table A.2: Examples of Chemical and Physical Properties of Industrial Non-Stormwater Entries into the Storm Drainage System

Industrial Categories Major Classifications SIC Group Numbers		Odor	Color	Turbidity	Floatables	Debris and Stains	Damage to Outfall Structures	Vegetation	pH	Total Dissolved Solids
Primary Industries										
201	Meat Products	Spoiled Meats, Rotten Eggs and Flesh	Brown to Reddish Brown	High	Animal Fats, Byproducts, Pieces of Processed Meats	Brown to Black	High	Flourish	Normal	High
202	Dairy Products	Spoiled Milk Rancid Butter	Gray to White	High	Animal Fats, Spoiled Milk Products	Gray to Light Brown	High	Flourish	Acidic	High
203	Canned and Preserved Fruits and Vegetables	Decaying Products Compost Pile	Various	High	Vegetable Waxes, Seeds, Skins, Cores, Leaves	Brown	Low	Normal	Wide Range	High
204	Grain Mill Products	Slightly Sweet and Musty Grainy	Brown to Reddish Brown	High	Grain Hulls and Skins, Straw & Plant Fragments	Light Brown	Low	Normal	Normal	High
205	Bakery Products	Sweet and or Spoiled	Brown to Black	High	Cooking Oils, Lard, Flour, Sugar	Gray to Light Brown	Low	Normal	Normal	High
206	Sugar and Confectionery Products	N/A	N/A	Low	Low Potential	White Crystals	Low	Normal	Normal	High
207	Fats and Oils	Spoiled Meats, Lard or Grease	Brown to Black	High	Animal Fats, Lard	Gray to Light Brown	Low	Normal	Normal	High
208	Beverages	Flat Soda, Beer or Wine, Alcohol, Yeast	Various	Moderate	Grains and Hops, Broken Glass, Discarded Canning Items	Light Brown	High	Inhibited	Wide Range	High
21	Tobacco Manufacturers	Dried Tobacco, Cigars, Cigarettes	Brown to Black	Low	Tobacco Stems and Leaves, Papers and Fillers	Brown	Low	Normal	Normal	Low
22	Textile Mill Products	Wet Burlap, Bleach, Soap, Detergents	Various	High	Fibers, Oils, Grease	Gray to Black	Low	Inhibited	Basic	High
23	Apparel and Other Finished Products	NA	Various	Low	Some Fabric Particles	N/A	Low	Normal	Normal	Low

Industrial Categories Major Classifications SIC Group Numbers		Odor	Color	Turbidity	Floatables	Debris and Stains	Damage to Outfall Structures	Vegetation	pH	Total Dissolved Solids
Material Manufacturers										
24	Lumber and Wood Products	N/A	N/A	Low	Some Sawdust	Light Brown	Low	Normal	Normal	Low
25	Furniture and Fixtures	Various	Various	Low	Some Sawdust, Solvents	Light Brown	Low	Normal	Normal	Low
26	Paper and Allied Products	Bleach, Various Chemicals	Various	Moderate	Sawdust, Pulp Paper, Waxes, Oils	Light Brown	Low	Normal	Wide Range	Low
27	Printing, Publishing, and Allied Industries	Ink, Solvents	Brown to Black	Moderate	Paper Dust, Solvents	Gray to Light Brown	Low	Inhibited	Normal	High
31	Leather and Leather Products	Leather, Bleach, Rotten Eggs or Flesh	Various	High	Animal Flesh and Hair, Oils & Grease	Gray to Black, Salt Crystals	High	Highly Inhibited	Wide Range	High
33	Primary Metal Industries	Various	Brown to Black	Moderate	Ore, Coke, Limestone, Millscale, Oils	Gray to Black	High	Inhibited	Acidic	High
34	Fabricated Metal Products	Detergents, Rotten Eggs	Brown to Black	High	Dirt, Grease, Oils, Sand, Clay Dust	Gray to Black	Low	Inhibited	Wide Range	High
32	Stone, Clay, Glass, and Concrete Products	Wet Clay, Mud, Detergents	Brown to Reddish Brown	Moderate	Glass Particles, Dust from Clay or Stone	Gray to Light Brown	Low	Normal	Basic	Low

Industrial Categories Major Classifications SIC Group Numbers		Odor	Color	Turbidity	Floatables	Debris and Stains	Damage to Outfall Structures	Vegetation	pH	Total Dissolved Solids
Chemical Manufacturer										
2812	Alkalies and Chlorine	Strong Halogen or Chlorine, Pugnent Burning	Alkalies - N/A Chlorine - Yellow to Green	Moderate	Glass Particles, Dust from Clay or Stone	Gray to Light Brown	Highly Inhibited	Normal	Basic	Low
2816	Inorganic Pigments	N/A	Various	High	Low Potential	Various	Low	Highly Inhibited	Wide Range	High
282	Plastic Materials and Synthetics	Pugnent, Fishy	Various	High	Plastic Fragments, Pieces of Synthetic Products	Various	Low	Inhibited	Wide Range	High
283	Drugs	N/A	Various	High	Gelatin Byproducts for Capsulating Drugs	Various	Low	Highly Inhibited	Normal	High
284	Soap, Detergents, & Cleaning Preparations	Sweet or Flowery	Various	High	Oils, Grease	Gray to Black	Low	Inhibited	Basic	High
285	Paints, Varnishes, Lacquers, Enamels and Allied Products (SB-Solvent Base)	Latex-Ammonia, SB Dependent upon Solvent (Paint Thinner, Mineral Spirits)	Various	High	Latex - N/A, SB - All Solvents	Gray to Black	Low	Inhibited	Latex- Basic, SB-Normal	High
2861	Gum and Wood Chemicals	Pine Spirits	Brown to Black	High	Rosins and Pine Tars	Gray to Black	Low	Inhibited	Acidic	High
2865	Cyclic Crudes, & Cyclic Intermediates, Dyes, & Organic Pigments	Sweet Organic Smell	N/A	Low	Translucent Sheen	N/A	Low	Highly Inhibited	Normal	Low
2873	Nitrogenous Fertilizers	N/A	N/A	Low	N/A	White Crystalline Powder	High	Inhibited	Acidic	High

Industrial Categories Major Classifications SIC Group Numbers		Odor	Color	Turbidity	Floatables	Debris and Stains	Damage to Outfall Structures	Vegetation	pH	Total Dissolved Solids
Transportation and Construction										
15	Building Construction	Various	Brown to Black	High	Oils, Grease, Fuels	Gray to Black	Low	Normal	Normal	High
16	Heavy Construction	Various	Brown to Black	High	Oils, Grease, Fuels, Diluted Asphalt or Cement	Gray to Black	Low	Normal	Normal	High

Industrial Categories Major Classifications SIC Group Numbers		Odor	Color	Turbidity	Floatables	Debris and Stains	Damage to Outfall Structures	Vegetation	pH	Total Dissolved Solids
Chemical Manufacturer										
52	Building Materials, Hardware, Garden Supply, and Mobile Home Dealers	N/A	Brown to Black	Low	Some Seeds, Plant Parts, Dirt, Sawdust, or Oil	Light Brown	Low	Normal	Normal	Low
53	General Merchandise Stores	N/A	N/A	N/A	N/A	N/A	Low	Normal	Normal	Low
54	Food Stores	Spoiled Produce, Rancid, Sour	Various	Low	Fragments of Food, Decaying Produce	Light Brown	Low	Flourish	Normal	Low
65	Automotive Dealers & Gasoline Service Stations	Oil or Gasoline	Brown to Black	Moderate	Oil or Gasoline	Brown	Low	Inhibited	Normal	Low
56	Apparel & Accessory Stores	N/A	N/A	Low	N/A	N/A	Low	Normal	Normal	Low
57	Home Furniture, Furnishings, & Equipment Stores	N/A	N/A	Low	N/A	N/A	Low	Normal	Normal	Low
58	Eating and Drinking Places	Spoiled Foods, Oil & Grease	Brown to Black	Low	Spoiled or Leftover Food	Brown	Low	Normal	Normal	Low
Coal Steam Electric Power		N/A	Brown to Black	High	Coal Dust	Black Emorphous Powder	Low	Normal	Slightly Acidic	Low
Nuclear Steam Electric Power		N/A	Light Brown	Low	Oil, Lubricants	Light Brown	Low	Normal	Normal	Low

Source: Brown, Caraco, and Pitt. *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments.* USEPA. Washington, DC, 2004

A.2 Treated Potable Water

A number of tracer parameters may be useful for distinguishing treated potable water from natural waters:

- Major ions or other chemical/physical characteristics of the flow components can vary substantially depending upon whether the water supply sources are groundwater or surface water, and whether the sources are treated or not. Specific conductance may also serve as a rough indicator of the major water source.
- Fluoride can often be used to separate treated potable water from untreated water sources. Untreated water sources can include local springs, groundwater, regional surface flows or non-portable industrial waters. If the treated water has no fluoride added, or if the natural water has fluoride concentrations close to potable water fluoride concentrations, then fluoride may not be an appropriate indicator.
- Hardness can also be used as an indicator if the potable water source and the base flow are from different water sources. An example would be if the base flow is from hard groundwater, and the potable water is from softer surface supplies.
- If the concentration of chlorine is high, then a major leak of disinfected potable water is likely to be close to the outfall. Because of the rapid dissipation of chlorine in water (especially if some organic contamination is present) it is not a good parameter for quantifying the amount of treated potable water observed at the outfall.

Water from potable water supplies (that test positive for fluorides, or other suitable tracers) can be relatively uncontaminated, e.g., potable waterline leakage or irrigation runoff, or heavily contaminated, e.g., sanitary wastewater.

A.3 Sanitary Wastewaters

In areas containing no industrial or commercial sources, sanitary wastewater is probably the most severe dry-weather contaminating source of storm drain flows. The following parameters can be used for quantifying the sanitary wastewater components of the treated potable water portion:

- Surfactant analysis may be used in determining the presence of sanitary wastewaters. However, surfactants present in water originating from potable water sources could indicate sanitary wastewaters, laundry wastewaters, car washing wastewater, or any other waters containing surfactants. If surfactants (or fluorescence) are not present, then the potable water could be relatively uncontaminated (potable waterline leaks or irrigation runoff).
- The presence of fabric whiteners (as measured by fluorescence using a fluorometer in the laboratory or field) can also be used in distinguishing laundry and sanitary wastewaters.
- Sanitary wastewaters often exhibit predictable trends during the day in flow and quality. In order to maximize the ability to detect direct sanitary wastewater connections into the storm drainage system, it would be best to survey the outfalls during periods of highest sanitary wastewater flows (mid to late morning hours).
- The ratio of surfactants to ammonia or potassium concentrations may be an effective indicator of the presence of sanitary wastewaters or septic tank effluents. If the surfactant concentrations are high, but the ammonia and potassium concentrations are low, then the contaminated source may be laundry wastewaters. Conversely, if ammonia, potassium, and surfactant concentrations are all high, then sanitary wastewater is the likely source. Some researchers have reported low surfactants in septic tank effluents. Therefore, if

surfactants are low, but potassium and ammonia are both high, septic tank effluent may be present.

- Obviously, odor and other physical characteristics, e.g. turbidity, coarse and floating solids, foaming, color, and temperature would also be very useful in distinguishing sanitary wastewater from wash water or laundry wastewater sources. However, these indicators may not be very obvious for small levels of sanitary wastewater contamination.

Resources

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7. SCDHEC, 2014. The State of South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SMS4), SCR030000, January 1, 2014.

Appendix B

Water Quality Sampling Procedures

B.1. Overview of Sampling Procedure

One-liter samples should be collected in clean wide-mouth Nalgene bottles.

Temperature and pH readings should be analyzed in the field using a YSI 556 MPS meter. Make sure that the meter has been properly calibrated for any parameters being measured. See Section B.2 and YSI Manual for additional information. Analysis must occur within 15 minutes of collection. Odor, color, turbidity, scum, oil sheen, and flow rate are also observed and recorded on site. The samples may additionally be tested for Total Chlorine, Total Copper, Phenols, and Surfactants/Detergents using test strips or by utilizing a contract laboratory. Holding times for these and other parameters may vary.

B.2. Sampling Procedures

B.2.1 Prior to Starting Sample Collection

pH Calibration for YSI 556 MPS Meter (Every morning before entering the field.)

1. Press the **On/Off** key to display the run screen.
2. Press the **Escape** key to display the main menu screen.
3. Use the arrow keys to highlight the **Calibrate** screen.
4. Press the **Enter** key. The Calibrate screen will be displayed.
5. Use the arrow keys to highlight the **pH** selection. Press **Enter**. The pH calibration screen is displayed.
6. Select the 2-point option to calibrate the pH sensor using only two calibration standards. Use this option if the media being monitored is known to be either basic or acidic. For example, if the pH of a pond is known to vary between 5.5 and 7, a two-point calibration with pH 7 and pH 4 buffers is sufficient. A three point calibration with an additional pH 10 buffer will not increase the accuracy of this measurement since the pH is not within this higher range.
7. Select the 3-point option to calibrate the pH sensor using three calibration solutions. In this procedure, the pH sensor is calibrated with a pH 7 buffer and two additional buffers. The 3-point calibration method assures maximum accuracy when the pH of the media to be monitored cannot be anticipated. The procedure for this calibration is the same as for a 2-point calibration, but the software will prompt you to select a third pH buffer.
8. Use the arrow keys to highlight the desired selection (2 or 3 point). Press **Enter**. The pH screen is displayed.
9. Place the correct amount (see Table 6.1 Calibration Volumes in YSI manual) of pH buffer into a clean, dry or pre-rinsed transport/calibration cup. Always calibrate with 7.0 buffer first, regardless if performing a 1, 2, or 3 point calibration. Before proceeding, ensure that the sensor is as dry as possible. Ideally, rinse the pH sensor with a small amount of buffer that can be discarded. Be certain that you avoid cross-contamination of buffers with other solutions.
10. Rinse pH probe with DI water and dry by gently blotting with a soft, lint free tissue.
11. Carefully immerse the sensor end of the probe module into the solution.
12. Gently rotate and/or move the probe module up and down to remove any bubbles from the pH sensor. NOTE: The sensors must be completely immersed. Ensure that the sensors are covered.

13. Screw the transport/calibration cup on the threaded end of the probe module and securely tighten. NOTE: Do not over tighten as this could cause damage to the threaded portions.
14. Use the keypad to enter the calibration value of the buffer you are using at the current temperature. NOTE: pH vs. temperature values are printed on the labels of all YSI pH buffers.
15. Press Enter. The pH calibration screen is displayed.
16. Allow at least one minute for temperature equilibration before proceeding. The current values of all enabled sensors will appear on the screen and will change with time as they stabilize.
17. Observe the reading under pH, when the reading shows no significant change for approximately 30 seconds, press **Enter**. The screen will indicate that the calibration has been accepted and prompt you to press **Enter** again to Continue.
18. Press **Enter**. This returns you to the specified pH Calibration Screen.
19. Rinse the probe module, transport/calibration cup and sensors in tap or purified water and dry.
20. Repeat steps 9 through 18 above using a second pH buffer.
21. Press **Enter**. This returns you to the pH Calibration Screen.
22. Press Escape to return to the calibrate menu.
23. Rinse the probe module and sensors in tap or purified water and dry.

B.2.2 Grab Sampling

1. Sample containers should be stored inside at room temperature when not in use.
2. Note that containers for certain parameters contain preservatives. Handle preserved containers with caution, as preservatives may be an acid (e.g. hydrochloric, nitric). When sampling, take measures to ensure that no preservative is lost during sample collection.
3. Always wear protective gloves when collecting stormwater samples. Wear new gloves at each sample location to eliminate cross contamination. Safety glasses should also be worn to protect the eyes while collecting samples. If using or mixing chemicals, or sampling any location that may create splash, safety goggles should be worn to protect the eyes from inadvertent splashing of chemicals or samples.
4. Always collect a sample in an area of representative flow (e.g. in the middle of the stream or discharge). When possible, fill the container directly from the flow without touching the lip of the bottle to anything in the surrounding environment.
    a. Unless you are purposely sampling stagnated water, do not collect a sample in a stagnant area of the water body.
    b. Do not touch the inside of any bottles or lids. Take precautions to avoid splashing or other contamination when sampling.
5. When sampling from a pool, be careful not to disturb any sediment if you must dip a container into the water.
6. After collection, the sample should be placed in an ice filled cooler. Refer to Code of Federal Regulations Title 40, Part 136 (40 CFR 136), Guidelines for Establishing Test Procedures for the Analysis of Pollutants, for sample collection, preservation and transportation requirements. All

samples have associated holding times; coordinate with laboratory staff to ensure that samples are returned to the lab properly and on time.

7. Fill out a chain of custody form with sample name or location, number, date, time, and other pertinent information. Always retain a copy for the County.

B.2.3 In-Field Water Quality Measurement

Water Quality Parameter Measurement Using YSI 556 MPS Meter

1. Before performing in-field measurements, make sure you have calibrated for the parameters you intend to observe and record. pH has been discussed specifically in this Appendix because of its relevance to illicit tracking. Refer to YSI manual for instructions on other calibrations.
2. Obtain a 1 L wide-mouth plastic sampling container. Rinse three times with DI water or water from the stream or flow to be measured. Do not disturb your sampling location during rinsing (See Section B.2.2).
3. Follow instructions in Section B.2.2 to take a representative sample.
4. Press the **On/Off** key to display the run screen. OR select Run from the main menu to display the run screen.
5. Make sure the probe sensor guard is installed.
6. Place the probe module in the sample. Be sure to completely immerse all the sensors.
7. Watch the readings on the display until they are stable.
8. Record sample values.

pH Calibration Check (once per day)

1. Rinse the probe with DI water and dry by gently blotting with a lint free tissue.
2. Place the probe in QC standard of pH 7.00; press the dispenser button once and then the read button.
3. Let the pH reading stabilize; when the lock appears, the pH of the known QC standard should appear.
4. If the reading is not between 6.95 and 7.05, the meter must be recalibrated.
5. Always remember to rinse the probe with DI water when done.
6. At the end of the day store the meter with the travel cover in place.

B.2.4 End of the Day

1. Do a pH meter check by running a pH test with the pH 7 buffer.
2. Check and charge the batteries for all equipment.
3. Prepare for the next day of sampling.

Appendix C

Reporting Forms

Illicit Discharge Detection and Elimination Field Sheet

Section 1: Background Data

Subwatershed:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

☐ Industrial ☐ Open Space

☐ Ultra-Urban Residential ☐ Institutional

☐ Suburban Residential Other: _____

☐ Commercial Known Industries: _____

Notes (e.g.., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Illicit Discharge Detection and Elimination Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

James R. Neal
Director
Public Works Department

CHARLESTON COUNTY
SOUTH CAROLINA

(843) 202 7600
Fax (843) 202 7601
Lonnie Hamilton III, Public Service Building
4045 Bridge View Drive
North Charleston, SC 29405

Date:

Re: Illicit Discharge Corrective Order

Dear:

The purpose of this letter is to serve notice that you are in violation of Charleston County's Stormwater Management, Sediment and Erosion Control Ordinance at (insert address or other positional info) due to an illicit discharge. Add text.

This violation is a first offense based on an inspection conducted on X/X/20XX. The Charleston County Stormwater Division requests that you promptly remove the illicit discharge before additional action is necessary. Charleston County Stormwater personnel will revisit the referenced site location in approximately two weeks (or sooner if a hazardous condition warrants it) to see if you have removed the illicit discharge.

Failure to comply with this Corrective Order may result in a court proceeding issued to you and/or a **civil penalty of up to $1,000/day for each deficiency.**

If you have questions concerning this violation you can contact our office at 843-202-7639.

Add additional text as necessary.

Sincerely,

James R. Neal
Director
Public Works Department

CHARLESTON COUNTY
SOUTH CAROLINA

(843) 202 7600
Fax (843) 202 7601
Lonnie Hamilton III, Public Service Building
4045 Bridge View Drive
North Charleston, SC 29405

Date:

Re: Notice of Violation

Dear:

The purpose of this letter is to serve notice that you are in violation of Charleston County's Stormwater Management, Sediment and Erosion Control Ordinance at (list address or other positional information) due to an illicit discharge. Add text.

This violation is due to failure to comply with a past corrective order resulting from an inspection conducted on X/X/20XX. The Charleston County Stormwater Division requests that you promptly remove the illicit discharge before additional action is necessary. Charleston County Stormwater personnel will revisit the referenced site location in approximately two weeks to see if you have removed the illicit discharge.

Failure to comply with this Notice of Violation prior to the re-inspection will result in an immediate report to the Magistrate's office and/or a **civil penalty of up to $1,000/day for each deficiency.**

If you have questions concerning this violation you can contact our office at 843-202-7639.

Add additional text

Sincerely,

James R. Neal
Director
Public Works Department

CHARLESTON COUNTY
SOUTH CAROLINA

(843) 202 7600
Fax (843) 202 7601
Lonnie Hamilton III, Public Service Building
4045 Bridge View Drive
North Charleston, SC 29405

Date:

Re: Final Notice of Violation Letter

Dear:

The purpose of this letter is to serve notice that you are in violation of Charleston County's Stormwater Management, Sediment and Erosion Control Ordinance at (list address or other positional information) due to an illicit discharge. Previous requests to you to remove the discharge have been unsuccessful. Therefore, the Charleston County Stormwater Division has reported the violation to the Magistrate's office for further action.

If you have questions concerning this violation you can contact our office at 843-202-7639.

Add additional text

Sincerely,

James R. Neal
Director
Public Works Department

CHARLESTON COUNTY
SOUTH CAROLINA

(843) 202 7600
Fax (843) 202 7601
Lonnie Hamilton III, Public Service Building
4045 Bridge View Drive
North Charleston, SC 29405

Date:

Re: Illicit Discharge Removal Letter

Dear:

The purpose of this letter is to inform you that Charleston County has determined that an illicit discharge is occurring into your stormwater system at insert address or other positional information. This location is beyond the scope of the County's Stormwater Management Ordinance, and the County cannot therefore enforce its removal. However, the illicit discharge must be removed since it eventually finds its way into the County-owned system. Please find the attached report that provides greater detail on the investigation and/or results of water sample analyses. A copy of this letter and investigation report has also been sent to SCDHEC-EQC.

If you have questions concerning this violation you can contact our office at 843-202-7639.

Add additional text as necessary.

Sincerely,

James R. Neal
Director
Public Works Department

CHARLESTON COUNTY
SOUTH CAROLINA

(843) 202 7600
Fax (843) 202 7601
Lonnie Hamilton III, Public Service Building
4045 Bridge View Drive
North Charleston, SC 29405

Date:

Re: Illicit Discharge Removal Letter

Dear:

The purpose of this letter is to inform you that Charleston County has determined that an illicit discharge is occurring at insert address or other positional information. This location is beyond the scope of the County's Stormwater Management, Sediment and Erosion Control Ordinance, and the County cannot therefore enforce its removal. The County is hereby releasing responsibility of removing this illicit to you or another entity that you identify.

Please find the attached report that provides greater detail on the investigation and/or results of water sample analyses. A copy of this letter and investigation report has also been sent to Insert municipality name.

If you have questions concerning this violation you can contact our office at 843-202-7639.

Add additional text as necessary.

Sincerely,

Appendix D

Additional Illicit Tracking Information

Appendix D contains additional information that may be useful in tracking illicit discharges. Table D.1 can be used to identify the local industries in each drainage area most likely to contribute non-stormwater entries into the storm drainage system. The categories considered in this table include loading and unloading of dry bulk or liquid materials, outdoor storage or processing, water usage (cooling and process waters), dust or particulate generating processes, and illicit or inadvertent industrial connections. The likelihood of an industry producing dry weather or wet weather discharges in each of these categories was rated on the basis of high (H), moderate (M), or low (L) potential and not applicable if there was no relationship evident.

Table D.1: Sources of Industrial Non-Stormwater Entries Into Storm Drainage System

Industrial Categories			Loading/ Unloading		Outdoor Storage/ Processing	Water Usage		Particle Gener. Process	Illicit/ Inadvertent Connections
Major Class.	SIC Group	Industrial Description	Dry Bulk	Liquid		Cooling	Process		
Primary Industries									
20		Food & Kindred Products							
20	201	Meat Products	H	L	H	H	H	L	H
20	202	Dairy Products Processing Industry	H	H	N/A	H	H	N/A	H
20	203	Canned & Preserved Fruits & Vegetables	H	H	H	H	H	M	H
20	204	Grain Mill Products	H	H	L	H	H	H	H
20	205	Bakery Products	H	M	N/A	N/A	H	M	L
20	206	Sugar & Confectionery Products	H	M	N/A	L	M	H	L
20	207	Fats & Oils	H	H	N/A	M	H	N/A	M
20	208	Beverages	H	H	N/A	H	H	M	L
21		Tobacco Manufactures	H	M	N/A	N/A	M	H	M
22		Textile Mill Products	H	L	N/A	H	H	M	H
23		Apparel & Other Finished Products Made from Fabrics	H	L	N/A	N/A	M	M	L
Material Manufacture									
24		Lumber & Food Products	H	L	H	N/A	M	H	L
25		Furniture & Fixtures	H	M	N/A	N/A	L	M	L
26		Paper & Allied Products	H	H	H	H	H	H	H
27		Printing, Publishing, & Allied Industries	H	M	N/A	N/A	M	H	L
31		Leather & Leather Products	H	H	L	L	H	H	H
32		Stone, Clay, Glass, & Concrete Products	H	M	H	L	H	H	L
33		Primary Metal Industries	H	M	H	H	H	H	H
34		Fabricated Metal Products	H	H	L	H	H	H	H
37		Transportation Equipment	L	H	L	H	H	L	H

Table D.1: Sources of Industrial Non-Stormwater Entries Into Storm Drainage System (Continued)

Industrial Categories			Loading/ Unloading		Outdoor Storage/ Processing	Water Usage		Particle Gener. Process	Illicit/ Inadvertent Connections
Major Class.	SIC Group	Industrial Description	Dry Bulk	Liquid		Cooling	Process		
Chemical Manufacture									
28	Chemicals & Allied Products								
	281	Industrial Inorganic Chemicals	H	H	N/A	H	H	H	H
	282	Plastic Materials & Synthetics	H	H	L	H	M	L	H
	283	Drugs	L	L	N/A	H	M	L	L
	284	Soaps, Detergents, & Cleaning Preparations	H	H	N/A	H	H	H	H
	285	Paints, Varnishes, Lacquers, Enamels & Allied Products	H	H	N/A	L	H	H	L
	286	Industrial Organic Chemicals	H	H	N/A	H	H	H	M
	287	Agricultural Chemicals	L	L	N/A	H	L	L	L
29	Petroleum Refining & Related Industries								
	291	Petroleum Refining	L	H	H	H	L	N/A	H
	295	Paving & Roofing Materials	H	H	H	N/A	M	M	L
30		Rubber & Misc. Plastic Products	H	H	N/A	H	H	H	M
Transportation & Construction									
15		Building Construction	M	L	H	N/A	L	H	L
16		Heavy Construction	M	L	H	N/A	L	H	L
Retail									
52		Building Materials, Hardware Garden Supply, & Mobile Home Dealers	H	L	H	N/A	L	N/A	L
53		General Merchandise Stores	H	M	L	N/A	L	N/A	L
54		Food Stores	H	H	N/A	N/A	M	L	L
55		Automotive Dealers & Gasoline Service Stations	H	H	H	N/A	M	L	M
56		Apparel & Accessory Stores	H	L	N/A	N/A	L	N/A	L
57		Home Furniture, Furnishings and Equipment Stores	H	L	L	N/A	L	N/A	L
58		Eating & Drinking Places	H	M	N/A	N/A	M	N/A	M
Other									
		Coal Steam Electric Power	H	L	H	H	L	H	L
		Nuclear Steam Electric Power	N/A	L	N/A	H	L	N/A	N/A

NOTE: H: High potential M: Medium potential L: Low potential N/A: Not applicable

The industrial categories listed in Table D.1 were defined according to the 1987 Standard Industrial Classification Manual codes (SIC code). The industries were classified according to six main categories. The category for "Primary Industries" includes facilities involved in the production of food products and other basic goods. The category of "Material Manufacturing" includes those industries producing materials such as lumber, paper, glass, and leather. Similarly, the "Chemical Manufacturing" category includes those industries making products such as plastics, paints, detergents, fertilizers, pesticides, and other related substances. "Transportation and Construction" primarily concerns the discharge of contaminants from building or other types of outdoor development. The "Retail" category includes establishments engaged in the selling of merchandise or offering merchandise related services. Finally, all other industries, which did not fit into any of the above classifications, were placed into a "General" category. Those industries, which are not specifically listed, should have characteristics resembling the industries of the major groups with which they are classified by SIC code.

Table D.2 describes typical activities that may produce illicit discharges which are associated with different types of land use.

Table D.2: Land Uses, Generating Sites and Activities That Produce Indirect Discharges

Land Use	Generating Site	Activity that Produces Discharge
Residential	• Apartments • Multi-family • Single Family Detached	• Car Washing • Driveway Cleaning • Dumping / Spills (e.g. leaf litter and RV/boat holding tank effluent • Equipment Washdowns • Lawn/Landscape Watering • Septic System Maintenance/Overflow • Swimming Pool Discharges
Commercial	• Campgrounds/RV parks • Car Dealers/Rental Car Companies • Car Washes • Commercial Laundry / Dry Cleaning • Gas Stations/ Auto Repair Shops • Marinas • Nurseries and Garden Centers • Oil Change Shops • Restaurants • Swimming Pools	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Vehicle Fueling • Vehicle Maintenance / Repair • Vehicle Washing • Washdown of greasy equipment and grease traps
Industrial	• Auto recyclers • Beverages and brewing • Construction vehicle washouts • Distribution Centers • Food processing • Garbage truck washouts • Marinas, boat building and repair • Metal plating operations • Paper and wood products • Petroleum storage and refining • Printing	• All commercial activities • Industrial process water or rinse water • Loading and un-loading area washdowns • Outdoor material storage (fluids)

Land Use	Generating Site	Activity that Produces Discharge
Institutional	• Cemeteries • Churches • Corporate Campuses • Hospitals • Schools and Universities	• Building Maintenance (e.g. power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Parking Lot Maintenance (power washing) • Vehicle Washing
Municipal	• Airports • Landfills • Maintenance Depots • Municipal Fleet Storage Areas • Ports • Public Works Yards • Streets and Highways	• Building Maintenance (e.g. power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Road Maintenance • Spill Prevention/Response • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing

Preventing Illicit Discharges / Resolution

Outreach programs and public education are some of the more effective practices to influence neighborhoods to become more aware of their runoff potential.

- Storm drain stenciling
- Septic system maintenance
- Vehicle fluid changing / recycling
- Car washing
- Household hazardous waste storage and disposal
- Swimming pool draining

Table D.3 is the list of activities that originate from the land uses described in Table D.2. It provides the potential pollutants and ways to help educate or prevent these activities from discharging harmful pollutants to the waters of the state. When Charleston County field crews detect an illicit from one of the following sources, the information and flow charts in this document should be used to determine how to resolve or fix the discharge. Once the source is identified, notification should be made as described in Section 2.2.

Table D.3: Pollution Causing Activities

Activity	Pollutant	Resolution / Prevention
Car Wash	• Surfactants / detergents • Oil and grease • Metals • Xylene	• Nozzles with shut off valves • Storm drain plug and wet vacuum provisions for charity carwash events • Water bill inserts promoting environmentally safe car washing products • Promote car wash on grass vs. pavement or in the street • Require a permit • Include a kit of env safe soap, etc.
Driveway Cleaning / Parking log maintenance	• Oil and grease • Chemicals • Hydrocarbons • Ethylene glycol	• Installation and maintenance of filters

Activity	Pollutant	Resolution / Prevention
Lawn / Landscape Watering and Maintenance	• Fecal coliform • Sediment • Nutrients	• Public education indicating importance of site specific application rather than broad casting pesticides, herbicides and fertilizers • Signs and public pet waste bags with disposal can
Swimming Pool Discharges	• Chlorine • Back flush water	• Educational kiosks at retail outlets selling chemicals • Changes in local plumbing codes to require discharge to sanitary sewer systems
Building Maintenance (power-washing)	• Oil and Grease • Chemicals • Fecal coliform	• Educational brochures
Dumping / Spills	• Hydrocarbons, • Oil and grease • Metals • Xylene • Ethylene glycol	• Community recycling centers • Pollution hotlines • Fines • Outreach material at auto parts stores
Vehicle Fueling	• Oil and Grease • Hydrocarbons • Xylene	• Educational posted signs at fueling stations • Fueling area must be covered
Vehicle Maintenance / Repair	• Oil and Grease • Hydrocarbons • Ethylene glycol	• Outreach materials at auto parts stores and service stations • Community oil recycling stations • Directories of used oil collection stations • Pollution hotlines
Outdoor Fluid Storage	• Oil and Grease • Hydrocarbons	• Posted signs of potential hazard • Covered with secondary containment
Road Maintenance	• Hydrocarbons • Oil and Grease • Trash and pollution	• Education information
Septic System Maintenance/Overflow	• Surfactants • Fecal coliform	• Water bill inserts informing the need for routine visual inspections
Loading and Unloading Areas	• Oil and Grease • Hydrocarbons	• Spill prevention and response training • Identification of potential spill areas • Inventory of harmful materials • Employee training
Industrial Process Water / Rinse Water	• Temperature • Surfactants • Phenols • Chlorine	• Business outreach and education • Spill prevention and response training • Employee training • Site inspections

Appendix E

Enforcement Response Plan (ERP)

ENFORCEMENT RESPONSE PLAN
Charleston County
South Carolina

Table of Contents

I. INTRODUCTION

This Enforcement Response Plan (ERP) document was developed as a guidance manual for identifying specific violation types and defining Charleston County's response to violations of the Charleston County Stormwater Management Ordinance (Ordinance #1518), the Charleston County Stormwater Permitting Standards and Procedures Manual, or site specific stormwater management plans. The goals of the ERP are to:

1) Deter future noncompliance by the violator and other members of the regulated community,

2) Ensure that violators do not obtain economic benefit or advantage over competitors through noncompliance, and

3) Apply fair and consistent enforcement actions to the regulated community throughout the County.

Upon determination that a violation of any provisions referenced above has occurred, the County will notify the responsible party and may choose to assess and make a written demand for payment of a civil penalty. In addition to any applicable civil penalties, the following may also apply:

- Any entity that negligently or intentionally violates any provision of the above shall be guilty of a misdemeanor and punished within the jurisdictional limits of the magistrate's court.
- Charleston County may withhold the release of permanent electric power to the site.
- Charleston County may withhold or revoke permits related to the site.
- If Charleston County performs corrective action due to continued non-compliance, then the costs incurred as a result of such action shall be reimbursed to Charleston County by the owner or operator.
- If Charleston County is fined and/or placed under a compliance schedule by the state or federal government for a violation(s) of its NPDES permit, and can identify the person(s) who caused such violation(s) to occur, then Charleston County may pass through the penalty and cost of compliance to that person(s).

This ERP document is for the use of Charleston County personnel. Charleston County reserves the right to change this document at any time, without prior notice, or to act at variance to this document. This document does not create any rights, implied or otherwise, to any third parties.

II. ENFORCEMENT ACTION DEFINITIONS

Correction Order: (Stormwater Design Standards Manual Sec. 4.3.1)

The Correction Order is a written or verbal notice for first offenses of non-compliance with the County Stormwater Management Ordinance, the County permit or the approved stormwater management plan. The purpose of the Correction Order is to give notice of the deficiencies, identify expected corrective results and provide a reasonable timeframe to the contractor prior to the County taking further action to ensure compliance.

Notice of Violation (NOV): (Stormwater Management Ordinance Sec. 6.1)

The NOV shall serve as a notice to remove the violation(s) to the Stormwater Management Ordinance or the approved stormwater management plan. It shall include the nature of the violation, the amount of time in which to correct deficiencies, the date on which an inspection will be made to make sure that corrective action has been performed, and the applicable penalty or fine if corrective action is not taken by the inspection date.

Stop Work Order: (Stormwater Management Ordinance Sec. 6.6)

The Stop Work Order shall require correction of NOV issues, but shall stop all other construction related activities. Any person in violation of a Stop Work Order is subject to payment of all fees, bonds, and penalties prior to the lifting of the Stop Work Order.

Civil Penalty: (Stormwater Management Ordinance Sec. 6.2)

Any person violating any provision of the Stormwater Management Ordinance or approved stormwater management plan shall be subject to a Civil Penalty of up to one thousand dollars ($1000) for each violation. Each separate day of a violation constitutes a new and separate violation.

Criminal Penalty: (Stormwater Management Ordinance Sec. 6.2)

In addition to any applicable civil penalties, any owner, operator, or person who willfully, with wanton disregard, or intentionally violates any provision of the Stormwater Management Ordinance or approved stormwater management plan shall be guilty of a misdemeanor and shall be punished within the jurisdictional limits of the magistrate court. Fines may not exceed $500.00 per violation and/or thirty days in jail. Each day a violation remains constitutes a separate violation.

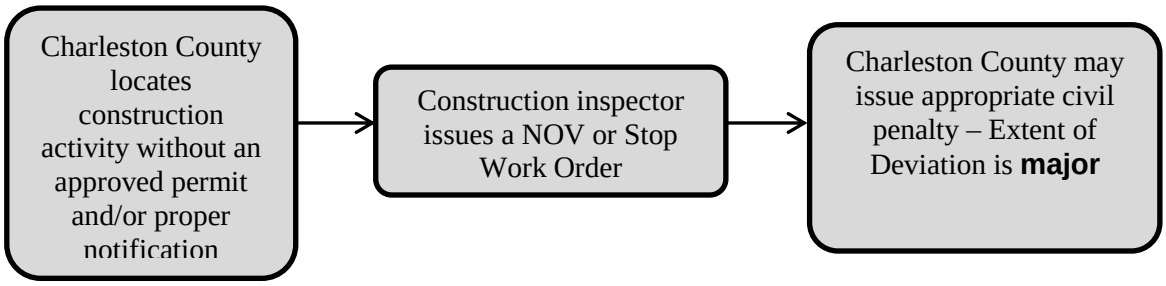
III. VIOLATION CATEGORIES

A. Construction/Permitting Violations

1. Initiation of construction activity without a site development/land disturbing/grading permit and/or proper notification.

Charleston County response:

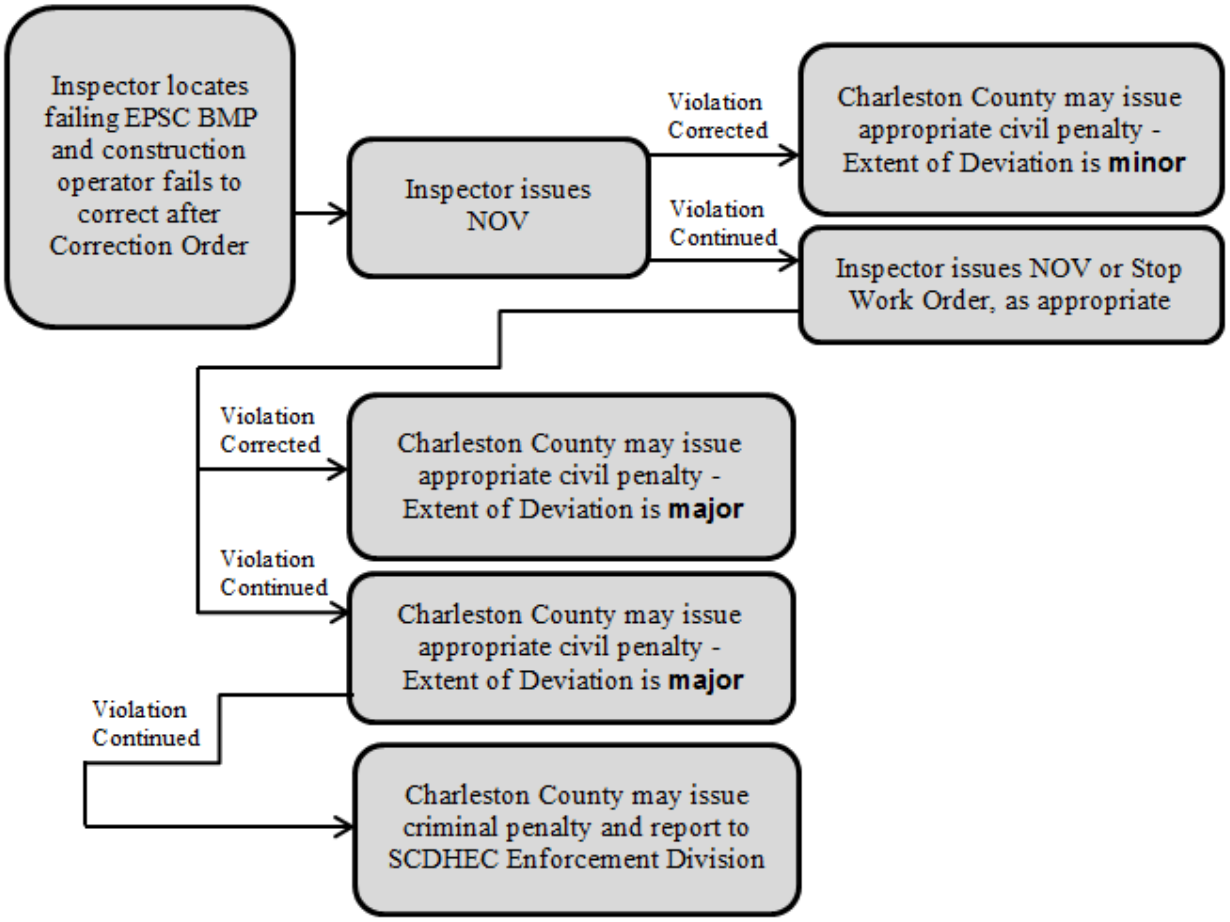
Charleston County may issue a Notice of Violation (NOV) or Stop Work Order, as appropriate, for all violations involving initiation of construction activity without a site development/land disturbing/grading permit and proper notification. Appropriate civil or criminal penalties may be issued. A repeat offense of failure to obtain the correct permit and notify the County prior to beginning construction will be considered a major offense.



2. Failure to properly operate and/or maintain all BMPs, components, facilities, and equipment associated with site Erosion Prevention and Sediment Control (EPSC).

Charleston County response:

In cases of minor violations for operation and maintenance of EPSC BMPs, the construction inspector may issue a verbal Correction Order prior to issuing written notifications. Charleston County may issue a Notice of Violation (NOV) if the construction operator fails to correct deficiency after a Correction Order. Charleston County will conduct follow-up inspections to ensure corrective action is provided. A Stop Work Order or additional NOV may be issued if corrective action is not provided. Appropriate civil or criminal penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.



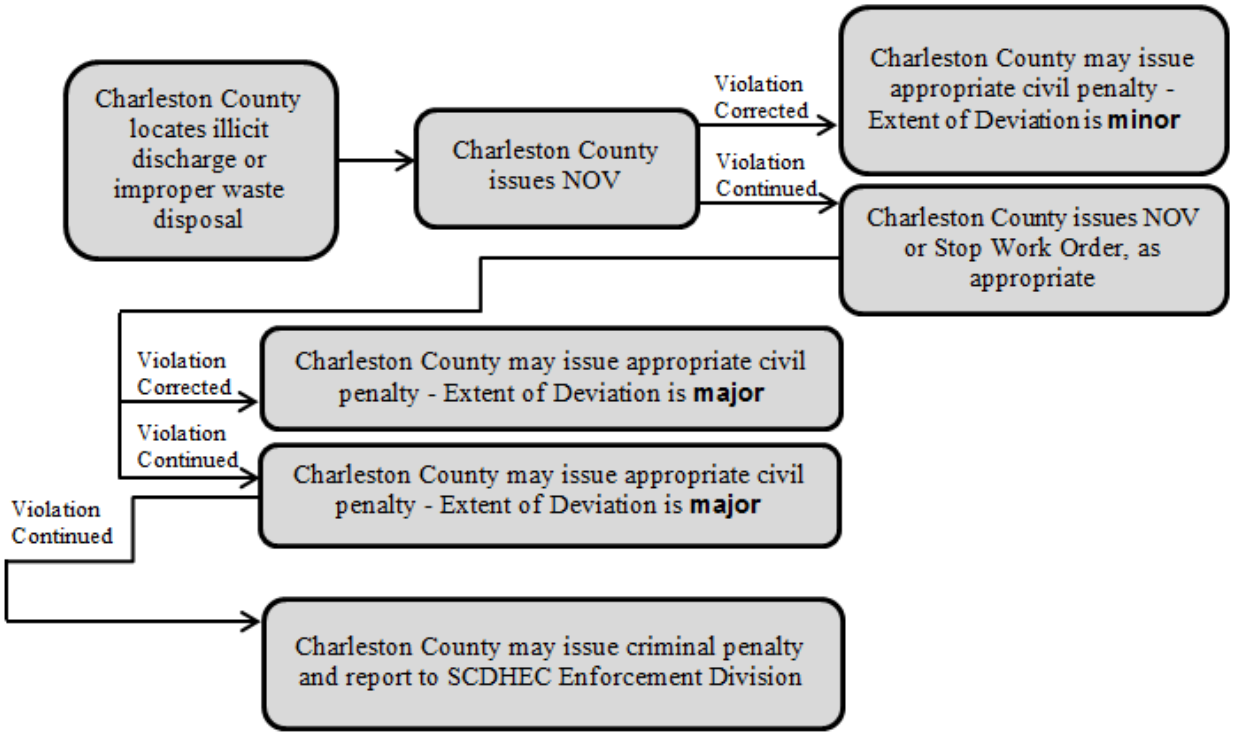
B. Illicit Discharge/ Illicit Connection/ Improper Waste Disposal

Charleston County response:

Charleston County must report immediately the occurrence of any dry weather flows believed to be an immediate threat to human health or the environment to SCDHEC Emergency Response, 1-888-481-0125. If the source of the suspected illicit discharge is found to be a suspected non-compliance with an NPDES permit, the appropriate SCDHEC Regional Office must be notified.

Once the source of the illicit discharge has been determined, Charleston County will notify the responsible party of the discharge as soon as practicable but not later than three (3) days after that determination. The County will require the responsible party to conduct all necessary corrective actions to eliminate the non-stormwater discharge within 30 days. If elimination takes longer than 30 days, Charleston County will require responsible parties to submit a plan with a schedule for elimination. Charleston County will conduct a follow-up investigation to verify that the discharge has been eliminated upon being notified by responsible parties that the discharge has been eliminated.

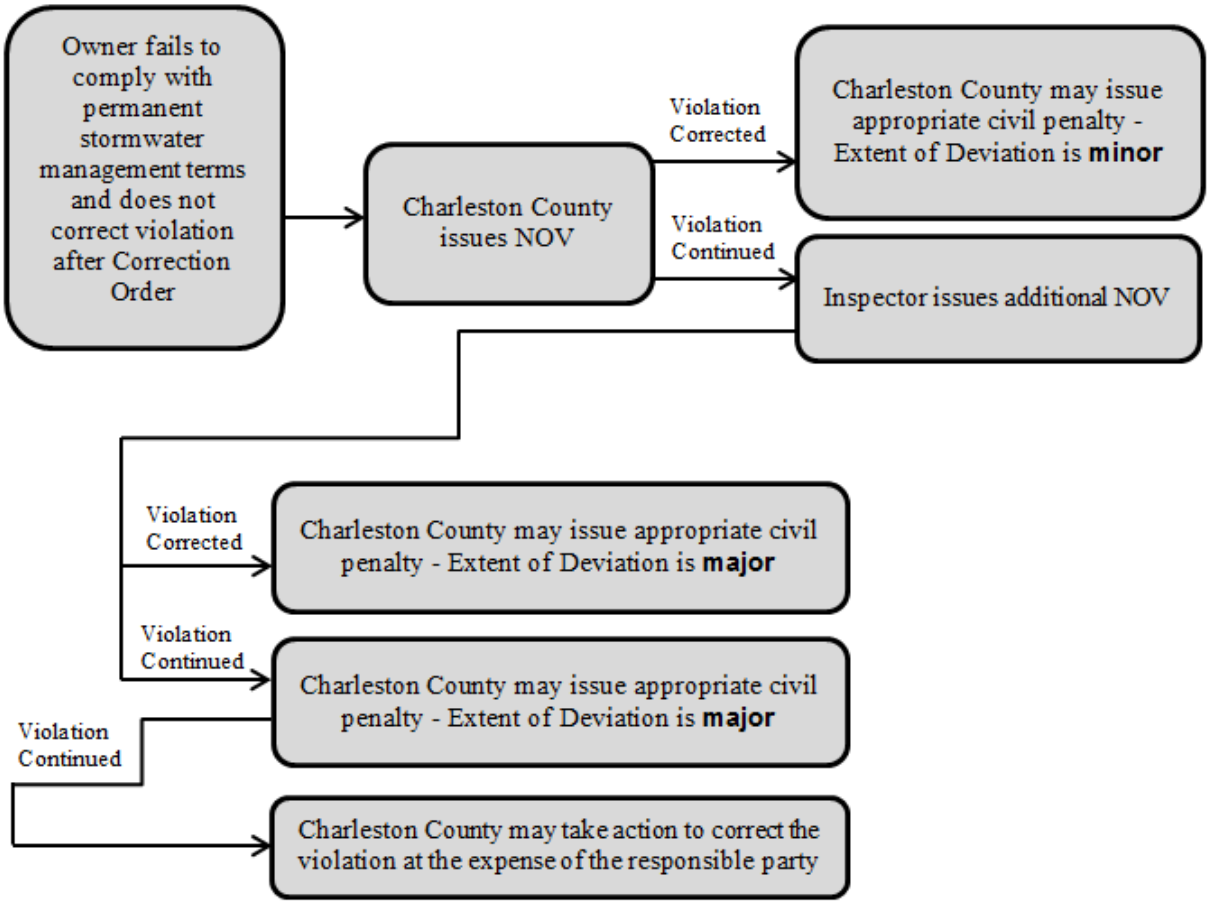
Charleston County may issue a Correction Order prior to the initial Notice of Violation (NOV). Charleston County will issue an additional NOV or Stop Work Order, as appropriate, after 30 days if the illicit discharge has not been eliminated and no schedule for elimination has been submitted. Charleston County will conduct follow-up inspections to ensure corrective action is provided. Appropriate civil or criminal penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.



C. Failure to Comply with Permanent Stormwater Management Requirements

Charleston County response:

Charleston County may issue a verbal Correction Order upon initial discovery of a permanent stormwater management violation. Charleston County may issue a Notice of Violation (NOV) if the owner or operator fails to correct deficiency after a Correction Order. Charleston County will conduct follow-up inspections to ensure corrective action is provided. An additional NOV may be issued if corrective action is not provided. Appropriate civil or criminal penalties may be issued.

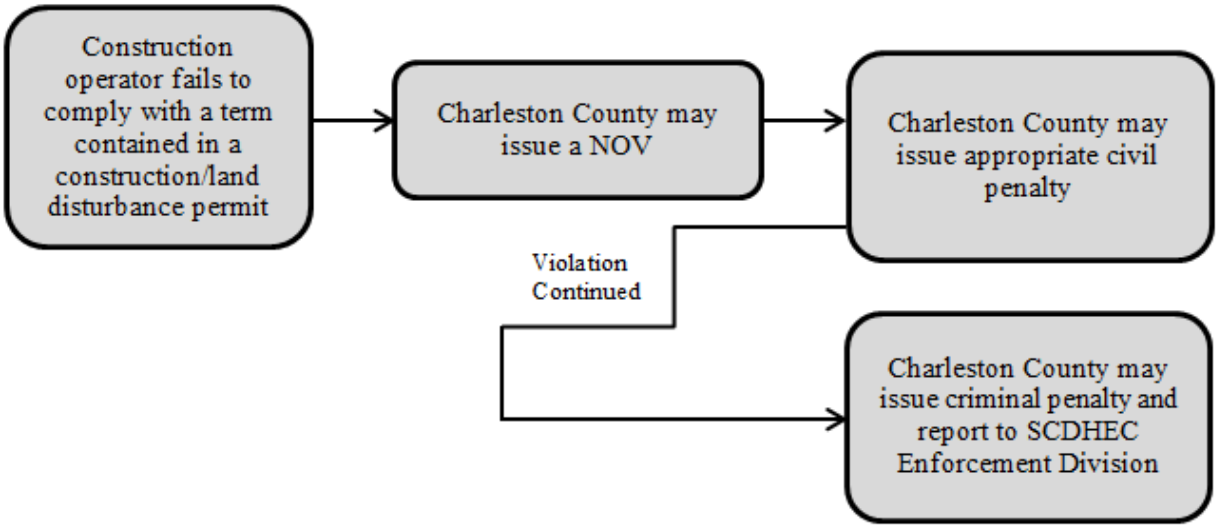


D. Failure to Comply with Permit

Failure to comply with a requirement, condition, or term contained in a construction permit, site development, land disturbance, or grading permit.

Charleston County response:

Charleston County may issue Notice of Violation (NOV) upon initial discovery of violation. Charleston County will conduct follow-up inspections to ensure corrective action is provided. Appropriate civil or criminal penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.

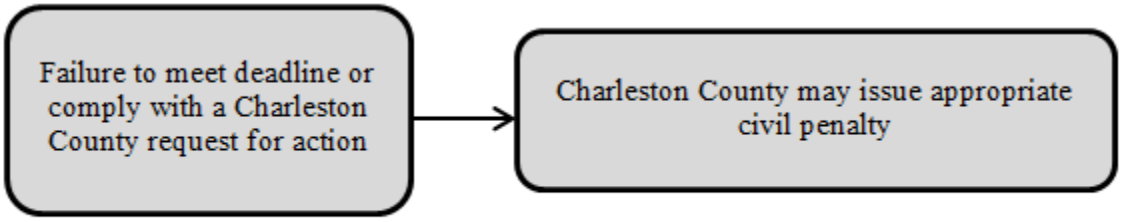


E. Failure to Comply with a County Request

Failure to comply with each requirement, term, or condition of a County request for action.

Charleston County response:

For instances in which there is a failure to comply with a condition of a County request for action, Charleston County may issue civil penalties when deadlines are not met.



PENALTY CALCULATION RATIONALE

The total penalty calculation will include consideration of the following factors at the discretion of Charleston County:

1) Degree of harm or potential for harm to the public health, safety, private property, or the environment.

2) Extent of Deviation* from the requirements of the regulation, standard, or permit.

3) Frequency or duration of the violation.

4) Economic benefit as a result of noncompliance.

5) Cost of restoration of the environment or abatement of the environmental harm.

6) Past performance record or past history of noncompliance.

7) Degree of willfulness or negligence.

*Extent of Deviation for civil penalty comes from flow chart on previous page. The maximum civil penalty is to be determined by Charleston County. Suggested civil penalties are as follow:

	Suggested Maximum Civil Penalty (per day)
Minor	$500
Major	$1000

When a violation is determined to involve criminal action, an additional criminal penalty of $500 per day may be assessed.

A total penalty assessment rationale will be developed and outlined in writing for each enforcement action for which a penalty is assessed.

Penalties for long-lasting and/or continuing violations (such as, but not limited to, unauthorized discharges or poor operation and maintenance) and recovery of economic benefit may be assessed per occurrence, per month, or per week.

SWMP Appendix F
Enforcement Response Plan

ENFORCEMENT RESPONSE PLAN

(ERP)

Charleston County

South Carolina

December 2014

CHARLESTON
COUNTY
SOUTH CAROLINA

ENFORCEMENT RESPONSE PLAN
Charleston County
South Carolina

Table of Contents

I. INTRODUCTION

This Enforcement Response Plan (ERP) document was developed as a guidance manual for identifying specific violation types and defining Charleston County's response to violations of the Charleston County Stormwater Management Ordinance (Ordinance #1518), the Charleston County Stormwater Permitting Standards and Procedures Manual, or site specific stormwater management plans. The goals of the ERP are to:

1) Deter future noncompliance by the violator and other members of the regulated community,

2) Ensure that violators do not obtain economic benefit or advantage over competitors through noncompliance, and

3) Apply fair and consistent enforcement actions to the regulated community throughout the County.

Upon determination that a violation of any provisions referenced above has occurred, the County will notify the responsible party and may choose to assess and make a written demand for payment of a civil penalty. In addition to any applicable civil penalties, the following may also apply:

- Any entity that negligently or intentionally violates any provision of the above shall be guilty of a misdemeanor and punished within the jurisdictional limits of the magistrate's court.
- Charleston County may withhold the release of permanent electric power to the site.
- Charleston County may withhold or revoke permits related to the site.
- If Charleston County performs corrective action due to continued non-compliance, then the costs incurred as a result of such action shall be reimbursed to Charleston County by the owner or operator.
- If Charleston County is fined and/or placed under a compliance schedule by the state or federal government for a violation(s) of its NPDES permit, and can identify the person(s) who caused such violation(s) to occur, then Charleston County may pass through the penalty and cost of compliance to that person(s).

This ERP document is for the use of Charleston County personnel. Charleston County reserves the right to change this document at any time, without prior notice, or to act at variance to this document. This document does not create any rights, implied or otherwise, to any third parties.

II. ENFORCEMENT ACTION DEFINITIONS

Correction Order: (Stormwater Design Standards Manual Sec. 4.3.1)

The Correction Order is a written or verbal notice for first offenses of non-compliance with the County Stormwater Management Ordinance, the County permit or the approved stormwater management plan. The purpose of the Correction Order is to give notice of the deficiencies, identify expected corrective results and provide a reasonable timeframe to the contractor prior to the County taking further action to ensure compliance.

Notice of Violation (NOV): (Stormwater Management Ordinance Sec. 6.1)

The NOV shall serve as a notice to remove the violation(s) to the Stormwater Management Ordinance or the approved stormwater management plan. It shall include the nature of the violation, the amount of time in which to correct deficiencies, the date on which an inspection will be made to make sure that corrective action has been performed, and the applicable penalty or fine if corrective action is not taken by the inspection date.

Stop Work Order: (Stormwater Management Ordinance Sec. 6.6)

The Stop Work Order shall require correction of NOV issues, but shall stop all other construction related activities. Any person in violation of a Stop Work Order is subject to payment of all fees, bonds, and penalties prior to the lifting of the Stop Work Order.

Civil Penalty: (Stormwater Management Ordinance Sec. 6.2)

Any person violating any provision of the Stormwater Management Ordinance or approved stormwater management plan shall be subject to a Civil Penalty of up to one thousand dollars ($1000) for each violation. Each separate day of a violation constitutes a new and separate violation.

Criminal Penalty: (Stormwater Management Ordinance Sec. 6.2)

In addition to any applicable civil penalties, any owner, operator, or person who willfully, with wanton disregard, or intentionally violates any provision of the Stormwater Management Ordinance or approved stormwater management plan shall be guilty of a misdemeanor and shall be punished within the jurisdictional limits of the magistrate court. Fines may not exceed $500.00 per violation and/or thirty days in jail. Each day a violation remains constitutes a separate violation.

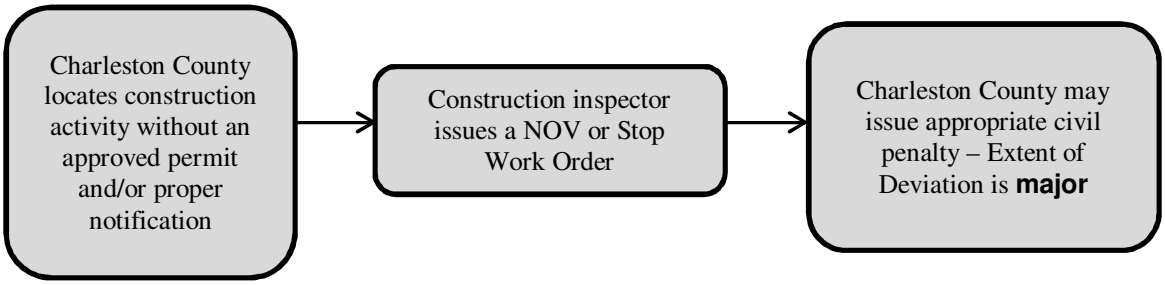
III. VIOLATION CATEGORIES

A. Construction/Permitting Violations

1. Initiation of construction activity without a site development/land disturbing/grading permit and/or proper notification.

Charleston County response:

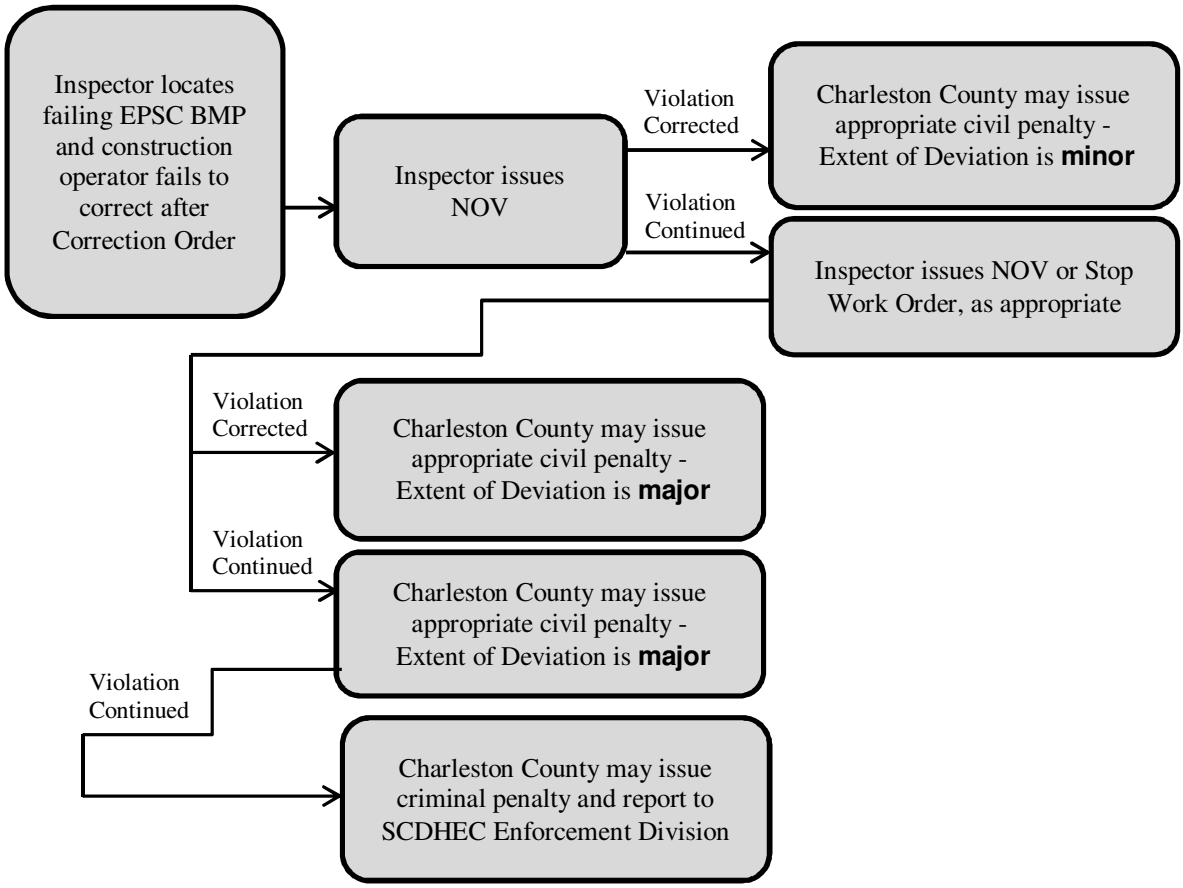
Charleston County may issue a Notice of Violation (NOV) or Stop Work Order, as appropriate, for all violations involving initiation of construction activity without a site development/land disturbing/grading permit and proper notification. Appropriate civil or criminal penalties may be issued. A repeat offense of failure to obtain the correct permit and notify the County prior to beginning construction will be considered a major offense.



2. **Failure to properly operate and/or maintain all BMPs, components, facilities, and equipment associated with site Erosion Prevention and Sediment Control (EPSC).**

Charleston County response:

In cases of minor violations for operation and maintenance of EPSC BMPs, the construction inspector may issue a verbal Correction Order prior to issuing written notifications. Charleston County may issue a Notice of Violation (NOV) if the construction operator fails to correct deficiency after a Correction Order. Charleston County will conduct follow-up inspections to ensure corrective action is provided. A Stop Work Order or additional NOV may be issued if corrective action is not provided. Appropriate civil or criminal penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.



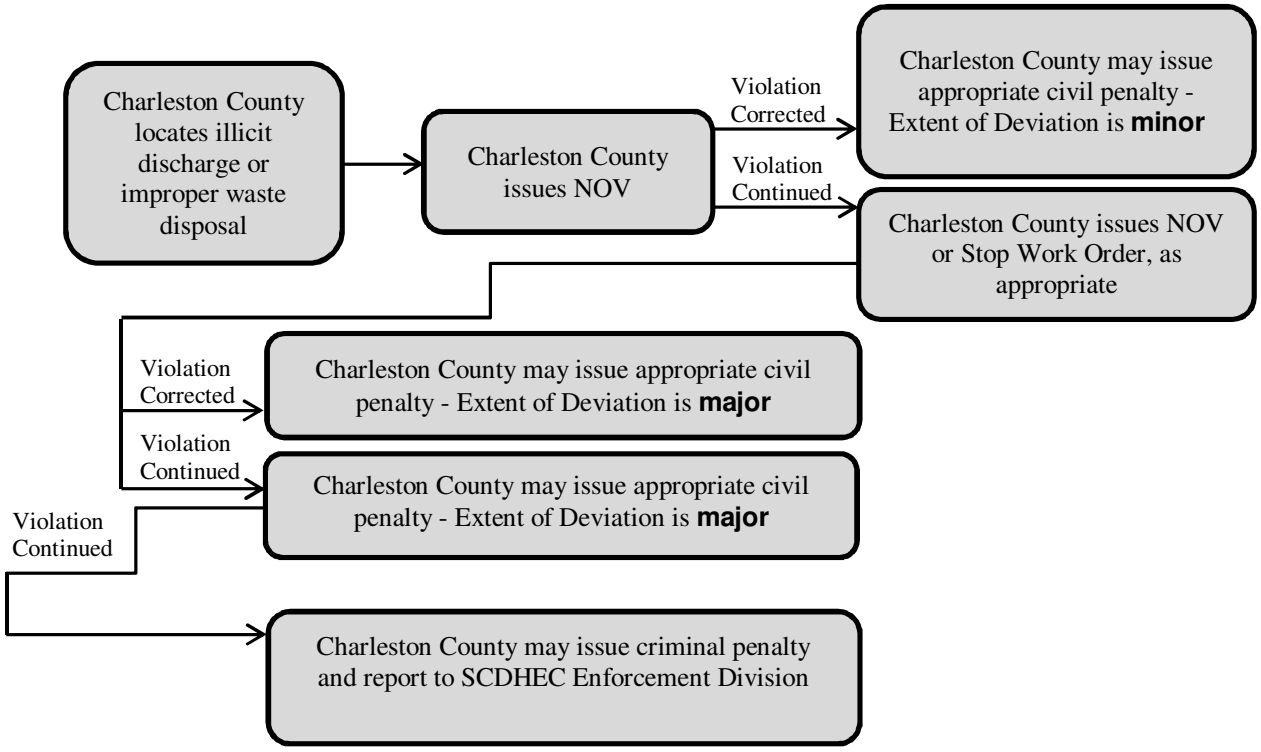
B. Illicit Discharge/ Illicit Connection/ Improper Waste Disposal

Charleston County response:

Charleston County must report immediately the occurrence of any dry weather flows believed to be an immediate threat to human health or the environment to SC DHEC Emergency Response, 1-888-481-0125. If the source of the suspected illicit discharge is found to be a suspected non-compliance with an NPDES permit, the appropriate SC DHEC Regional Office must be notified.

Once the source of the illicit discharge has been determined, Charleston County will notify the responsible party of the discharge as soon as practicable but not later than three (3) days after that determination. The County will require the responsible party to conduct all necessary corrective actions to eliminate the non-stormwater discharge within 30 days. If elimination takes longer than 30 days, Charleston County will require responsible parties to submit a plan with a schedule for elimination. Charleston County will conduct a follow-up investigation to verify that the discharge has been eliminated upon being notified by responsible parties that the discharge has been eliminated.

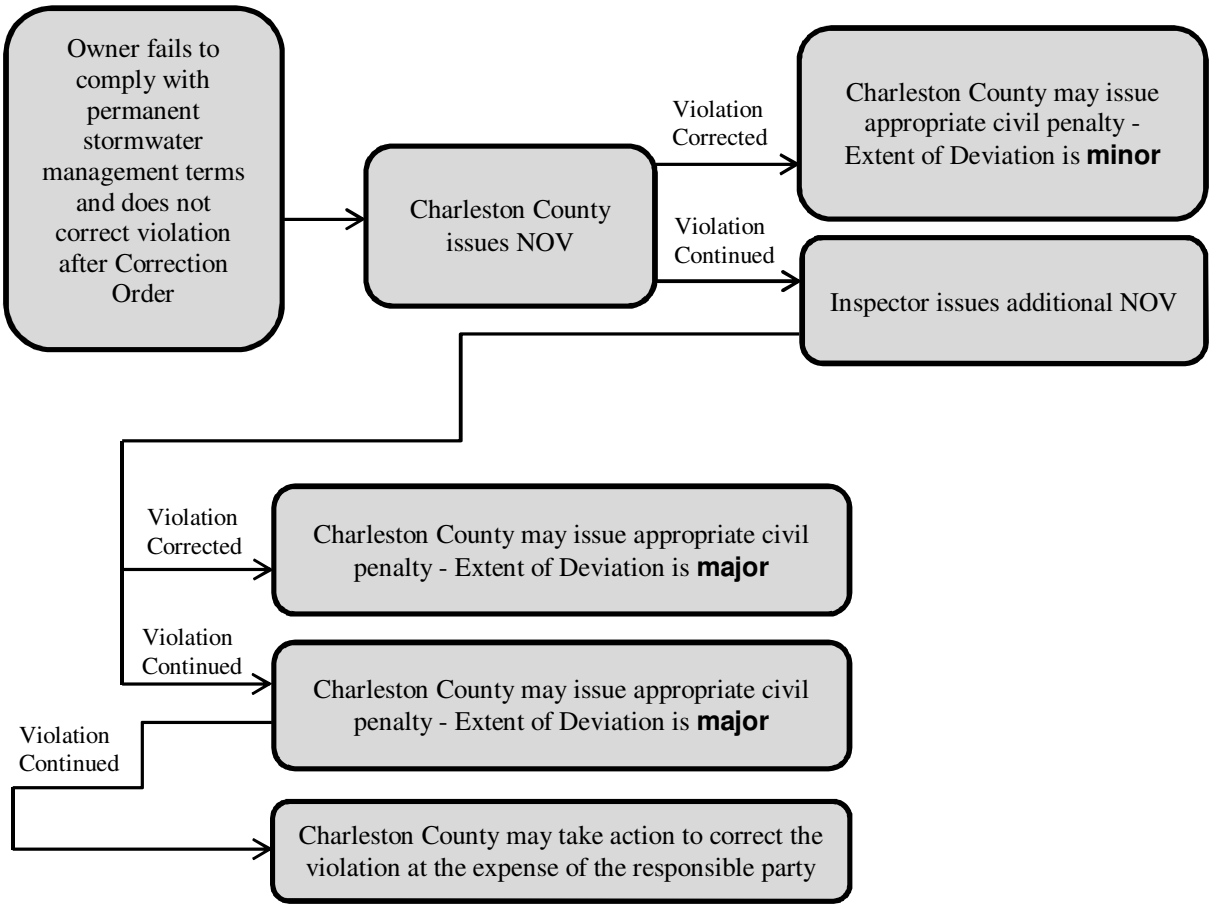
Charleston County may issue a Correction Order prior to the initial Notice of Violation (NOV). Charleston County will issue an additional NOV or Stop Work Order, as appropriate, after 30 days if the illicit discharge has not been eliminated and no schedule for elimination has been submitted. Charleston County will conduct follow-up inspections to ensure corrective action is provided. Appropriate civil or criminal penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.



C. Failure to Comply with Permanent Stormwater Management Requirements

Charleston County response:

Charleston County may issue a verbal Correction Order upon initial discovery of a permanent stormwater management violation. Charleston County may issue a Notice of Violation (NOV) if the owner or operator fails to correct deficiency after a Correction Order. Charleston County will conduct follow-up inspections to ensure corrective action is provided. An additional NOV may be issued if corrective action is not provided. Appropriate civil or criminal penalties may be issued.

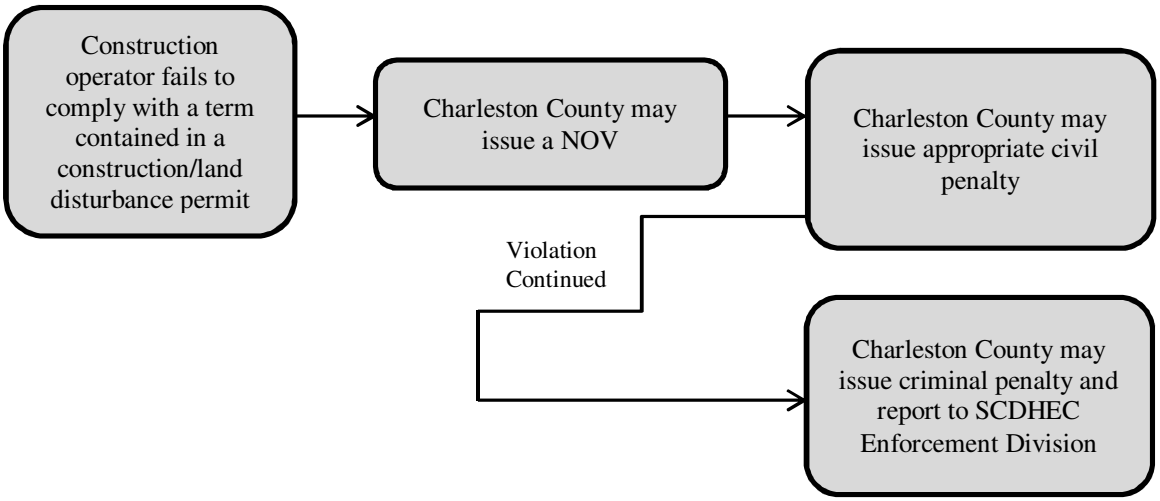


D. Failure to Comply with Permit

Failure to comply with a requirement, condition, or term contained in a construction permit, site development, land disturbance, or grading permit.

Charleston County response:

Charleston County may issue Notice of Violation (NOV) upon initial discovery of violation. Charleston County will conduct follow-up inspections to ensure corrective action is provided. Appropriate civil or criminal penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.

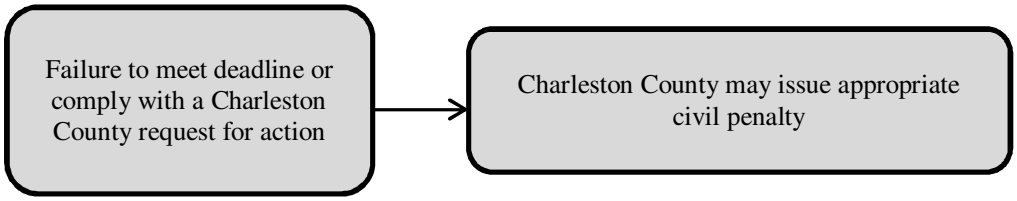


E. Failure to Comply with a County Request

Failure to comply with each requirement, term, or condition of a County request for action.

Charleston County response:

For instances in which there is a failure to comply with a condition of a County request for action, Charleston County may issue civil penalties when deadlines are not met.



IV. PENALTY CALCULATION RATIONALE

The total penalty calculation will include consideration of the following factors at the discretion of Charleston County:

1) Degree of harm or potential for harm to the public health, safety, private property, or the environment.

2) Extent of Deviation* from the requirements of the regulation, standard, or permit.

3) Frequency or duration of the violation.

4) Economic benefit as a result of noncompliance.

5) Cost of restoration of the environment or abatement of the environmental harm.

6) Past performance record or past history of noncompliance.

7) Degree of willfulness or negligence.

*Extent of Deviation for civil penalty comes from flow charts for each violation category. When not specified, the maximum civil penalty is to be determined by Charleston County. Suggested civil penalties are as follow:

	Suggested Maximum Civil Penalty (per day)
Minor	$500
Major	$1000

When a violation is determined to involve criminal action, an additional criminal penalty of $500 per day may be assessed.

A total penalty assessment rationale will be developed and outlined in writing for each enforcement action for which a penalty is assessed.

Penalties for long-lasting and/or continuing violations (such as, but not limited to, unauthorized discharges or poor operation and maintenance) and recovery of economic benefit may be assessed per occurrence, per month, or per week.

SWMP Appendix G
Contract with Clemson University - Carolina Clear Education Program

Agreement

between

CLEMSON UNIVERSITY

and

CHARLESTON COUNTY

WHEREAS, Clemson University (hereinafter, CLEMSON) holds in its Extension faculty and staff with various levels of expertise concerning stormwater compliance requirements as promulgated by SC DHEC and USEPA, and

WHEREAS, Charleston County is seeking to implement stormwater education and public involvement programming; and

WHEREAS, Clemson University has developed an environmental outreach program (Carolina Clear), portions of which apply to the impact of stormwater on natural resources;

THEREFORE, be it resolved that since Carolina Clear seeks to educate citizens about the impacts of stormwater and means to improve stormwater management and since this program provides outreach opportunities to address a broad range of water quality issues including the impact of stormwater on natural resources, Clemson and Charleston County will collaborate to address stormwater education and involvement. Carolina Clear is a comprehensive approach developed by Clemson University Cooperative Extension Service to inform and educate communities about, among other issues, water quality, water quantity and the cumulative effects of stormwater. Carolina Clear addresses the special significance of South Carolina's water resources and the role these resources play in the state's economy, environmental health, and overall quality of life.

In order to assist Charleston County in satisfying the Public Education and Outreach Minimum Control Measure as required by the EPA Phase II Stormwater Program, the Clemson University Cooperative Extension Service (CUCES) proposes to utilize selected components of the Carolina Clear program in order to:

- Coordinate and support a regional body of collaborators including community representatives joined together by a shared interest in watershed restoration, protection, and improved stormwater management.
- Determine the appropriate public awareness campaign with Charleston County and the community's guidance on target behaviors, audiences, pollutants, and established venues and modes for outreach. Some program implementation approaches, BMPs *(i.e.,* the program actions/activities), and measurable goals are contained in the individual agreement and seek to:
  - Form collaborative relationships,
  - Use and develop education materials and strategies, and
  - Reach diverse audiences.
- Implement a strategic public education program with Charleston County, or conduct

equivalent outreach activities addressing the awareness of stormwater pollution and its effects on natural resources and the specific activities and safe alternatives to improve stormwater management.

In order to satisfy the Public Involvement/Participation Minimum Control Measure, CUCES proposes to:

- Provide opportunities for audiences to become active in stormwater management.
- Provide program accountability measures including estimated number of people contacted, publications produced and distributed, and measures of outreach impacts and possible behavior change, and other specifics as appropriate considering DHEC and EPA guidance.
- Other programs and measures as specified in the Contractual Agreement.

Because each agreement is unique to the requirements of the circumstances, Clemson and Charleston County agree that the specific metrics of each contract shall be individually negotiated and delineated in the Contractual Agreement. Neither party has any responsibility for any performance obligations except as indicated in a subsequently negotiated Contractual Agreement.

This Agreement will commence upon the date of the signature of the last party to this contract and will run thereafter for a period of five (5) years from the date of the last signature. The parties may agree in writing to extend this agreement for an additional 5-year period, provided such agreement is executed no later than 30 days prior to the expiration of this contract. No amendments, changes or modifications will be effective until and unless reduced to writing and signed by the parties. Either party may cancel this agreement upon the giving of 30 days written notice.

Dr. George Askew, Vice President

Vice President for PSA

7/6/18

Date

Jennifer Miller, County Administrator

Charleston County

6/14/18

Date

Contractual Agreement
between
CLEMSON UNIVERSITY
and
CHARLESTON COUNTY

PUBLIC awareness and education about natural resources is crucial in the process of protecting and restoring water quality. Clemson University (Clemson) and Charleston County will work together to deliver education and involvement programming to general and targeted audiences to work towards achieving compliance with Phase II Clean Water Act: Stormwater Education and Awareness and Public Involvement/Participation. More specifically, these are referred to as Minimum Control Measures One and Two.

NOW, the parties agree as follows:

1. Clemson will deliver public education and outreach with a goal to educate a more aware and involved public in regards to stormwater management decisions. The educational programs will include components designed for various residential and commercial audiences and others targeted for their impact to stormwater and nonpoint source pollution. This effort will be delivered through various means, as detailed below in items 4 and 5. Events will be held at Clemson and/or other available facilities in such a way to reach diverse and regionally distributed audiences. Such instruction may include the furnishing of informational handouts, instructional manuals, promotional materials, webpages and similar such materials, as deemed appropriate by Clemson and the participating entity.

2. Charleston County will participate in a regional decision-making process to define regional priorities in regards to behaviors, pollutants and audiences to be targeted for outreach. Charleston County shall provide input as available on audience demographics, behaviors based on staff observations, commercial impacts related to stormwater management that may lead to compliance and enforcement actions, and other input based on stormwater operations.

3. Charleston County shall provide information regarding readily available delivery modes for education and involvement programming (e.g., newsletters, community calendars, government access channels, community-mayor meetings, tax or water bills, etc.).

4. Clemson will use a mass media approach, which may include the use of billboard and television public service announcements, radio broadcasts and interviews, newspaper articles, stories and advertisements, and publications to raise public awareness of stormwater issues.

5. Each of the public-related activities described below will be part of the base program on an annual basis and will target a specific audience, all subject to modification with the approval of Charleston County and Clemson, as well as acknowledging regulatory direction and interpretation by South Carolina DHEC.

Clemson University will:

LEAD

5.1. Work with one regional association of **stormwater managers and local decision-makers** to update, plan, and determine regional stormwater education and involvement priorities from year-to-year (in this case, the Ashley Cooper Stormwater Education Consortium).

5.2. Explore, pilot (as needed) and initiate strategic approaches to educating target audiences towards the goal of adopting improved behaviors and practices towards better stormwater management.

COMMUNICATE

5.3. Maintain webpage(s) with content specific to the regional outreach programs. Utilize tools to monitor website visits and other related statistics.

5.4. Maintain communication among regional collaborators through meetings, newsletters/e-news, one-on-one meetings or other means established as best practice for successful collaboration efforts.

IMPLEMENT

5.5 Plan, develop, present and be a participant in at least three (3) **community** and **public** programs with emphasis on stormwater education. Provide resources to encourage continued learning and practice adoption.

5.6. Create at least three (3) news articles for the **general public.**

5.7. Plan and present homeowner and yard owner program(s) for **individuals** and **families.** Distribute or provide materials for distribution as part of workshops and/or provide resources to encourage continued learning and practice adoption.

5.8. Provide at least one (1) **youth** program per year within the region such as

i. Adopt-A-Watershed which uses a local watershed,
ii. Storm Drain Marking
iii. 4-H Wetlands Project explores estuaries, marshes, and swamps,
iv. 4H2O Summer Camp,
v. Engaging teachers in new watershed and stormwater curriculum meeting SC Standards, and
vi. Enviroscape.

5.9. Present at least one (l) program that addresses pollution prevention and alternatives for a **target audience, as per the region's priorities.**

5.10. Develop and provide for the **general public,** within means, items such as banners and displays to serve as a way to attract and engage audiences, as well as increase regional consortium visibility.

5.11. Utilize mass media outlets to provide statewide education at an increased cost-effectiveness: as needed, locally utilize mass media such as newspapers, radio, interviews, and advertisements to address specific needs.

INVOLVE

5.12. Provide at least one (1) opportunity to involve an audience (**general public** or **commercial**) in improved watershed management and stormwater awareness.

5.13. Promote and expand web-based tools to encourage learning about and adoption of low impact development techniques (SC LID Atlas) and furthering involvement from citizens in watershed-focused volunteer opportunities (Watershed Stewardship Map) and through the use of demonstration sites as warranted appropriate.

REPORT

5.14. Provide and manage a user-friendly database to track each year's activities.

5.15. Annually, produce a document summarizing the year's efforts, successes, decision-making processes, collaborations and regional priorities

5.16. On request and based on current regulatory guidance, provide data for public education and outreach and public involvement/participation measures of the Annual Report Checklist required by DHEC of all Municipal Separate Storm Sewer Systems (MS4s).

6. Clemson will provide accountability statistics for each of the activities as best can be estimated. The statistics will include the following accomplishment indicators:

6.1. Number of educational programs and activities conducted.

6.2. Number of people reached through educational programs or involved by outreach programs according to method, audience or targeted behavior.
6.3. Number of people receiving information through "non-program" contacts such as telephone, office, visits, website contacts, visual and print media.
6.2. Evaluation of activities and the pollutant or behavior targeted.
6.3. As available, feedback on programs and anecdotal evidence of successful program implementation.

7. At a minimum of *once per permit cycle* (anticipated as no less than 3 years and no more than 5 years), and on the Carolina Clear statewide schedule so as to gain regional comparison information, implement statistically relevant survey instruments to gain insight on the awareness, knowledge and behaviors of the general public related to stormwater and watershed management as well as regional effort awareness.

8. Charleston County shall provide payment in the amount of $35,000 annually for the base program. Fees for any additional services will be negotiated based on cost. These costs are based on the urbanized area population of each MS4, county and/or defined area(s).

9. A mutually agreeable delivery schedule shall be agreed upon within 30 days of execution of this agreement, and said delivery schedule shall provide activities distributed through each year in an Annual Activity Plan (as default) or on an otherwise agreed upon multi-year activity plan, which will be noted as a regional decision documented in writing for the regional entity.

10. Clemson is insured by the State Insurance Reserve Fund pursuant to the State Tort Claims Act. Charleston County is also insured by the State Insurance Reserve Fund. The parties agree that each shall be responsible for the negligent acts or omissions of its own officers, employees and agents acting within the scope of their employment and that neither is responsible for the negligent acts or omissions of the other's officers, employees and agents in the performance of the requirements of this agreement.

This contract is subject to the terms and conditions of the Agreement between Clemson and Charleston County dated _____, which are fully incorporated herein by reference.

Dr. George Askew, Vice President

Vice President for PSA

12/6/18
Date

Jennifer Miller, County Administrator

Charleston County

6/14/18
Date