Appendix J to the Houston-Galveston Area Council (H-GAC) Multi-Basin Clean Rivers Program FY 2022/2023

Targeted Monitoring in Selected Assessment Units (AUs)

Prepared by the Houston-Galveston Area Council (H-GAC) in cooperation with the Texas Commission on Environmental Quality (TCEQ)

Effective: Immediately upon approval by all parties

Questions concerning this QAPP should be directed to:

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SS-A1 Approval Page

Texas Commission on Environmental Quality

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Electronically Approved 2/13/2023

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Eastex Lab Quality Assurance Officer	

Texas Research Institute for Environmental Studies (TRIES)

Electronically Approved 2/10/2023

Dr. Rachelle Smith Date
TRIES Laboratory Manager & Quality Assurance Officer

H-GAC will secure written documentation from each sub-tier project participant (e.g., subcontractors, other units of government) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. Signatures in section A1 will eliminate the need to adherence letters to be maintained. H-GAC will maintain this documentation as part of the project's quality assurance records and will ensure the documentation is available for review.

See sample letter in Appendix SS-1 of this document.

SS-A2 Table of Contents

List of Acronyms

As described in Section A2 of the *H-GAC Multi-Basin QAPP* plus the following:

BIG	Bacteria Implementation Group
BIG	Bacteria Implementation Group
Geomean	Geometric Mean
I-Plan	Implementation Plan
LU/LC	Land Use/Land Cover
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System
PCR1	Primary Contact Recreation 1
PM	Project Manager
SCR1	Secondary Contact Recreation 1
SOP	Standard Operating Procedure
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey

SS-A3 Distribution List

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H-GAC will provide copies of this project plan and any amendments or appendices of this plan to each person on this list and to each sub-tier project participant, e.g., subcontractors, subparticipants, or other units of government. H-GAC will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and ensure the documentation is available for review. Sub-Tier participants & Laboratories which may assist with project and therefore will receive copies of this QAPP include:

- Environmental Institute of Houston, University of Houston-Clear Lake
- Texas Research Institute for Environmental Studies & Laboratory
- Eastex Environmental Laboratory

SS-A4 Project/Task Organization

TCEQ

Sarah Whitley
Team Leader, Water Quality Standards and Clean Rivers Program
Responsible for Texas Commission on Environmental Quality (TCEQ) activities supporting the development and implementation of the Texas Clean Rivers Program (CRP). Responsible for verifying that the TCEQ Quality Management Plan (QMP) is followed by CRP staff. Supervises TCEQ CRP staff. Reviews and responds to any deficiencies, corrective actions, or findings related to the area of responsibility. Oversees the development of Quality Assurance (QA) guidance for the CRP. Reviews and approves all QA audits, corrective actions, reports, work plans, contracts, QAPPs, and TCEQ Quality Management Plan. Enforces corrective action, as required, where QA protocols are not met. Ensures CRP personnel are fully trained.

Jason Natho
Acting Lead CRP Quality Assurance Specialist
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists program and project manager in developing and implementing quality system. Serves on planning team for CRP special projects. Coordinates the review and approval of CRP QAPPs. Prepares and distributes annual audit plans. Conducts monitoring systems audits of Planning Agencies. Concurs with and monitors implementation of corrective actions. Conveys QA problems to appropriate management. Recommends that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Ensures maintenance of QAPPs and audit records for the CRP.

Jenna Wadman
CRP Project Manager
Responsible for the development, implementation, and maintenance of CRP contracts. Tracks, reviews, and approves deliverables. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists CRP Lead QA Specialist in conducting Basin Planning Agency audits. Verifies QAPPs are being followed by contractors and that projects are producing data of known quality. Coordinates project planning with the Basin Planning Agency Project Manager. Reviews and approves data and reports produced by contractors. Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Develops, enforces, and monitors corrective action measures to ensure contractors meet deadlines and scheduled commitments.

Sarah Whitley
Acting CRP Project Quality Assurance Specialist
Serves as liaison between CRP management and TCEQ QA management. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Serves on planning team for CRP special projects and reviews QAPPs in coordination with other CRP staff. Coordinates documentation and implementation of corrective action for the CRP.

Houston-Galveston Area Council (H-GAC)

Todd Running
H-GAC CRP Project Manager
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by H-GAC and basin partners and that projects are producing data of known quality. Ensures that basin partners are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of deficiencies and corrective actions, and that issues are resolved. Responsible for confirming that data collected are validated and are acceptable for reporting to the TCEQ.

Steven Johnston
H-GAC TMDL Project Manager
Responsible for ensuring that all tasks and other requirements in the contract are executed on time and with the quality assurance/quality control (QA/QC) requirements as defined by the contract and in the project QAPP; assessing the quality of subcontractor/participant work; submitting accurate and timely deliverables to the TCEQ TMDL PM; and coordinating attendance at conference calls, trainings, meetings, and related project activities with TCEQ. Responsible for verifying that the project is producing products of known and acceptable quality. Ensures work satisfies project objectives as well as contract and work plan requirements. Coordinates the project committee of responsible parties.

Jean Wright
H-GAC Quality Assurance Officer
Responsible for coordinating the implementation of the HGAC CRP QA program. Responsible for writing and maintaining the *Multi-Basin QAPP* and monitoring its implementation. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of basin partner commitment to requirements specified in this QAPP as needed. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Notifies the H-GAC Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Coordinates and maintains records of data verification and validation. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts monitoring systems audits on basin partners to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that field staff is properly trained and that training records are maintained.

Jessica Casillas
H-GAC Data Manager
Responsible for ensuring that field and laboratory data collected by or submitted to H-GAC CRP are properly reviewed, verified, and validated. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in the format described in the DMRG, most recent version. Maintains quality-assured data on H-GAC internet sites.

Eastex Environmental Laboratory (Eastex) (Coldspring, TX)

Tiffany Guerrero
Laboratory Technical Director
Responsible for the overall performance, administration, and reporting of analyses performed by Eastex Environmental Laboratory (Coldspring, TX). Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately.

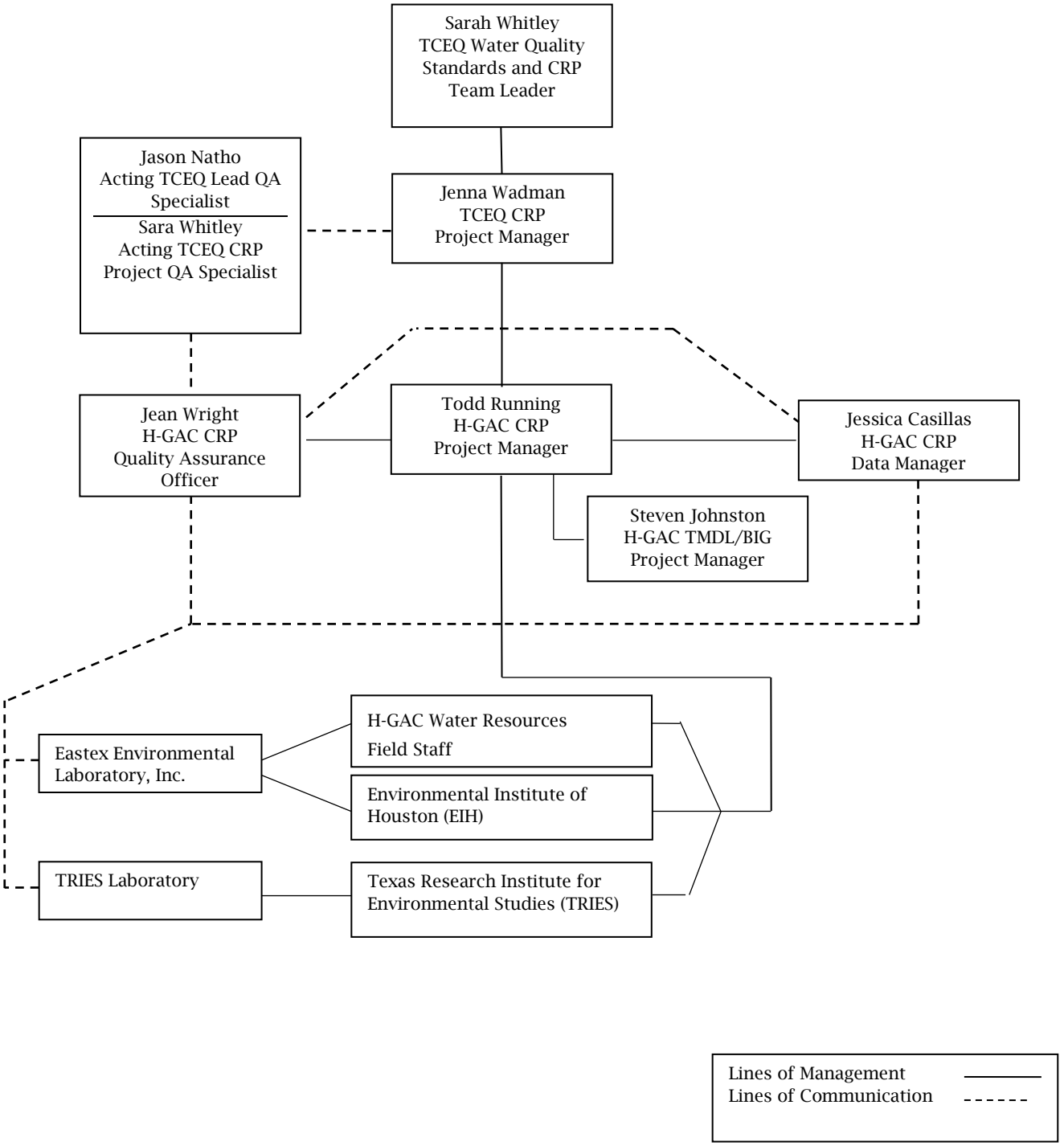
Emily McGregor
Laboratory Quality Assurance Officer
Responsible for the overall quality control and quality assurance of analyses performed by Eastex Environmental Laboratory (Coldspring, TX). Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by this QAPP. Coordinates and monitors deficiencies and corrective actions. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

Texas Research Institute for Environmental Studies (TRIES)

Dr. Rachelle Smith
Laboratory Manager / Laboratory Quality Assurance Officer
Responsible for the overall quality control and quality assurance of analyses performed by TRIES Lab. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by this QAPP. Coordinates and monitors deficiencies and corrective actions. Conducts in house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

Project Organization Chart

Figure SS-A4.1. Organization Chart – Lines of Communication



SS-A5 Problem Definition/Background

Clean Rivers Program (CRP) routine monitoring data is analyzed each year as part of the Houston-Galveston Area Council (H-GAC) Basin Summary/Basin Highlights Reporting process. Bacteria continues to be the most prevalent pollutant in the H-GAC CRP Basins. The Bacteria Implementation Group (BIG), which was formed in 2008 and oversees the TMDL Implementation Plan (I-Plan), desired that H-GAC produce a list of the water bodies with the highest bacteria concentrations in the BIG project area and conduct targeted monitoring that would help identify sources of bacteria in the BIG project area. That monitoring was conducted from FY2015-2017 under a grant from the Galveston Bay Estuary Program (GBEP) and was highly successful. While many large sources of bacteria were discovered and have been fixed or are scheduled to be fixed, stakeholders throughout the region have an interest in conducting more of this type of sampling due to its positive impact on water quality.

The initial FY2015 Targeted Monitoring Project focused on the five most contaminated and the five least contaminated watersheds in the BIG area. Overall project results indicated the most significant sources of bacterial contamination were from dry weather discharges, leaking or faulty collection systems and pipelines, etc., whereas bacteria sources impacting the least impaired segments were likely related to nonpoint sources of pollution.

The FY2021 Targeted Monitoring Project focused on ten watersheds that were divided into four highly urbanized areas, four suburban areas, and two rural areas. As in the previous targeted monitoring projects, contaminated dry-weather flows were and will be referred to the appropriate, responsible local jurisdiction for further investigation and repair/remediation.

In the 2022-2023 fiscal years, H-GAC's CRP, using information from previous Basin Highlights/Summary Reports, BIG annual reports, and previous targeted monitoring efforts, will address selected waterways to refine our spatial understanding of where extremely high bacterial concentrations are found in these waterways. The project will be fully documented to continue demonstrating the value of a prioritized watershed and targeted monitoring approach.

Monitoring conducted under the Project Work Plan for the BIG (TCEQ Contract No. 582-20-13156-12) will adhere to the CRP *Multi-Basin Quality Assurance Project Plan*.

SS-A6 Project/Task Description

H-GAC analyzed bacteria data to develop a list of water bodies within H-GAC's CRP Basins with the highest bacteria concentrations. From this list, H-GAC identified assessment units (AUs) for dry weather targeted monitoring. To simplify and monitor progress, this project has been split into three phases.

A seven-year geometric mean (geomean) analysis defining the severity of impairment was performed on two levels. See Phase 1 for how this was calculated.

Phase 1 – Selection of Waterbodies to Investigate

In 2022, H-GAC conducted a data analysis of all impaired waterbodies in its CRP basins to identify the AUs with the highest bacterial contamination. The data analysis used ambient monitoring data collected from 1/1/14 – 12/31/21 by H-GAC and its local partners through the quality-assured Texas Clean Rivers Program (CRP) and TCEQ Surface Water Quality Monitoring (SWQM) Program. These data were downloaded from SWQMIS to ensure only approved and quality-assured data were used.

Data analysis produced a list of AUs that were prioritized based upon the geometric mean calculated for the most recent seven-year period in comparison with the state water quality standards for contact recreation. First, the TCEQ-delineated individual AUs were ranked from highest geomean to lowest geomean. Secondly, the seven-year geomean per individual sample stations was calculated to help with ranking. After the data analysis was completed, H-GAC ranked water bodies at the AU level using the highest geomean relative to the state standards for contact recreation. The complete list of all AUs evaluated is in Appendix SS-2 (see Table App SS-2).

Next, H-GAC staff conducted a cursory desk review using general GIS Aerial Image Review to identify which AU catchment areas appeared to have accessibility to the stream for field investigations. H-GAC's cursory desk review was based upon six criteria:

1. Bacteria ranking
2. Excluded Galveston Bay Estuary Program projects
3. Excluded AUs which had previously been investigated and had sources identified (and remediation steps completed or in progress)
4. Included AUs which had previously been investigated but did not have sources identified (or remediation steps were not initiated or resolved)
5. Reasonableness or viability of the site (segment length, accessibility, stream order, etc.)
6. AUs in close proximity (for cost-saving/efficiency measures).

A committee comprised of jurisdictional authorities with responsibility for the targeted AUs (cities, MUDs, WCIDs, etc.), program partners, and watershed entities will be convened. This committee may assist in the selection of AUs for desktop review in Phase 1 or to review concerns and provide assistance in Phase 2 and Phase 3. Local CRP partners [City of Houston Health Department (HHD) or Drinking Water Operations (DWO), Environmental Institute of Houston (EIH), Texas Research Institute for Environmental Studies (TRIES), and the San Jacinto River Authority (SJRA)] participated in an advisory capacity alongside H-GAC in the selection of AUs, determination of the best possible monitoring sites, and identification of potential sources that should be investigated as part of the Phase 2 monitoring based upon their knowledge of the waterbodies.

Phase 1 of this targeted monitoring project includes 1) an intensive desktop review, 2) a windshield survey of each AU catchment area, and 3) sampling of the AU from primary road crossings. The intensive desktop review included an evaluation of permitted dischargers, outfalls, and potential sources of point source and nonpoint source pollution that may contribute to bacteria loading into the stream segment. The project committee were asked to participate or contribute to this intensive desktop review, including verification of potential sources of pollution. The results of the Phase 1 intensive desktop review and ground-truthing were used to select AUs for inclusion in the project and indicate where the intensive monitoring should begin. Monitoring activities may be adjusted based on further discussions with, or information provided by, the project committee.

As the result of the desktop review, fourteen impaired water bodies (AUs) (including two optional/alternate AUs) were selected and prioritized for conducting windshield surveys of the catchment area and field sampling. The desktop review began with a list of the 20 most impacted AUs, based upon the bacteria geometric mean relative to the primary contact recreation 1 (PCR1) standard. For AUs with a secondary contact recreation 1 (SCR1) designation, the geomean was compared to the PCR1 standard instead of the SCR1 standard. The determination to use the PCR1 standard was made by H-GAC Water Resources staff in order to keep this project consistent with previous projects which used the PCR1 standard. Additionally, because the PCR1 standard is more protective of public health than the SCR1 standard, the decision was made to use the more stringent bacteria standard. Since the long-term goal of remediation activities would be to achieve the PCR1 standard (even with a SCR1 use designation), H-GAC chose to use the PCR1 standard for our rankings.

H-GAC Water Resources staff reviewed data and maps of each potential AU identified in the cursory review. Previously monitored AUs were selected for reinvestigation if remediation steps were not implemented or were incomplete or to determine if there are still elevated bacteria levels. These follow-up investigations are to examine the degree of severity and verify sources and/or identify sources that were not identified previously.

Windshield surveys of the catchment area and bacteria sampling at some of the bridges within each catchment area will occur on most AUs (those listed as new sites in Table SS-

B1.1). The survey consists of driving nearly every block or street of the catchment area to confirm identified pollution sources found during the desktop review and to find any potential sources not identified during the desktop review. Bridge crossings chosen for sampling will be located approximately the same distance apart in an attempt to isolate sections of the waterway where higher bacteria concentrations could be found. Those areas will be focused upon during the intensive dry weather investigations in Phase 2. Other potential contributing variables identified during this phase will be included in the final report and made into recommendations to the BIG or other I-Plans.

Phase 2 – Dry Weather Targeted Monitoring

Based on the prioritization, twelve watersheds will be monitored during dry weather conditions, with two alternate AUs. For this project, dry weather sampling is defined as sampling dates or periods of time following a 72-hour antecedent dry period.

The intensive monitoring will require H GAC or its sub-contractor (EIH or TRIES) to survey each waterway and document all discharges flowing during dry weather. However, no MS4 permitted outfalls will be sampled during this project. Only ambient water upstream or downstream of a dry weather flow will be sampled. Samples will not be collected from a discharge pipe. For AUs not monitored previously, the investigation will cover the entire length of the AU, with sampling at locations selected throughout the length of the AU to help identify potential sources of pollution. For AUs that were monitored during previous targeted monitoring projects, a partial investigation will be conducted by H-GAC or its sub-contractor. This partial investigation will focus on monitoring locations that have previously shown elevated bacteria levels, or upstream sites that may contribute to the bacteria levels observed at those identified locations.

When there is more than one ambient water monitoring station located on an AU, the data for each site will be reviewed individually and then compared against each site to prioritize where targeted monitoring should begin. For AUs with multiple stations, the area where the highest bacteria concentration is found will be an area of interest where field monitoring will be initiated first. Bacteria samples (*E. coli*) may be collected at locations upstream and downstream of the station to identify and refine source identification. Windshield surveys will also be utilized to identify potential sources such as pipes, drains, line breaks, etc., with monitoring occurring upstream and downstream of these potential sources to examine their contribution to bacterial loading. Where there is only one monitoring site per AU, ambient water quality monitoring will be conducted throughout the AU from primary road crossings since it will not be possible to isolate areas with the highest bacteria concentrations based upon the existing one-monitoring site data. Sample locations monitored as part of this targeted monitoring project will be identified and logged into the GPS for use in reporting. These GPS coordinates will also allow field personnel to potentially return to the location for later re-testing to verify results or to help determine the effectiveness of remediation activities by the responsible party. All bacteriological samples will be analyzed at one of H-GAC's CRP partner NELAP-approved labs as identified in Table SS-A7.1.

Phase 3 – Documentation of Findings

Areas and outfalls with elevated bacteria results identified during this assessment will be referred to the appropriate responsible city, district, or entity to request or encourage additional investigations to identify the actual source. The project committee may be asked to review the findings. H-GAC may conduct follow-up sampling based on the review and any corrective actions to address potential sources of pollution.

All efforts will be fully documented in the Special Study Desktop Review/Ground Truth Preliminary Reports and Special Study Source Identification Final Reports, which will be prepared by H-GAC, EIH, and TRIES for the AUs each entity monitors. The reports will address analysis results, project successes, and lessons learned. For CRP-funded AU sampling, the Special Study reports will be submitted to the TCEQ CRP Project Manager. For the AUs funded through the TMDL program, the Special Study reports will be submitted to the TCEQ TMDL Project Manager. The final project report, consisting of an Executive Summary and all Special Study Source Identification Reports, will be submitted to both the CRP and TMDL Project Managers.

Amendments to the Special Study Appendix

Amendments to the Special Study Appendix may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the H-GAC Project Manager to the CRP Project Manager electronically. Amendments are effective immediately upon approval by the H-GAC Project Manager, the H-GAC QAO, the CRP Project Manager, the CRP Lead QA Specialist, the CRP Project QA Specialist, and additional parties affected by the amendment. Amendments are not retroactive. No work shall be implemented without an approved Special Study Appendix or amendment prior to the start of work. Any activities under this contract that commence prior to the approval of the governing QA document constitute a deficiency and are subject to corrective action as described in section C1 of the *Multi-Basin QAPP*. Any deviation or deficiency from this QAPP which occurs after the execution of this QAPP should be addressed through a Corrective Action Plan (CAP). An Amendment may be a component of a CAP to prevent future recurrence of a deviation. Amendments will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the H-GAC Project Manager or Quality Assurance Officer.

SS-A7 Quality Objectives and Criteria

Existing data from other sources will be acquired and used as described in Section B9. Data will also be collected directly for this project but not submitted to TCEQ's SWQMIS database.

The purpose of the water quality monitoring described in this QAPP is to collect bacteria samples in impaired AUs found in twelve prioritized watersheds, identify potential sources of bacteria, and provide a reference for future monitoring to determine if there are any improvements post-source identification.

This project is an example of systematic watershed monitoring, which is defined by sampling that is planned for a short duration (1 to 2 years) and is designed to: screen waters that would not normally be included in the routine monitoring program, monitor at sites to check the water quality situation, and investigate areas of potential concern. Due to the limitations regarding these data (e.g., not temporally representative, limited number of samples), the data will be used to determine whether various locations have values exceeding the TCEQ's water quality standards for bacteria but will not be submitted to SWQMIS.

Bacteria samples will be collected following procedures established under the CRP. Bacteria samples will be processed at a NELAP-accredited lab. H-GAC and EIH will submit samples to Eastex Environmental. TRIES will analyze samples in their in-house laboratory. TRIES is authorized to use Eastex Environmental as a backup if necessary due to equipment issues, QA/QC issues, holding time compliance, or other necessary reasons. The list of laboratory parameters and the measurement performance specifications to support the project objectives are specified in Table SS-A7.1.

Table SS-A7.1 – Measurement Performance Specifications

Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias (%Rec. of LCS)	LOQ Check Sample %Rec	Lab
Bacteria Parameters (Water)										
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	Colilert**	31699	1	1	NA	0.50*	NA	TRIES
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	Colilert**	31699	1	1	NA	0.50*	NA	Eastex
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	Colilert-18**	31699	1	1	NA	0.50*	NA	Eastex
E. COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	Eastex TRIES

* This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result.
** E.coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).

Ambient Water Reporting Limits (AWRLs)

As described in Section A7 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Precision

As described in Section A7 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Bias

As described in Section A7 of the H-GAC *Multi-Basin QAPP* (Effective Date 9/1/22).

Representativeness

Routine data collection will not be the sampling goal for this project. Rather, targeted bacteria monitoring will be conducted in 12 selected AUs for the purpose of evaluating the quality of water in the selected waterways. Ambient samples, not from point sources, will be collected upstream and downstream of suspect dry weather flows to determine the influence of each dry weather flow on the bacteria concentration of the water body. Bacteriological measurements are considered representative of true environmental conditions at each location at that specific time.

Comparability

As described in Section A7 of the H-GAC *Multi-Basin QAPP* (Effective Date 9/1/22).

Completeness

As described in Section A7 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-A8 Special Training/Certification

As described in Section A8 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

CRP field personnel for H-GAC, EIH, and TRIES are experienced in the collection of bacteria samples.

SS-A9 Documents and Records

As described in Section A9 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

The H-GAC CRP Project Manager or Quality Assurance Officer will provide the H-GAC TMDL/BIG Project Manager with Status Update Reports as needed for weekly, quarterly, and summary reports as specified in the BIG Project Work Plan (TCEQ Contract No. 582-20-13156-12).

Table SS-A9.1a. Project Documents and Records – H-GAC

Document/Record	Location	Retention (yrs)	Format
Status Update Reports to CRP/TMDL Project Managers (including Quarterly Progress Reports)	H-GAC	>7	Electronic
Special Study Desktop Review/Ground Truth Preliminary Final Report	H-GAC	>7	Electronic
Special Studies Source Identification Final Report	H-GAC	>7	Electronic
Executive Summary Report	H-GAC	>7	Electronic

Table SS-A9.1b. Project Documents and Records – EIH

Document/Record	Location	Retention (yrs)	Format
Special Study Desktop Review/Ground Truth Preliminary Final Reports	H-GAC / EIH	>7	Electronic
Special Studies Source Identification Final Reports	H-GAC / EIH	>7	Electronic

Table SS-A9.1c. Project Documents and Records – TRIES

Document/Record	Location	Retention (yrs)	Format
Special Study Desktop Review/Ground Truth Preliminary Final Reports	H-GAC / TRIES	>7	Electronic
Special Studies Source Identification Final Reports	H-GAC / TRIES	>7	Electronic

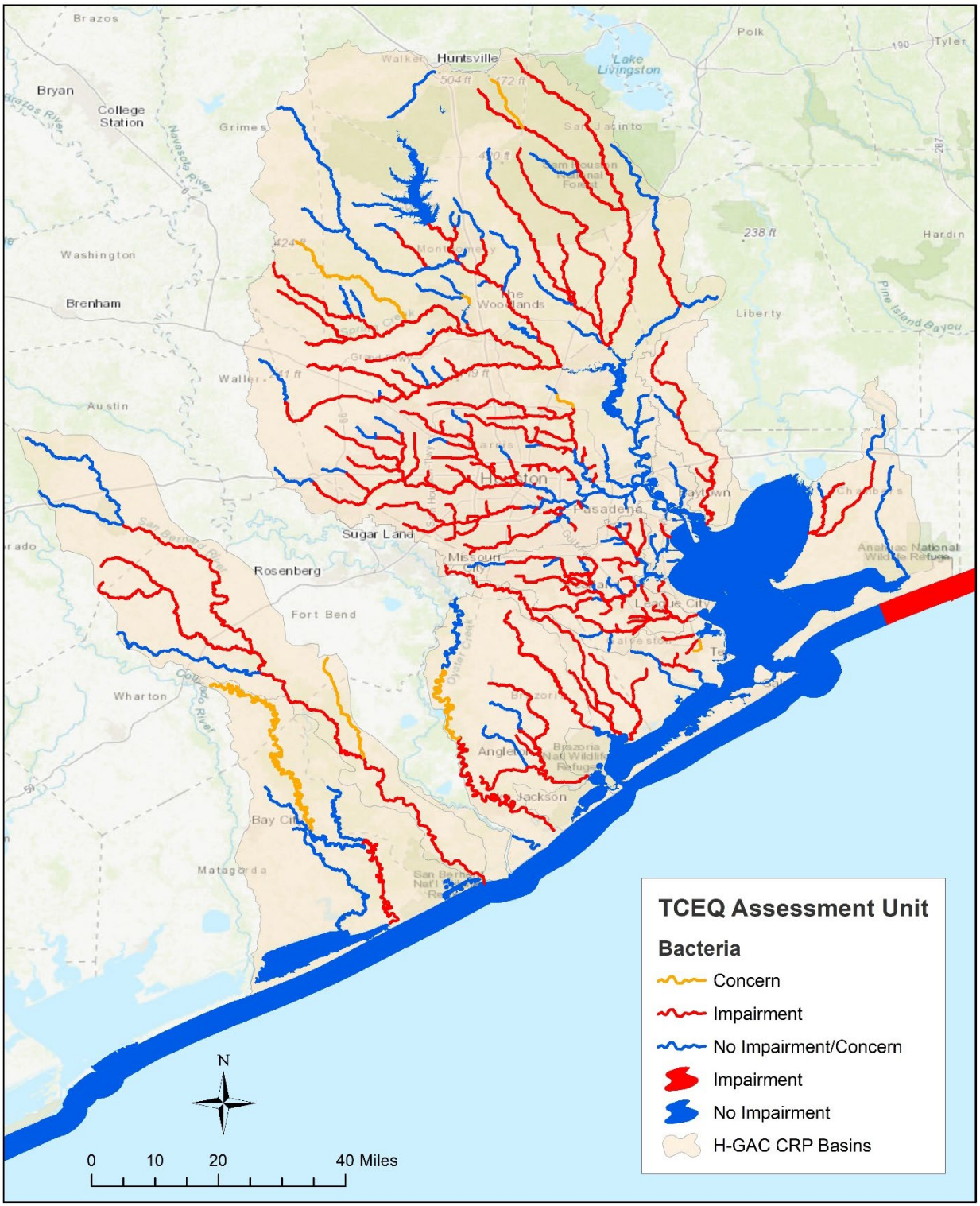
SS-B1 Sampling Process Design

Since identifying sources of bacteria is the primary goal of this special study, the number and location of samples to be collected will be determined during field reconnaissance. Whenever a dry weather flow is observed, field crews (H-GAC, EIH, or TRIES) will collect ambient water samples upstream and downstream of each dry weather flow and test for bacteria concentrations. No 'end-of-pipe' sampling will be conducted. No routine field parameters are planned to be collected other than date, time, location of each discharge, and days since last significant rainfall. Rainfall accumulation (over three days) will be recorded to help document dry weather. Information related to discharge pipe material, diameter, and depth of flowing water will be notated on field sheets to help assist in locating specific outfall locations for further monitoring or remediation. This data will be provided to the responsible entities to assist those entities in remediation efforts. Photos may be taken to help identify the dry weather flow site in the future. Other than the initial bacteria sampling being conducted at major road crossings in the catchment area, there is no 'pre-determined' data collection design to be summarized in a monitoring schedule. Samples will be collected upstream and downstream of the confluences with all tributaries to the main body of water being investigated. The sampling maps included in this QAPP show the water body and catchment area for each AU to be investigated. A map showing all sampling points will be developed as field work is completed and presented in the final report.

Stream Segments with Bacteria Impairments and Concerns

The map presented in Figure SS-B1.1 shows all the AUs with bacteria impairments or concerns for the entire H-GAC region, as identified in the 2022 Texas Integrated Report. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. The map does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact Jessica Casillas at 713-993-4594.

Figure SS-B1.1. Stream Segments within the H-GAC Region with Bacteria Impairments or Concerns



Using the priority list generated during the data analysis of the seven-year bacteria geomean for AUs and at individual sampling stations, H-GAC selected the AUs to be surveyed and investigated.

Sample Design Rationale and Site Selection Criteria

H-GAC identified and ranked bacteria impaired water bodies in the H-GAC CRP basins. The list of all ranked AUs can be found in Appendix SS-2. The list of potential watersheds (AUs) was sorted according to the most recently calculated seven-year geometric mean in comparison with the state water quality standards for contact recreation. Following input from local partners and/or stakeholders, twelve watersheds (AUs) and two alternate watersheds were selected for investigation from the overall prioritization list. That reduced list of AUs for investigation is provided in Table SS-B1.1.

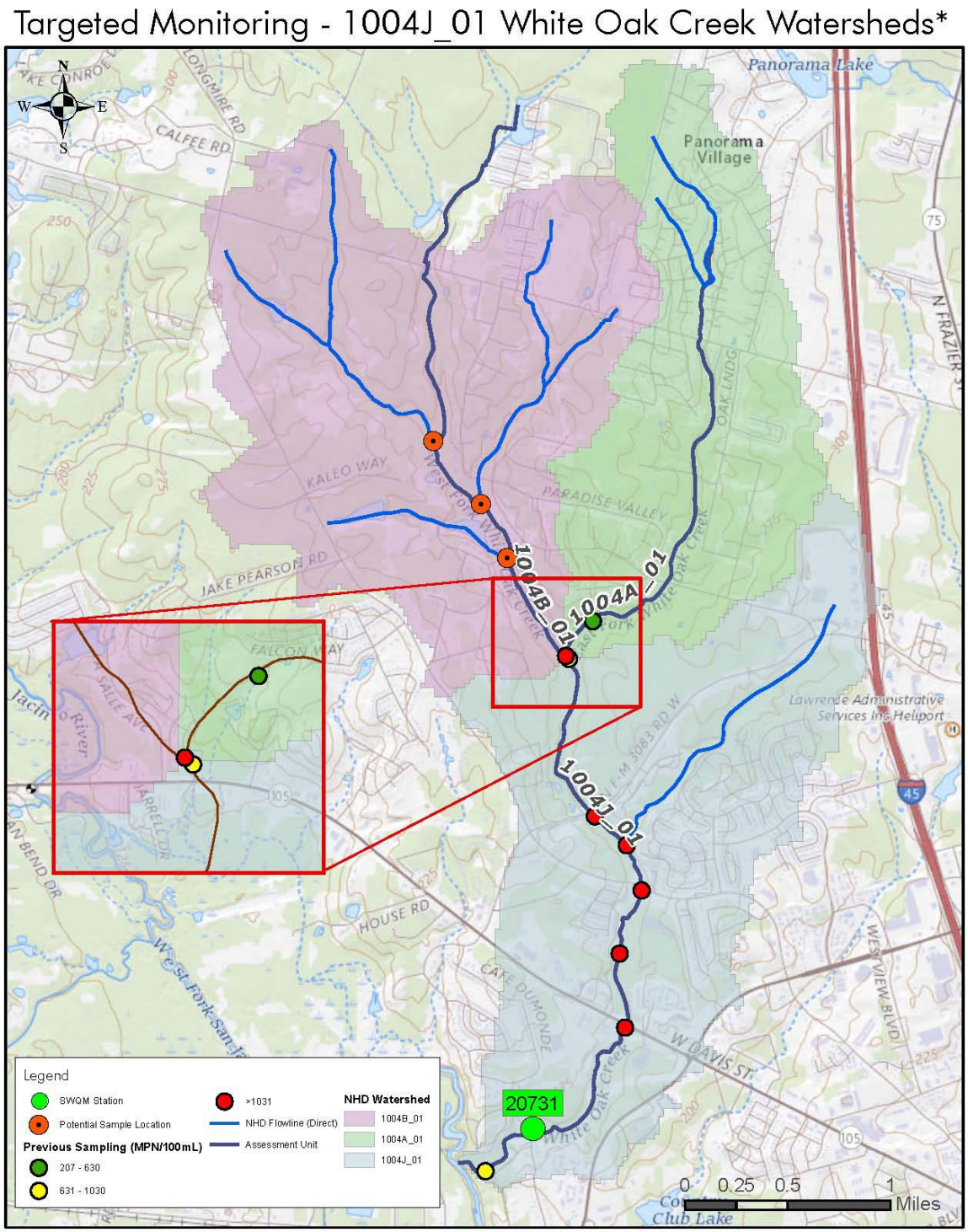
Table SS-B1.1. List of AUs for Targeted Monitoring Project

AU_ID	AU Description	Bacteria Geomean (MPN/100 mL)	New / Repeat	Investigations Performed & Reports Developed By	Funding Source	Activities
1004J_01	White Oak Creek (Conroe)	2981	Repeat	TRIES	TMDL	TRIES focuses on hot spots from FY21 study. Add investigations of upstream AUs. HG follows up with city/reasonable parties.
1007T_01	Bintliff Ditch	5969.1	Repeat	EIH	CRP	HG follows up with city/responsible parties. EIH conducts follow-up investigations.
1007U_01	Mimosa Ditch	1457.4	Repeat	EIH	CRP	HG follows up with city/responsible parties. EIH conducts partial/follow-up investigations.
1017E_01	Unnamed Tributary of White Oak Bayou	2288	Repeat	EIH	CRP	HG follows up with city/responsible parties. EIH conducts partial/follow-up investigations.
1017_03	White Oak Bayou Above Tidal	1624.8	New	EIH	CRP	Full investigations from beginning to end.
1017B_02	Cole Creek	1601.6	New	EIH	CRP	Full investigations from beginning to end.
1017A_01	Brickhouse Gully	1405.5	New	EIH	CRP	Full investigations from beginning to end.
1017D_01	Unnamed Tributary of White Oak Bayou	1225.9	New	EIH	CRP	Full investigations from beginning to end.
1016C_01	Unnamed Tributary of Greens Bayou	2023	New	TRIES	TMDL	Full investigations from beginning to end.
1016D_01	Unnamed Tributary of Greens Bayou	1535.9	Repeat	H-GAC	CRP	HG follows up with city/responsible parties. H-GAC conducts partial/follow-up investigations.
1014O_01	Spring Branch (Tributary of Buffalo Bayou)	1206.2	New	EIH	CRP	Full investigations from beginning to end.
1101D_01	Robinson Bayou Tidal / Above Tidal (LC)	305.4	Repeat	EIH	CRP	HG follows up with city/responsible parties first. EIH conducts partial/follow-up investigations. Monitoring for this project will only be conducted in the Above Tidal portion of this segment.
1009_04	Cypress Creek	1030.9	New	EIH	CRP	Alternate AU if time allows & money is still available
1006D_02	Halls Bayou	1014.1	New	EIH	CRP	Alternate AU if time allows & money is still available

The following maps (Figures SS-B1.2 thru SS-B1.15) zoom into the specific locations of each AU targeted for investigation during this project and show the initial locations where bacteria sampling may be conducted during the windshield survey. The presence of flow and accessibility will be determined in the field during the survey.

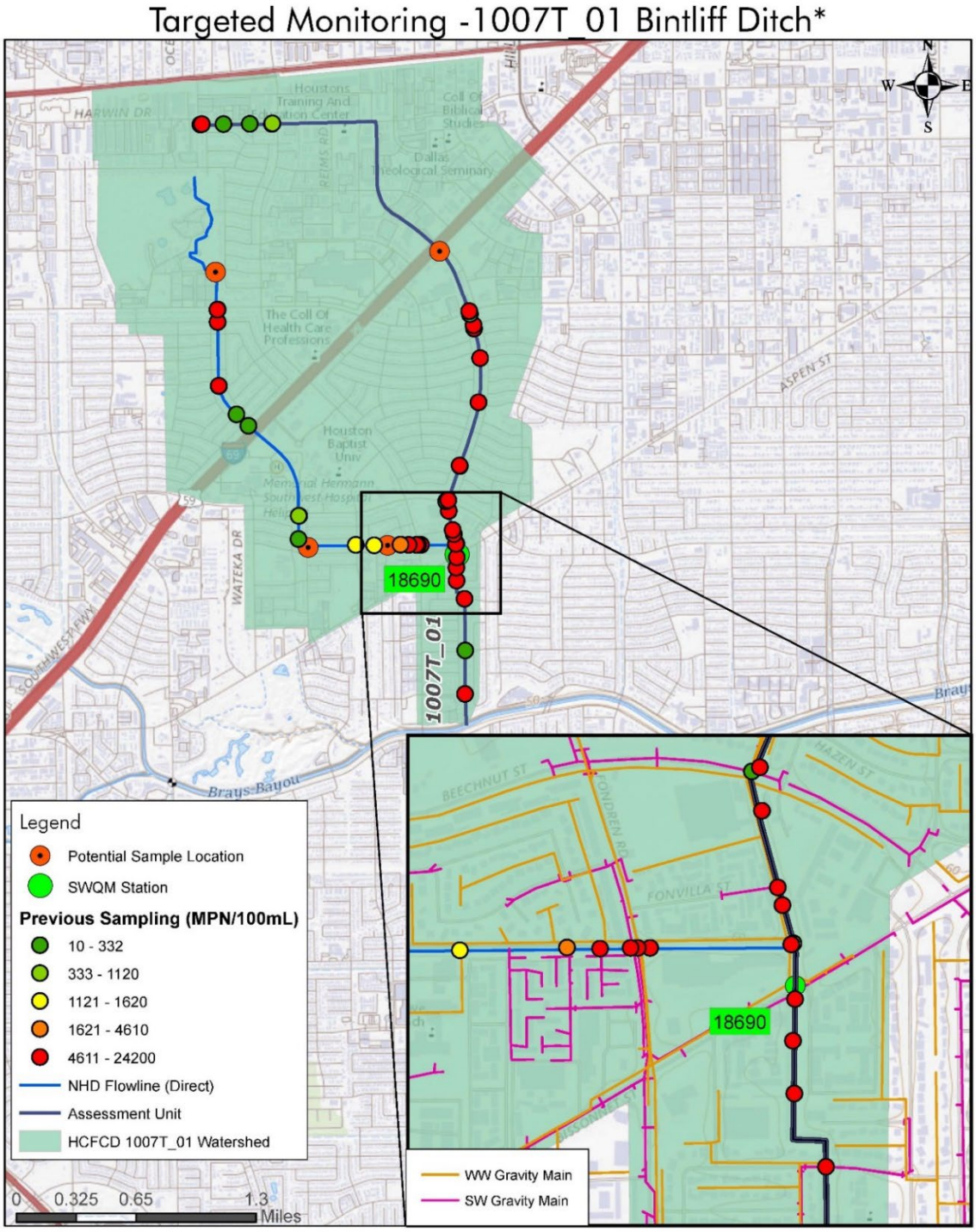
Maps marked with an asterisk (*) indicated segments that were previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.2. The catchment area for AU 1004J_01 (White Oak Creek (Conroe)) and possible locations for bacteria testing



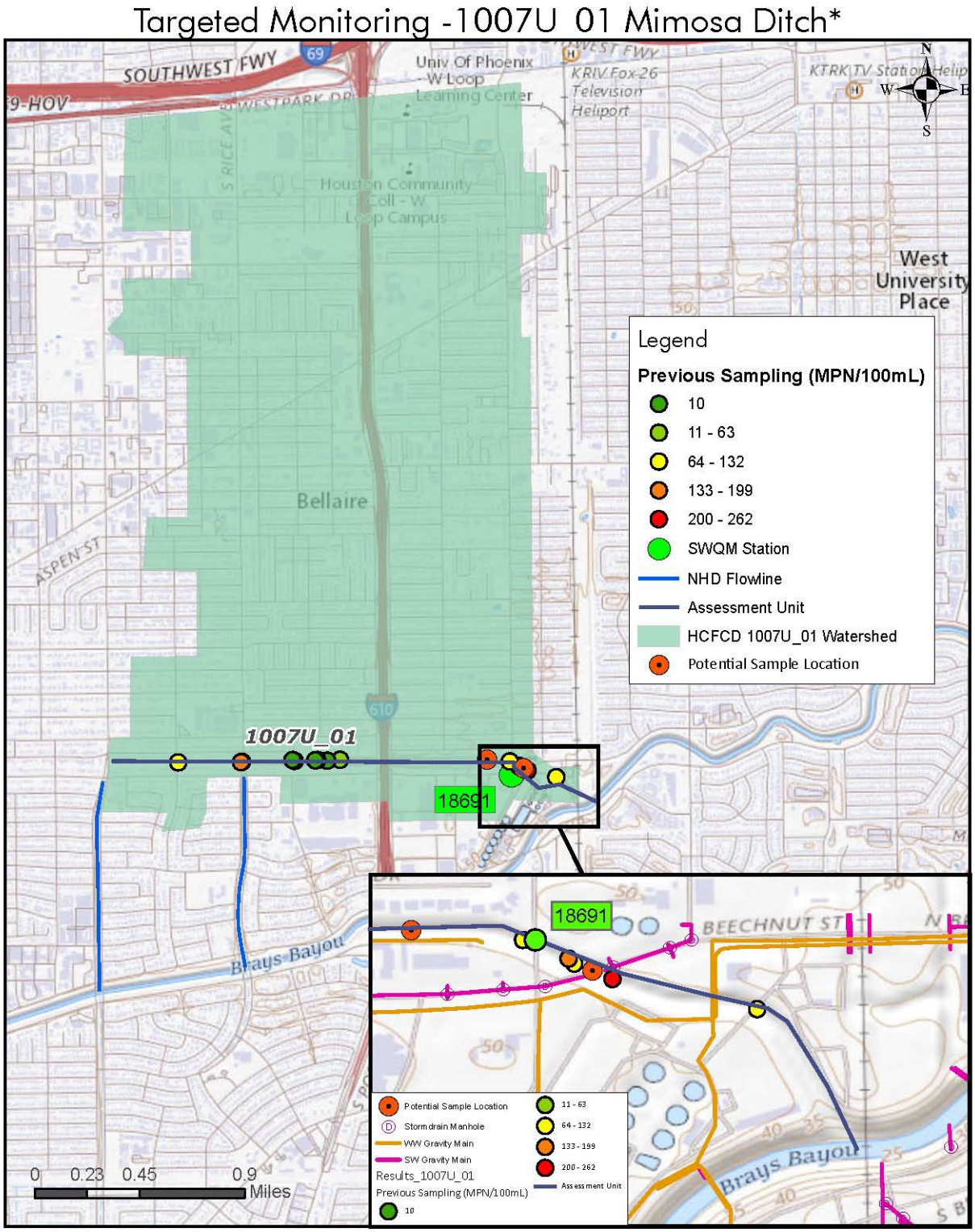
* Previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.3. The catchment area for AU 1007T_01 (Bintliff Creek) and possible locations for bacteria testing



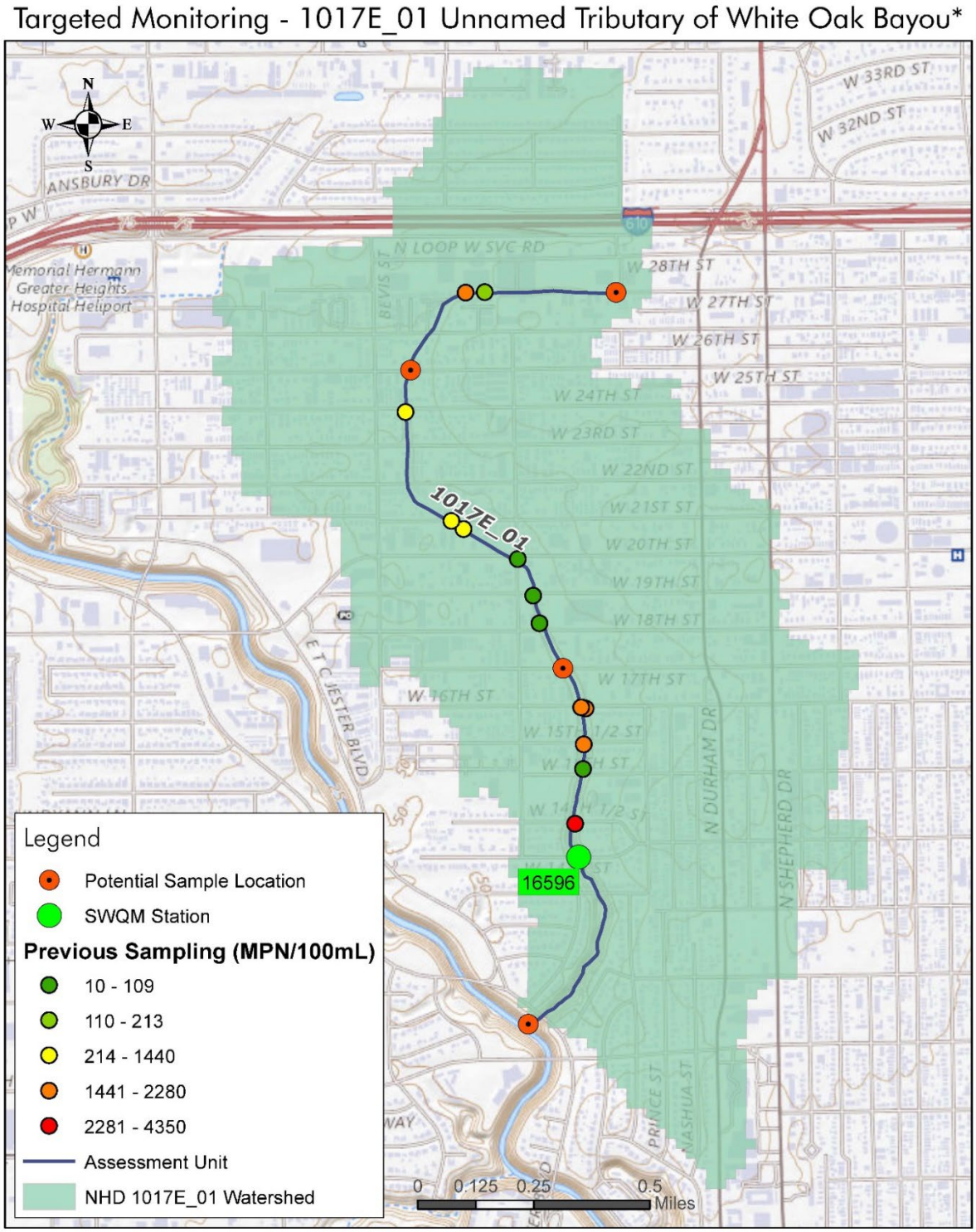
* Previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.4. The catchment area for AU 1007U_01 (Mimosa Ditch) and possible locations for bacteria testing



* Previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.5. The catchment area for AU 1017E_01 (Unnamed Tributary of White Oak) and possible locations for bacteria testing



* Previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.6. The catchment area for AU 1017_03 (White Oak Bayou Above Tidal) and possible locations for bacteria testing

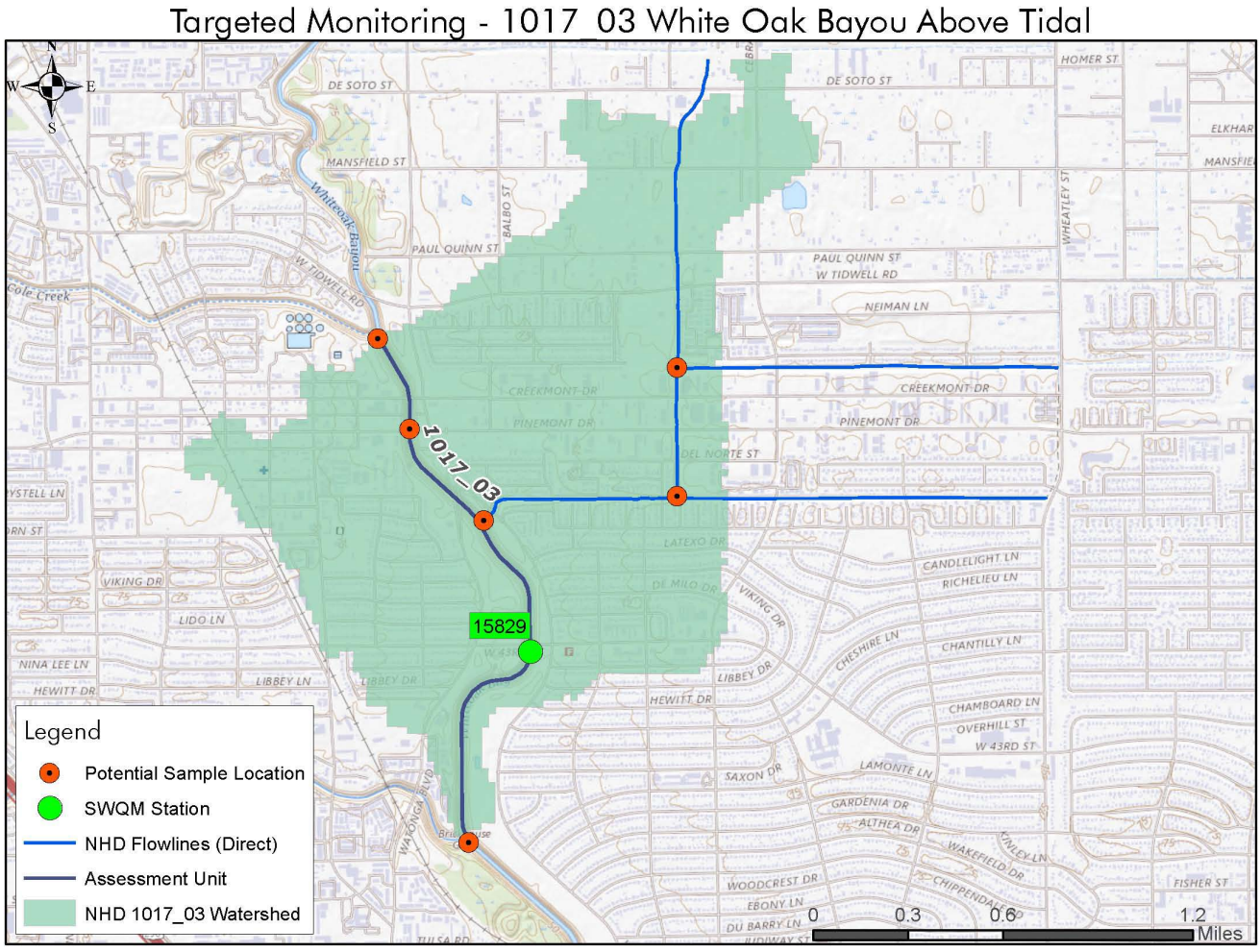


Figure SS-B1.7. The catchment area for AU 1017B_02 (Cole Creek) and possible locations for bacteria testing

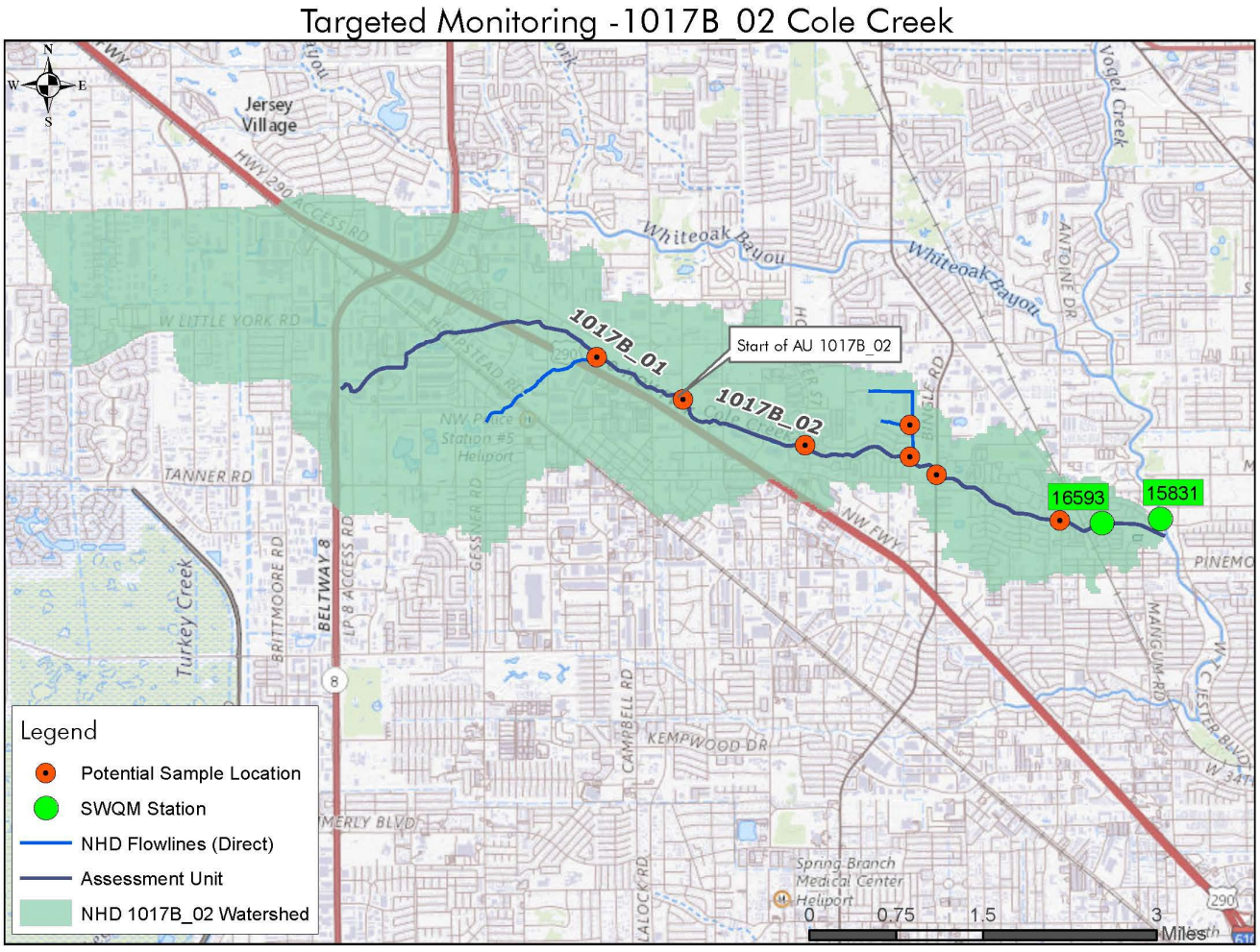


Figure SS-B1.8. The catchment area for AU 1017A_01 (Brickhouse Gully) and possible locations for bacteria testing

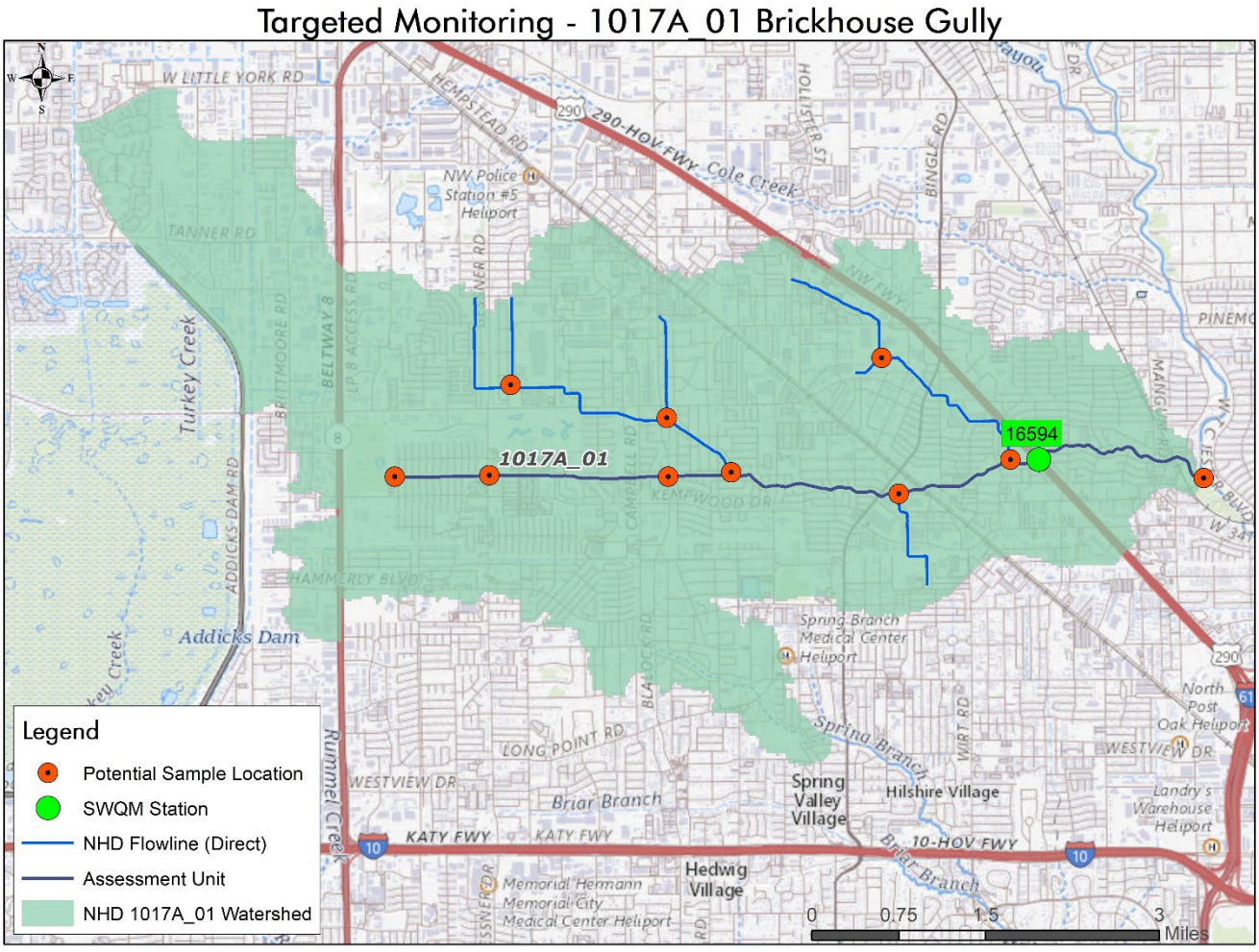


Figure SS-B1.9. The catchment area for AU 1017D_01 (Unnamed Tributary of White Oak Bayou) and possible locations for bacteria testing

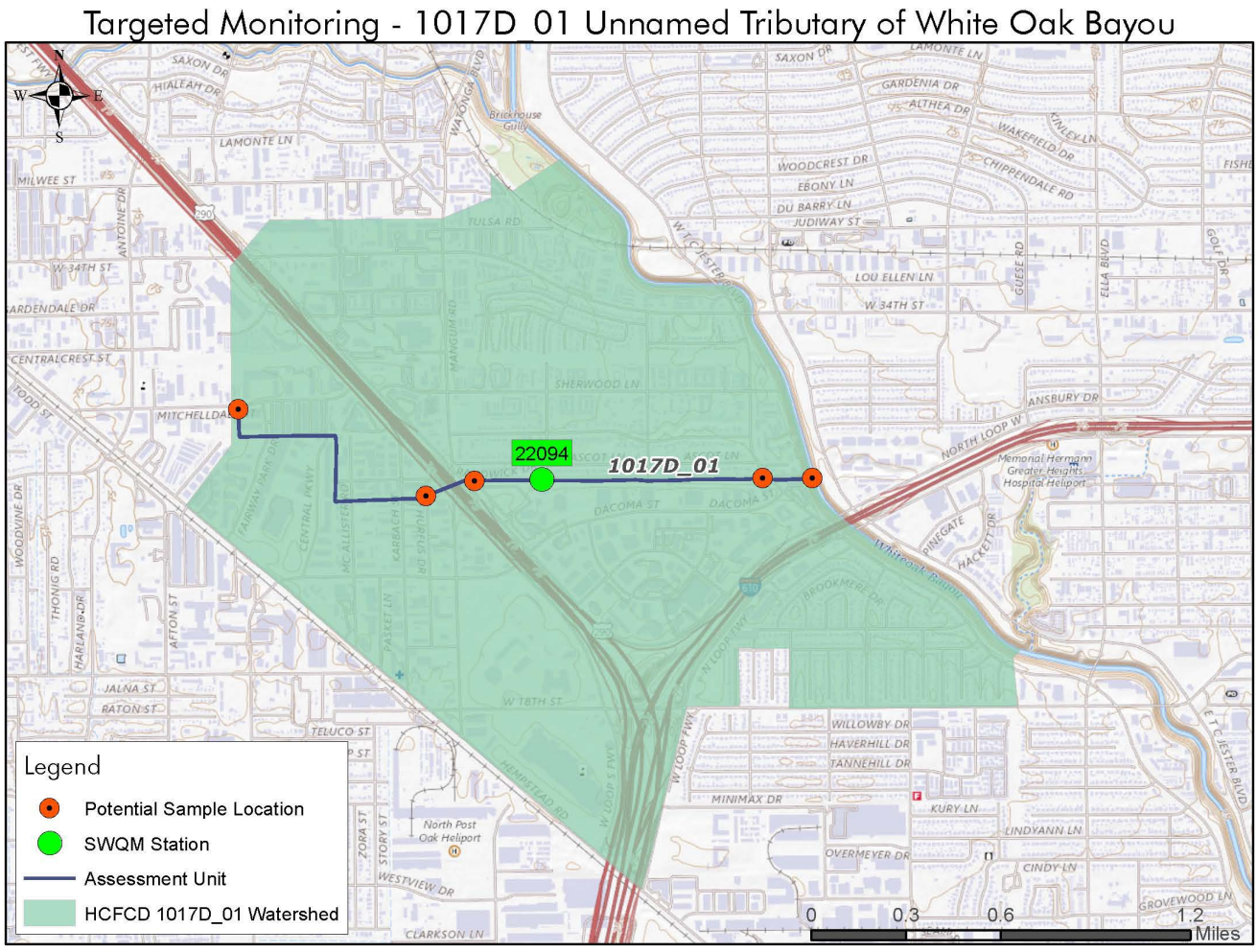


Figure SS-B1.10. The catchment area for AU 1016C_01 (Unnamed Tributary of Greens Bayou) and possible locations for bacteria testing

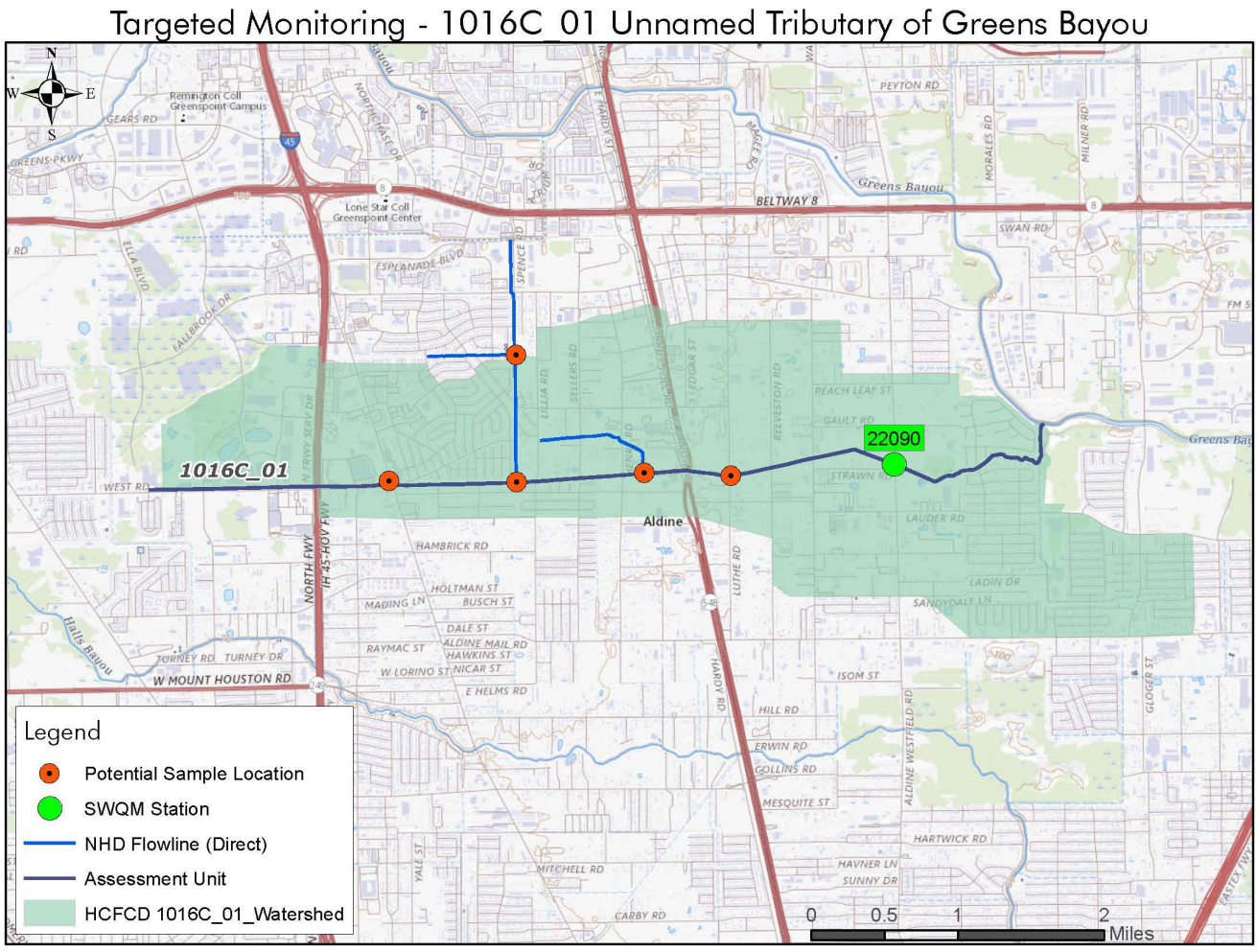
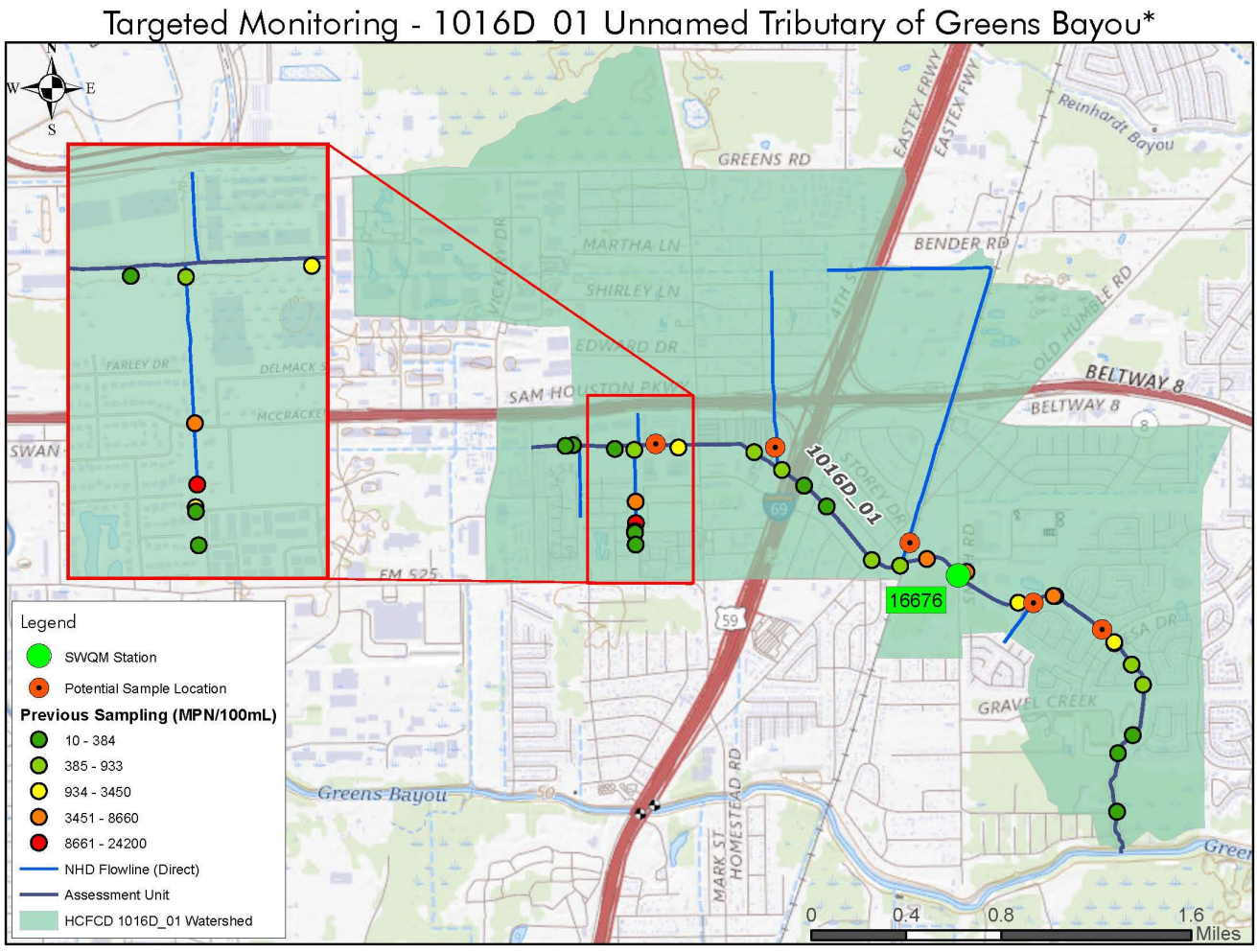


Figure SS-B1.11. The catchment area for AU 1016D_01 (Unnamed Tributary of Greens Bayou) and possible locations for bacteria testing



* Previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.12. The catchment area for AU 1014O_01 (Spring Branch - Tributary of Buffalo Bayou) and possible locations for bacteria testing

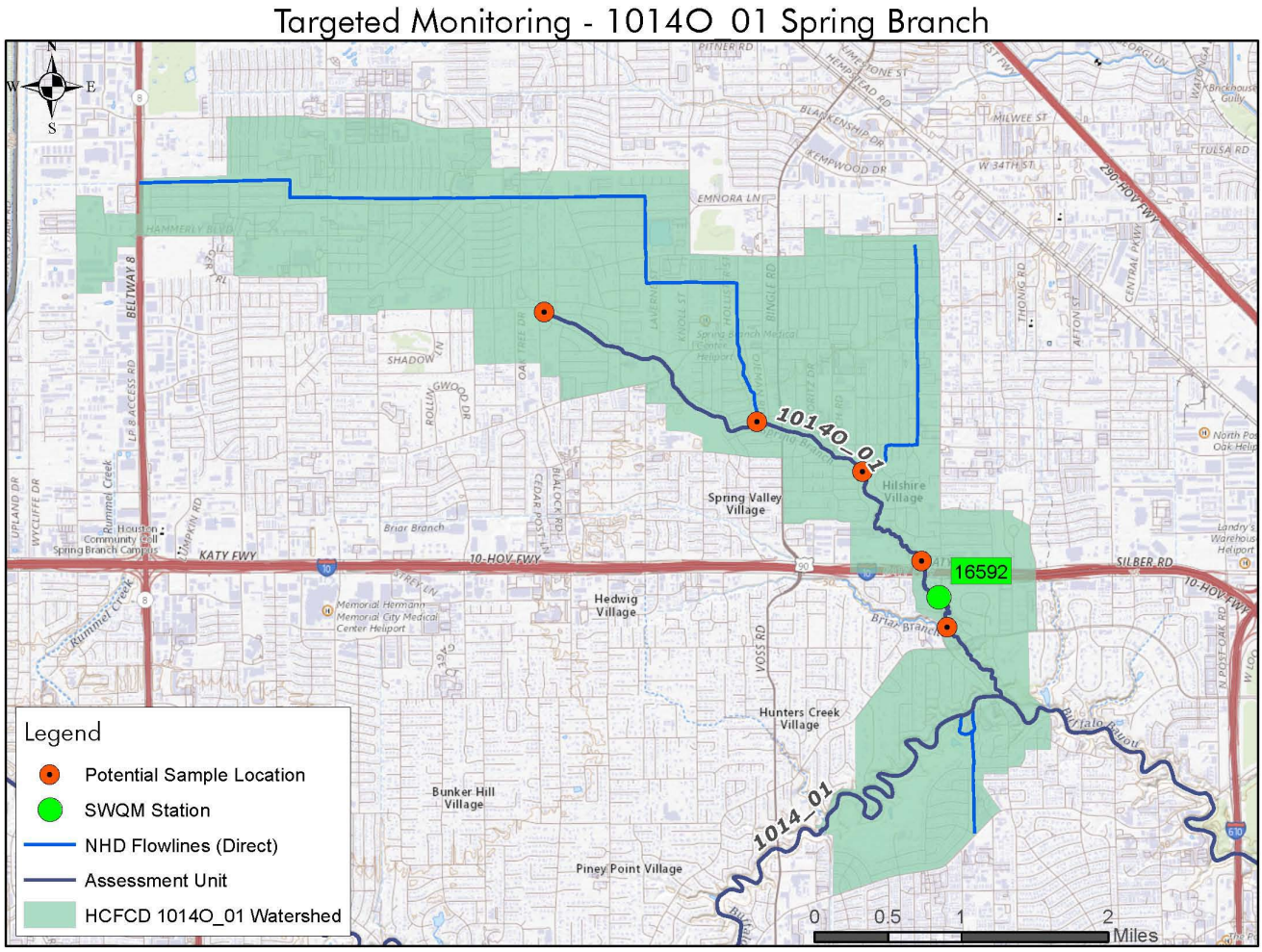
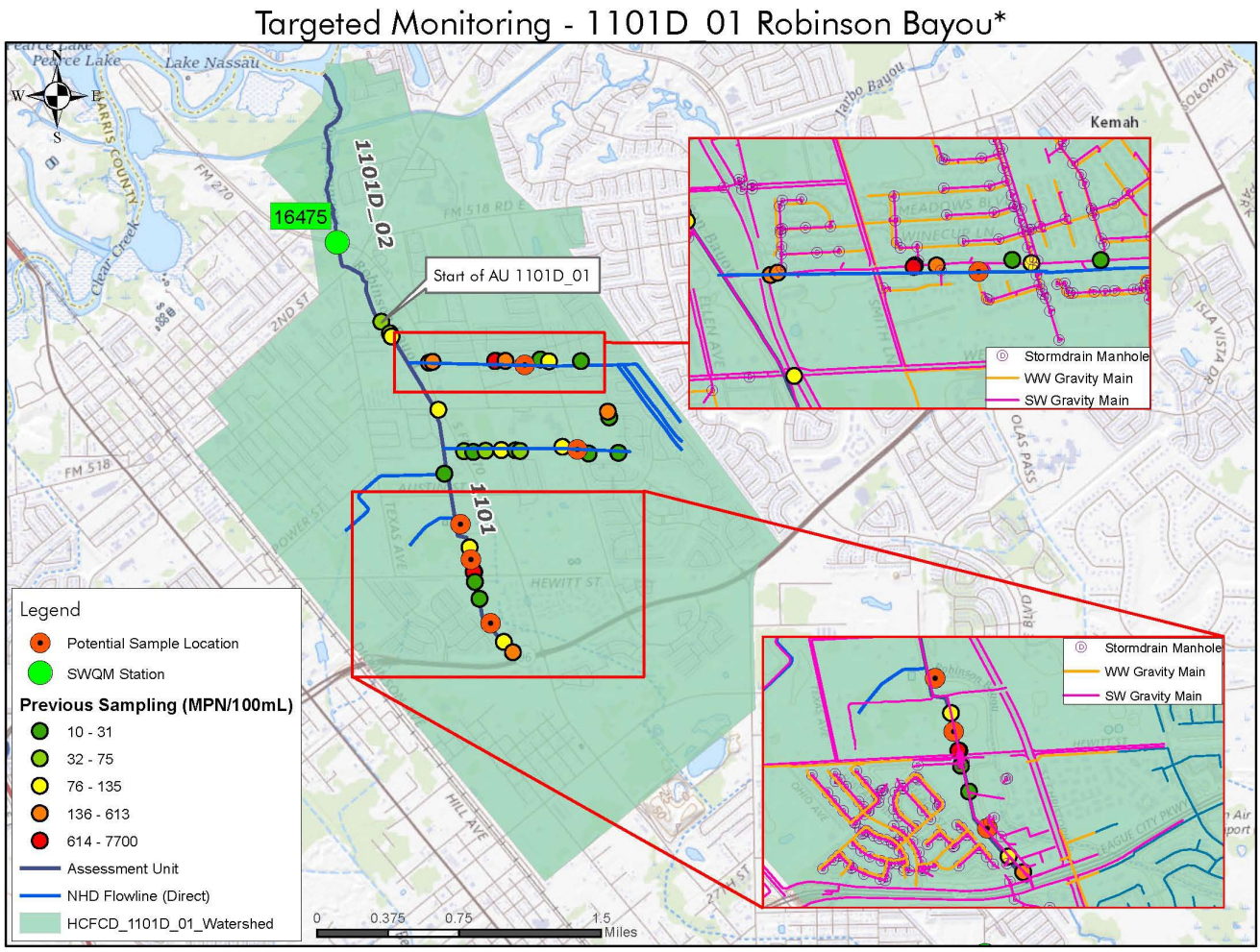


Figure SS-B1.13. The catchment area for AU 1101D_01 (Robinson Bayou Tidal / Above Tidal) and possible locations for bacteria testing



* Previously monitored during the FY 20-21 Targeted Monitoring Project.

Figure SS-B1.14. The catchment area for AU 1009_04 (Cypress Creek) and possible locations for bacteria testing

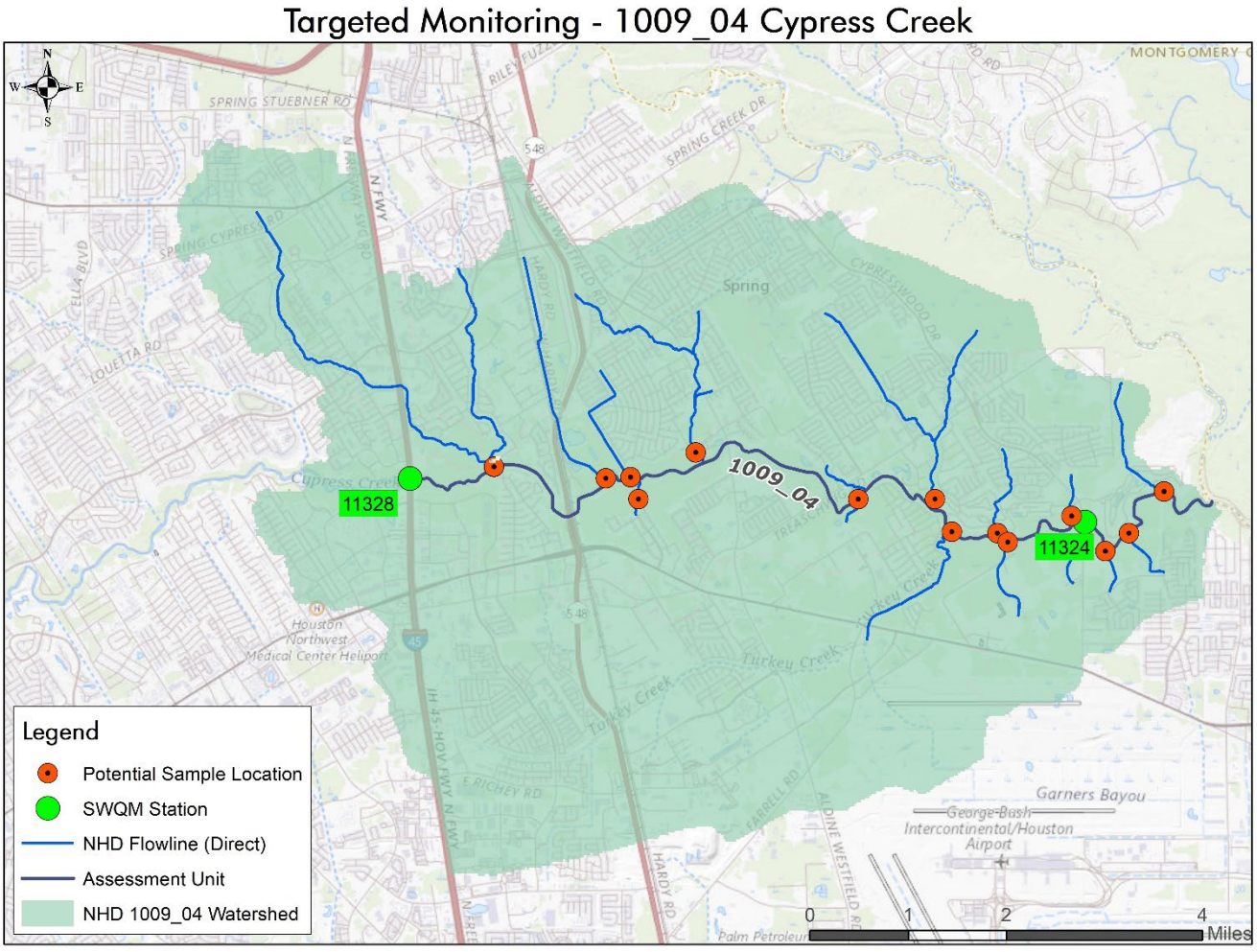
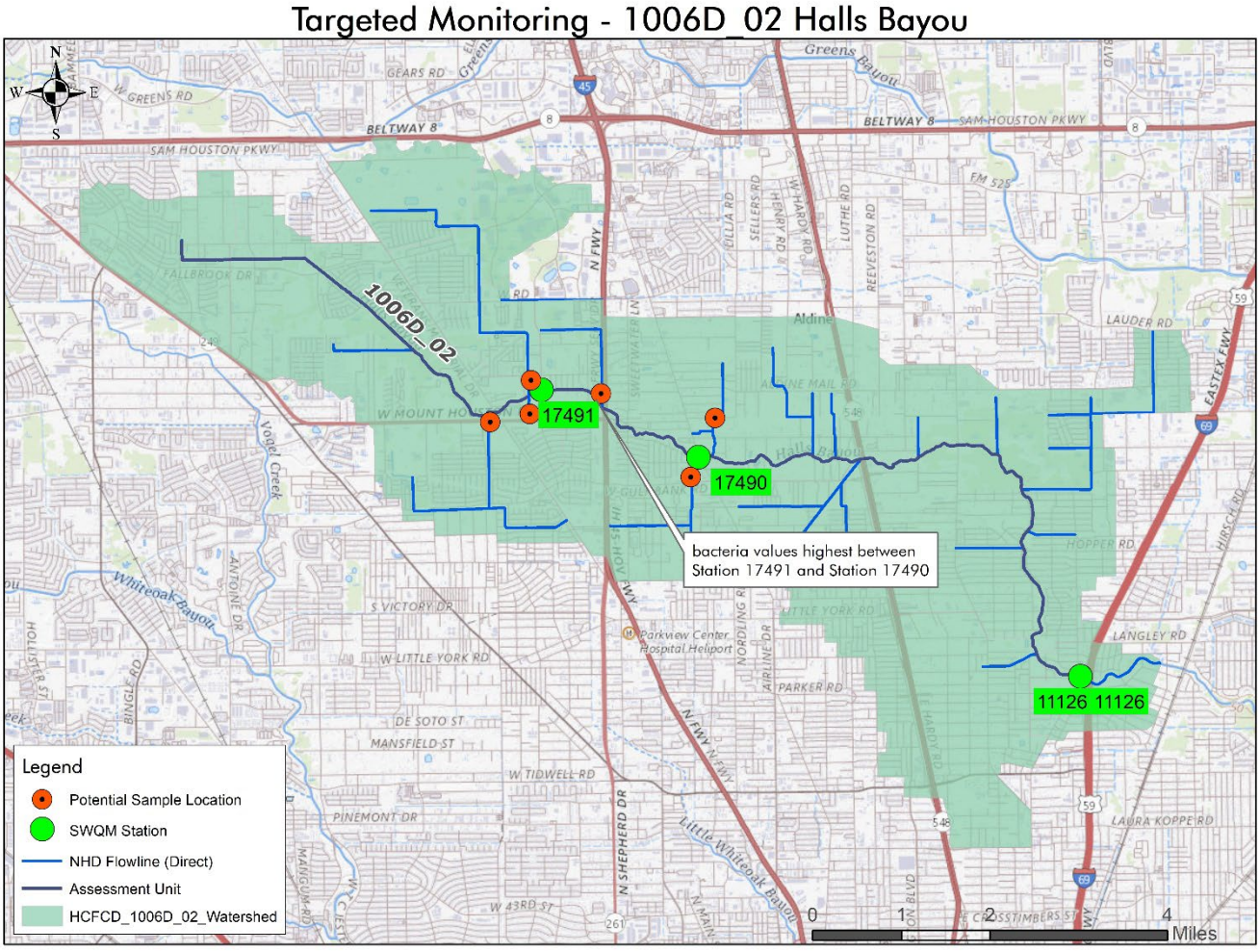


Figure SS-B1.15. The catchment area for AU 1006D_02 (Halls Bayou) and possible locations for bacteria testing



SS-B2 Sampling Methods

Field Sampling Procedures

Field sampling will be conducted in accordance with the latest versions of the TCEQ *Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue*, 2012 (RG-415).

Field sampling will be as described in Section B2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22), with the following exception:

- Samples will be collected within the mixing zone (SWQM Procedures Manual, Vol. 1, page 2-9).

The goals of this project require data that demonstrates the effect of dry weather flows on bacteria concentrations in water bodies with bacteria impairments. This data will not be submitted to SWQMIS and therefore will not be available for use in water quality assessments by the TCEQ.

Sample volume, container types, minimum sampling volume, preservation requirements, and holding time requirements

As shown in Table SS-B2 below.

Table SS-B2. Sample Storage, Preservation, and Handling Requirements

Parameter	Matrix	Container	Preservation	Minimum Sample Volume (mL)	Holding Time
E. coli	water	Sterile Plastic	Placed on ice to cool to <6°C but not frozen (bottles are pre-dosed with sodium thiosulfate by manufacturer)	100	8 hours*

* *E. coli* samples should always be processed as soon as possible and incubated no later than 30 hours from time of collection.

Sample Containers

As described in Section B2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Processes to Prevent Contamination

As described in Section B2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).
As described in Section B2 of QAPP

Documentation of Field Sampling Activities

Field sampling activities are documented on the field sheet presented in Appendix SS-3.

The following will be recorded for all sampling locations and different visits:

- Sampling Date
- Sampling Time
- Sampling Conducted By
- Waterbody Surveyed
- Outfall Location
- Site ID
- Longitude
- Latitude
- # of Day Since Last Significant Rainfall
- Rainfall Accumulation in last 3 days (inches)
- Material of outfall pipe/source
- Inner Diameter of Pipe
- Depth of Water flowing from outfall pipe
- Comments or Field Observations
- Photos – Yes or No

Recording Data

As described in Section B2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Sampling Method Requirements or Sampling Process Design Deficiencies, and Corrective Action

As described in Section B2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B3 Sample Handling and Custody

Sample Tracking

As described in Section B3 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Sample Labeling

As described in Section B3 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Sample Handling

As described in Section B3 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Sample Tracking Procedure Deficiencies and Corrective Action

As described in Section B3 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B4 Analytical Methods

The analytical methods, associated matrices, and performing laboratories are listed in Table SS-A7.1 of Section SS-A7. The authority for analysis methodologies under CRP is derived from the 30 Tex. Admin. Code Ch. 307, in that data generally are generated for comparison to those standards and/or criteria. The Standards state “Procedures for laboratory analysis must be in accordance with the most recently published edition of the book entitled Standard Methods for the Examination of Water and Wastewater, the TCEQ Surface Water Quality Monitoring Procedures as amended, 40 CFR 136, or other reliable procedures acceptable to the TCEQ, and in accordance with Chapter 25 of this title.” Copies of laboratory SOPs are retained by the laboratory and are available for review by H-GAC and the TCEQ upon request. Laboratory SOPs are consistent with EPA requirements, as specified in the method.

Standards Traceability

As described in Section B4 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Analytical Method Deficiencies and Corrective Actions

As described in Section B4 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B5 Quality Control

Sampling Quality Control Requirements and Acceptability Criteria

As described in Section B5 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22). QAPP.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

As described in Section B5 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22). QAPP.

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

As described in Section B5 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B6 Instrument/Equipment Testing, Inspection, and Maintenance

As described in Section B6 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B7 Instrument Calibration and Frequency

As described in Section B7 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B8 Inspection/Acceptance of Supplies and Consumables

As described in Section B8 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-B9 Acquired Data

No data collected directly under this QAPP will be submitted to the SWQMIS database. The data source(s) presented in Section B9 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22) may be used for this project. Only data collected directly under this Appendix will be submitted in the data table of this project's final report. The National Land Cover Database 2019 (or most recent release) may be used during data analysis.

SS-B10 Data Management

Data Management Process

Data is received by H-GAC from partners EIH and TRIES, as well as H-GAC's own monitoring program. For the EIH and TRIES paragraphs below, the role descriptions for CRP/Field QAOs and CRP Data Managers can be found in Section A4 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22). The data submission process for each partner involved in this project is described below:

Houston-Galveston Area Council

H-GAC's field sheets are kept in a designated binder at H-GAC's office. The field sheets are reviewed by the field staff, Data Manager, and QAO or designee. Field data are entered in an EXCEL spreadsheet by H-GAC staff and saved in a secured network location dedicated to CRP Special Projects. A second H-GAC staff member reviews the input data for accuracy and completeness. Network drives are backed by H-GAC Data Services on a regular basis. Sample analysis is performed by both Eastex Environmental Laboratory and TRIES Laboratory and submitted to H-GAC in either an EXCEL spreadsheet or PDF document. The data is saved in the CRP Special Projects folder.

Environmental Institute of Houston

The EIH field staff enter field data collected by their program into an EXCEL spreadsheet. A second EIH staff member reviews the entered data for accuracy and completeness. The EIH CRP QAO and the EIH CRP Data Manager review 50-100% of the data for accuracy, completeness, and reasonableness. The spreadsheet is submitted to H-GAC with field sheets and electronic data. EIH submits field data periodically once a waterway has been investigated. The submission process is via e-mail, where the data is then saved by H-GAC in the CRP Special Projects folder.

Texas Research Institute for Environmental Studies

The TRIES field QAO and TRIES Lab QAO submit all field and lab data to the TRIES CRP Data Manager. The Data Manager completes all data entry into an EXCEL spreadsheet. The TRIES field QAO, TRIES Lab QAO and the TRIES CRP Data Manager review more than 10% of data for accuracy, completeness, and reasonableness. The Data Manager then submits the EXCEL spreadsheet for both the field and lab data along with scanned hard copies of the field sheets to H-GAC via e-mail. If any samples are submitted to Eastex for analysis, the results generated by Eastex Laboratory are submitted to TRIES and H-GAC.

Eastex Environmental Lab

Eastex analyzes water quality samples for H-GAC and EIH. Although TRIES analyzes samples in-house, samples are occasionally submitted to Eastex for analysis. Eastex's sample courier service is contacted to pick up samples in the field and the samples are transported to their

Coldspring, TX facility for analysis. All transfers of sample custody are documented on the chain of custody. Final results, including associated QA information, are e-mailed to both H-GAC and the collecting entity.

Data Dictionary

Terminology and field descriptions, as they are presented in the DMRG (most recent version), do not apply to the data collected under this QAPP. Data results will be included in the final report, but no data is being submitted to SWQMIS. Rather, the purpose of the data and its analysis are for immediate needs for remediation tactics.

Data Errors and Loss

H-GAC stores original electronic data as "Raw Data" files. These files are saved in the original format and other than changing the name of a file, remains unchanged.

Data control mechanisms for each partner are described below:

Houston-Galveston Area Council

Water samples collected by H-GAC are submitted to Eastex Lab for analysis. (See Eastex lab details below.) Field data sheets are collected by the assigned staff for input to an EXCEL spreadsheet and are reviewed for outliers. H-GAC's QAO reviews the data for transcription accuracy and reasonableness.

Environmental Institute of Houston

Water samples collected by EIH are submitted to Eastex Lab for analysis (See Eastex Lab details above.) Field data sheets are collected and information input to EXCEL spreadsheets by the EIH Data Manager or designee. The EIH Data Manager or designee checks for outliers and reasonableness. The EIH Field QAO also reviews the data for transcription accuracy and reasonableness.

Texas Research Institute for Environmental Studies

Details of the protocols for data reductions and review are described in TRIES' *Analytical Lab Quality Manual*, Section 27 (most current version). The TRIES Data Manager collects all field data sheets and immediately inputs data into an EXCEL spreadsheet while also checking for data outliers and reasonableness. The TRIES CRP QAO also reviews the data for transcription accuracy and reasonableness.

Eastex Environmental Lab

Details of their protocols for data reduction and review are described in Eastex Laboratory's *Quality Assurance Manual*, (most recent version), Sections 8.1. Eastex sends data results from CRP monitoring to H-GAC and the collecting entity.

Record Keeping and Data Storage

The Record Keeping and Data Storage practices for each partner are described below:

Houston-Galveston Area Council

Each local agency submits electronic data along with scanned copies of completed field sheets to H-GAC. Electronic data is stored in folders on H-GAC's network as CRP Special Projects data. Daily and weekly backups are completed on H-GAC's server. Electronic data is maintained indefinitely by H-GAC and for at least seven (7) years by all local partners

Environmental Institute of Houston

EIH stores hard copy and electronic data at their offices on the University of Houston-Clear Lake campus. Electronic data is stored in EXCEL spreadsheets and various workbooks. The data manager maintains the files.

Texas Research Institute for Environmental Studies

Details of the protocols for records management and data storage procedures are described in TRIES' *Analytical Lab Quality Manual*, Sections 16.1 & 16.2 (most current version). All field data will be stored electronically in an EXCEL spreadsheet and/or in hard copy format at TRIES. The TRIES Data Manager and the TRIES Lab QAO will maintain the data.

Eastex Environmental Lab

Details of Eastex Lab's electronic record storage system are described in Eastex Laboratory's *Quality Assurance Manual*, (most current version), Section 8.4.

Data Handling, Hardware, and Software Requirements

As described in Section B10 of the *H-GAC Multi-Basin QAPP (Effective Date 9/1/22)*.

Information Resource Management Requirements

As described in Section B10 of the *H-GAC Multi-Basin QAPP (Effective Date 9/1/22)*.

SS-C1 Assessments and Response Actions

As described in Section C1 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Corrective Action

As described in Section C1 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-C2 Reports to Management

Reports to Planning Agency Project Management

As described in Section C2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

Reports to TCEQ Project Management

In addition to including status updates in the quarterly progress reports, Special Study Desktop Review/Ground Truth Preliminary Reports and Special Study Source Identification Reports will be submitted. For CRP-funded AU sampling, the Special Study reports will be submitted to the TCEQ CRP Project Manager. For the AUs funded through the TMDL program, the Special Study reports will be submitted to the TCEQ TMDL Project Manager.

The project final report will compile all Special Study Source Identification Reports. The report will summarize findings from work conducted under this QAPP and will follow the special study report outline found in the Texas Clean Rivers Program FY2022-2023 Guidance Exhibit 3A, as well as the following items:

- A brief written report (Executive Summary) including a background, description of project tasks, description of methodology for determining locations for sampling, and results of all sampling events
- Pictures taken during sampling events
- Notes taken during sampling events and windshield surveys
- Overview maps of sampling locations
- A table of all project data including notes
- Summaries of project committee meetings

Additionally, a project data summary report will be provided to the TCEQ TMDL Project Manager.

Reports by TCEQ Project Management

As described in Section C2 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-D1 Data Review, Verification, and Validation

As described in Section D1 of the *H-GAC Multi-Basin QAPP* (Effective Date 9/1/22).

SS-D2 Verification and Validation Methods

As described in Section D2 of the H-GAC *Multi-Basin QAPP* (Effective Date 9/1/22).

SS-D3 Reconciliation with User Requirements

Data produced in this project, and data collected by other organizations (e.g., local partners, subcontractors, USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Sample results from upstream and downstream of dry weather discharges will be compared against each other and against water quality standards for contact recreation. Regardless, no data collected during this special study will be submitted to SWQMIS.

APPENDIX SS-1: Example Letter to Document Adherence to the QAPP Appendix J by Subcontractors/Subparticipants

NOTE: Please print on letterhead before signing and sending to H-GAC.

DATE: Date

TO: Jean Wright, H-GAC CRP QAO
H-GAC
3555 Timmons Lane, Suite 120
Houston, TX 77027

FROM: Name
Organization

RE: *Appendix J to the H-GAC Multi-Basin QAPP* (Effective Date 9/1/22) Fiscal Year 2022-2023 CRP QAPP

I acknowledge receipt of the "*Appendix J of the H-GAC Multi-Basin QAPP* (Effective Date 9/1/22) Fiscal Year 2022-2023." I understand the document(s) describe quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria. My signature on this document signifies that I have read and approved the document contents pertaining to my program. Furthermore, I will ensure that all staff members participating in CRP activities will be required to familiarize themselves with the document contents and adhere to them as well.

Please sign and return this form by date.

_____

Name Date
Job Title

Copies of the signed forms will be sent by the H-GAC to the TCEQ CRP Project Manager within 60 days of TCEQ approval of the QAPP Appendix.

APPENDIX SS-2: Analytical Results of Bacteria Data Analyzed for Impaired AUs, Comparing the 7-year Geomean to that of the State Primary Contact Recreation 1 Water Quality Standards

Table App SS-2. Ranked Assessment Units

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
1	1007T_01	Bintliff Ditch (unclassified water body)	E. Coli	10/12/2021	55	5969.1	126	47.37
2	1007I_01	Plum Creek Above Tidal (unclassified water body)	E. Coli	11/23/2021	56	4523.6	126	35.90
3	1017_04	Whiteoak Bayou Above Tidal	E. Coli	11/22/2021	98	4085.2	126	32.42
4	1004J_01	White Oak Creek	E. Coli	10/13/2021	28	2981.0	126	23.66
5	1007F_01	Berry Bayou Above Tidal (unclassified water body)	E. Coli	11/23/2021	56	2769.8	126	21.98
6	1007H_01	Pine Gully Above Tidal (unclassified water body)	E. Coli	11/23/2021	54	2530.5	126	20.08
7	1017E_01	Unnamed Tributary of White Oak Bayou (unclassified water body)	E. Coli	11/22/2021	56	2288.0	126	18.16
8	1013C_01	Unnamed Non-Tidal Tributary of Buffalo Bayou Tidal (unclassified water body)	E. Coli	10/20/2021	55	2069.4	126	16.42
9	1016C_01	Unnamed Tributary of Greens Bayou	E. Coli	11/1/2021	56	2023.0	126	16.06
10	1007K_01	Country Club Bayou Above Tidal (unclassified water body)	E. Coli	10/7/2021	111	1891.8	126	15.01
11	1007B_01	Brays Bayou Above Tidal	E. Coli	11/9/2021	500	1843.4	126	14.63
12	1013A_01	Little White Oak Bayou (unclassified water body)	E. Coli	11/22/2021	111	1712.6	126	13.59
13	1017_03	Whiteoak Bayou Above Tidal	E. Coli	11/22/2021	56	1624.8	126	12.90
14	1017B_02	Cole Creek (unclassified water body)	E. Coli	11/16/2021	56	1601.6	126	12.71
15	1016D_01	Unnamed Tributary of Greens Bayou	E. Coli	11/1/2021	56	1535.9	126	12.19
16	1103G_01	Gum Bayou (unclassified water body)	Enterococci	9/30/2021	28	406.6	35	11.62
17	1007U_01	Mimosa Ditch (unclassified water body)	E. Coli	7/27/2021	55	1457.4	126	11.57
18	1017A_01	Brickhouse Gully/Bayou	E. Coli	11/16/2021	54	1405.5	126	11.15
19	2432A_02	Mustang Bayou (unclassified water body)	E. Coli	10/14/2021	28	1233.9	126	9.79
20	1017D_01	Unnamed Tributary of Whiteoak Bayou (unclassified water body)	E. Coli	7/26/2021	54	1225.9	126	9.73
21	1014O_01	Spring Branch (unclassified water body)	E. Coli	10/19/2021	56	1206.2	126	9.57
22	1101D_01	Robinson Bayou (unclassified water body)	Enterococci	7/10/2017	4	305.4	35	8.73
23	1007R_01	Hunting Bayou Above Tidal	E. Coli	11/4/2021	56	1051.8	126	8.35
24	1009_04	Cypress Creek	E. Coli	1/15/2020	17	1030.9	126	8.18
25	1006D_02	Halls Bayou (unclassified water body)	E. Coli	11/8/2021	179	1014.1	126	8.05
26	1007E_01	Willow Waterhole Bayou Above Tidal (unclassified water body)	E. Coli	10/12/2021	56	947.5	126	7.52
27	1007S_01	Poor Farm Ditch (unclassified water body)	E. Coli	11/9/2021	56	900.8	126	7.15
28	1007O_01	Unnamed Tributary of Buffalo Bayou (unclassified water body)	E. Coli	10/20/2021	55	895.7	126	7.11
29	1007G_01	Kuhlman Gully Above Tidal (unclassified water body)	E. Coli	10/7/2021	55	879.8	126	6.98
30	1007W_01	Houston Ship Channel/Buffalo Bayou Tidal	E. Coli	11/9/2021	56	793.2	126	6.29
31	1007R_03	Hunting Bayou Above Tidal (unclassified water body)	E. Coli	11/4/2021	112	792.8	126	6.29
32	1014M_01	Newman Branch (Neimans Bayou) (unclassified water body)	E. Coli	10/19/2021	55	776.1	126	6.16
33	1006J_01	Unnamed Tributary of Halls Bayou (unclassified water body)	E. Coli	11/8/2021	55	775.3	126	6.15
34	1007_05	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	12/8/2020	34	209.8	35	5.99

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
35	1014H_02	South Mayde Creek	E. Coli	10/13/2021	56	755.0	126	5.99
36	1007D_03	Sims Bayou Above Tidal (unclassified water body)	E. Coli	11/23/2021	168	740.2	126	5.87
37	1017_02	Whiteoak Bayou Above Tidal	E. Coli	11/16/2021	56	725.4	126	5.76
38	1007C_01	Keegans Bayou Above Tidal (unclassified water body)	E. Coli	10/7/2021	112	724.5	126	5.75
39	1007R_04	Hunting Bayou Above Tidal (unclassified water body)	E. Coli	11/4/2021	56	723.5	126	5.74
40	1007B_02	Brays Bayou Above Tidal (unclassified water body)	E. Coli	10/7/2021	56	713.9	126	5.67
41	1006I_01	Unnamed Tributary of Halls Bayou (unclassified water body)	E. Coli	10/26/2021	109	693.5	126	5.50
42	1006D_01	Halls Bayou	E. Coli	11/8/2021	223	686.7	126	5.45
43	1013_01	Buffalo Bayou Tidal	Enterococci	10/20/2021	232	187.5	35	5.36
44	1113D_01	Willow Springs Bayou (unclassified water body)	E. Coli	11/18/2021	56	653.2	126	5.18
45	1016_02	Greens Bayou Above Tidal	E. Coli	11/1/2021	112	644.8	126	5.12
46	1102B_01	Mary's Creek/ North Fork Mary's Creek (unclassified water body)	E. Coli	10/20/2021	28	637.6	126	5.06
47	1006_05	Houston Ship Channel Tidal	Enterococci	11/2/2021	56	173.0	35	4.94
48	1017F_01	Rolling Fork Creek	E. Coli	11/16/2021	56	612.4	126	4.86
49	1009_02	Cypress Creek	E. Coli	10/5/2021	111	585.9	126	4.65
50	1014_01	Buffalo Bayou Above Tidal	E. Coli	10/19/2021	543	581.0	126	4.61
51	1007R_02	Hunting Bayou Above Tidal (unclassified water body)	E. Coli	11/4/2021	56	573.0	126	4.55
52	1009_03	Cypress Creek	E. Coli	10/5/2021	90	571.6	126	4.54
53	1016A_03	Garners Bayou (unclassified water body)	E. Coli	11/1/2021	56	568.9	126	4.52
54	1101A_01	Magnolia Creek (unclassified water body)	E. Coli	10/12/2021	27	559.7	126	4.44
55	1103F_01	Unnamed Tributary of Dickinson Bayou Tidal	Enterococci	1/7/2020	17	151.0	35	4.31
56	1101C_01	Cow Bayou (unclassified water body)	Enterococci	9/30/2021	26	143.8	35	4.11
57	1007D_02	Sims Bayou Above Tidal (unclassified water body)	E. Coli	11/15/2021	112	516.8	126	4.10
58	1007_06	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	11/23/2021	56	142.0	35	4.06
59	1007D_01	Sims Bayou Above Tidal (unclassified water body)	E. Coli	11/15/2021	112	507.1	126	4.02
60	2421B_01	Upper Galveston Bay	Enterococci	11/12/2020	22	138.0	35	3.94
61	1014K_02	Turkey Creek (unclassified water body)	E. Coli	8/7/2019	39	495.7	126	3.93
62	1007L_01	Unnamed Tributary of Brays Bayou (unclassified water body)	E. Coli	10/12/2021	56	493.9	126	3.92
63	1014N_01	Rummel Creek (unclassified water body)	E. Coli	10/18/2021	56	486.4	126	3.86
64	1302A_01	Gum Tree Branch (unclassified water body)	E. Coli	7/17/2017	4	482.2	126	3.83
65	1014E_01	Langham Creek (unclassified water body)	E. Coli	10/13/2021	56	454.5	126	3.61
66	1006F_01	Big Gulch Above Tidal (unclassified water body)	E. Coli	11/2/2021	56	449.5	126	3.57
67	2424A_05	Highland Bayou (unclassified water body)	Enterococci	10/18/2021	28	122.5	35	3.50
68	1103C_01	Geisler Bayou (unclassified water body)	Enterococci	9/30/2021	28	121.1	35	3.46
69	1016_03	Greens Bayou Above Tidal	E. Coli	11/2/2021	122	433.9	126	3.44
70	1102G_01	Unnamed Tributary of Mary's Creek (unclassified water body)	E. Coli	10/13/2021	9	430.2	126	3.41

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
71	1014L_01	Mason Creek (unclassified water body)	E. Coli	10/13/2021	56	430.0	126	3.41
72	1101_03	Clear Creek Tidal	Enterococci	1/7/2020	17	118.5	35	3.39
73	1302B_02	West Bernard Creek (unclassified water body)	E. Coli	7/17/2017	4	421.6	126	3.35
74	1014A_01	Bear Creek (unclassified water body)	E. Coli	10/13/2021	56	396.9	126	3.15
75	0901A_01	Cary Bayou	Enterococci	10/12/2021	8	110.1	35	3.15
76	1102A_02	Cowart Creek	E. Coli	10/20/2021	28	386.4	126	3.07
77	1014K_01	Turkey Creek	E. Coli	10/18/2021	68	386.2	126	3.06
78	1006H_01	Spring Gully Above Tidal (unclassified water body)	E. Coli	11/2/2021	55	382.8	126	3.04
79	1014C_01	Horsepen Creek	E. Coli	10/5/2021	27	378.5	126	3.00
80	2424C_01	Marchand Bayou (unclassified water body)	Enterococci	10/5/2021	28	103.6	35	2.96
81	1007V_01	Unnamed Tributary of Hunting Bayou (unclassified water body)	E. Coli	11/4/2021	55	366.8	126	2.91
82	1008H_01	Willow Creek (unclassified water body)	E. Coli	10/11/2021	105	365.9	126	2.90
83	1014H_01	South Mayde Creek (unclassified water body)	E. Coli	10/18/2021	56	349.4	126	2.77
84	0901_01	Cedar Bayou Tidal	Enterococci	10/1/2021	74	96.3	35	2.75
85	1009_01	Cypress Creek	E. Coli	12/15/2021	81	329.7	126	2.62
86	1016_01	Greens Bayou Above Tidal	E. Coli	11/1/2021	112	326.6	126	2.59
87	1101D_02	Robinson Bayou (unclassified water body)	Enterococci	9/30/2021	28	90.2	35	2.58
88	1102_04	Clear Creek Above Tidal	E. Coli	1/7/2020	18	324.0	126	2.57
89	1008_03	Spring Creek	E. Coli	10/11/2021	90	323.0	126	2.56
90	1110_03	Oyster Creek Above Tidal	E. Coli	10/7/2021	6	320.1	126	2.54
91	2432E_01	New Bayou (unclassified water body)	Enterococci	10/18/2021	28	88.4	35	2.52
92	2424A_04	Highland Bayou (unclassified water body)	Enterococci	10/5/2021	19	86.9	35	2.48
93	1007N_01	Unnamed Tributary of Sims Bayou (unclassified water body)	E. Coli	11/15/2021	55	310.6	126	2.47
94	0902A_01	Cedar Bayou Above Tidal	E. Coli	7/1/2015	3	308.6	126	2.45
95	1103_04	Dickinson Bayou Tidal	Enterococci	9/30/2021	45	85.7	35	2.45
96	1102F_01	Mary's Creek Bypass (unclassified water body)	E. Coli	10/13/2021	21	304.9	126	2.42
97	1007_07	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	10/20/2021	153	84.5	35	2.41
98	1009C_01	Faulkey Gully (unclassified water body)	E. Coli	10/5/2021	56	298.0	126	2.37
99	1103D_01	Gum Bayou	Enterococci	9/30/2021	28	82.5	35	2.36
100	1017C_01	Vogel Creek (unclassified water body)	E. Coli	11/16/2021	56	295.2	126	2.34
101	1103E_01	Cedar Creek (unclassified water body)	E. Coli	9/30/2021	28	294.9	126	2.34
102	1008_02	Spring Creek	E. Coli	12/15/2021	135	284.8	126	2.26
103	1103A_01	Bensons Bayou (unclassified water body)	Enterococci	9/30/2021	28	78.9	35	2.25
104	1008_04	Spring Creek	E. Coli	10/11/2021	56	283.8	126	2.25
105	1007_04	Brays Bayou Above Tidal (unclassified water body)	Enterococci	10/7/2021	120	77.9	35	2.23
106	1105B_01	Austin Bayou Above Tidal (unclassified water body)	Enterococci	10/21/2021	56	77.8	35	2.22
107	1109_01	Oyster Creek Tidal	Enterococci	10/4/2021	44	77.5	35	2.21
108	1011_02	Peach Creek	E. Coli	10/9/2019	17	278.2	126	2.21
109	2424A_03	Highland Bayou (unclassified water body)	Enterococci	10/5/2021	28	76.2	35	2.18
110	1007_02	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	11/23/2021	127	75.6	35	2.16

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
111	1113E_01	Big Island Slough (unclassified water body)	E. Coli	11/18/2021	56	270.6	126	2.15
112	1014B_01	Buffalo Bayou/Barker Reservoir	E. Coli	12/15/2021	85	267.4	126	2.12
113	1017_01	Whiteoak Bayou Above Tidal	E. Coli	11/16/2021	112	267.2	126	2.12
114	1003_03	East Fork San Jacinto River	E. Coli	10/12/2021	25	264.6	126	2.10
115	2422B_01	Double Bayou West Fork (unclassified water body)	Enterococci	1/6/2020	16	73.0	35	2.09
116	1101B_01	Chigger Creek (unclassified water body)	E. Coli	10/20/2021	28	262.2	126	2.08
117	1110_01	Oyster Creek Above Tidal	E. Coli	10/7/2021	26	262.0	126	2.08
118	1007M_01	Unnamed Tributary of Hunting Bayou (unclassified water body)	E. Coli	11/4/2021	56	260.3	126	2.07
119	1004E_02	Stewarts Creek (unclassified water body)	E. Coli	11/18/2020	35	258.6	126	2.05
120	2425B_01	Jarbo Bayou (unclassified water body)	Enterococci	1/7/2020	42	71.6	35	2.05
121	1009E_01	Little Cypress Creek (unclassified water body)	E. Coli	10/6/2021	84	257.2	126	2.04
122	1107_01	Chocolate Bayou Tidal	Enterococci	10/20/2021	64	71.1	35	2.03
123	1009D_01	Spring Gully	E. Coli	10/5/2021	55	254.6	126	2.02
124	2432D_01	Persimmon Bayou (unclassified water body)	Enterococci	10/18/2021	28	70.6	35	2.02
125	1302B_01	West Bernard Creek	E. Coli	10/19/2021	28	252.2	126	2.00
126	1015A_01	Mound Creek (unclassified water body)	E. Coli	2/11/2021	23	251.6	126	2.00
127	1102_03	Clear Creek Above Tidal	E. Coli	10/13/2021	28	249.1	126	1.98
128	1304_02	Caney Creek Tidal	Enterococci	10/4/2021	28	68.2	35	1.95
129	1010_03	Caney Creek	E. Coli	2/4/2020	21	245.3	126	1.95
130	2432C_01	Halls Bayou Tidal (unclassified water body)	Enterococci	12/18/2019	27	66.0	35	1.89
131	1008I_01	Walnut Creek (unclassified water body)	E. Coli	10/6/2021	27	237.4	126	1.88
132	1105E_01	Brushy Bayou	E. Coli	7/15/2020	19	235.7	126	1.87
133	1301_01	San Bernard River Tidal	Enterococci	10/6/2021	44	64.2	35	1.83
134	2432A_01	Mustang Bayou (unclassified water body)	E. Coli	10/22/2021	28	230.5	126	1.83
135	1010_02	Caney Creek	E. Coli	10/13/2021	63	230.0	126	1.83
136	1008A_01	Mill Creek	E. Coli	10/7/2021	28	228.5	126	1.81
137	1103_02	Dickinson Bayou Tidal	Enterococci	1/7/2020	17	63.4	35	1.81
138	1104_02	Dickinson Bayou Above Tidal	E. Coli	1/7/2020	17	227.3	126	1.80
139	1007_08	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	7/24/2017	11	62.6	35	1.79
141	1113A_01	Armand Bayou Above Tidal (unclassified water body)	E. Coli	11/18/2021	112	221.6	126	1.76
142	0902_01	Cedar Bayou Above Tidal	E. Coli	10/1/2021	81	221.1	126	1.75
143	1105_01	Bastrop Bayou Tidal	Enterococci	10/21/2021	127	59.7	35	1.71
144	1010_04	Caney Creek	E. Coli	10/14/2021	80	214.7	126	1.70
145	1003_01	East Fork San Jacinto River	E. Coli	10/6/2021	53	214.7	126	1.70
146	1006_03	Houston Ship Channel Tidal	Enterococci	12/8/2020	55	59.5	35	1.70
147	1008J_01	Brushy Creek (unclassified water body)	E. Coli	12/15/2021	29	210.7	126	1.67
148	1302_01	San Bernard River Above Tidal	E. Coli	2/4/2020	19	208.0	126	1.65
149	1113_03	Armand Bayou Tidal	Enterococci	8/13/2019	15	57.8	35	1.65
150	1007_01	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	8/25/2020	166	57.8	35	1.65
151	1105C_01	Austin Bayou Above Tidal	E. Coli	10/14/2021	28	200.9	126	1.59
152	2431A_01	Moses Bayou (unclassified water body)	Enterococci	10/5/2021	28	55.7	35	1.59
153	1102D_01	Turkey Creek (unclassified water body)	E. Coli	10/20/2021	21	194.7	126	1.54
154	1113C_01	Unnamed Tributary to Horsepen Bayou (unclassified water body)	E. Coli	11/18/2021	56	194.2	126	1.54

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
155	1110_02	Oyster Creek Above Tidal	E. Coli	10/6/2021	14	193.0	126	1.53
156	1016B_01	Unnamed Tributary of Greens Bayou (unclassified water body)	E. Coli	7/21/2021	55	192.8	126	1.53
157	1101_02	Clear Creek Tidal	Enterococci	10/12/2021	27	52.5	35	1.50
158	1004_02	West Fork San Jacinto River	E. Coli	11/18/2020	52	188.1	126	1.49
159	2424A_02	Highland Bayou (unclassified water body)	Enterococci	10/5/2021	21	51.8	35	1.48
160	1113B_01	Horsepen Bayou Tidal (unclassified water body)	Enterococci	11/12/2020	43	51.6	35	1.47
161	1004_01	West Fork San Jacinto River	E. Coli	11/18/2020	35	181.7	126	1.44
162	1016A_02	Garners Bayou (unclassified water body)	E. Coli	11/1/2021	56	175.9	126	1.40
163	1108_01	Chocolate Bayou Above Tidal	E. Coli	11/19/2020	20	175.7	126	1.39
164	1003A_01	East Fork San Jacinto River	E. Coli	10/12/2021	98	175.4	126	1.39
165	1302_03	San Bernard River Above Tidal	E. Coli	10/19/2021	46	175.3	126	1.39
166	1003_02	East Fork San Jacinto River	E. Coli	10/6/2021	87	174.6	126	1.39
167	2432A_03	Mustang Bayou (unclassified water body)	E. Coli	10/14/2021	27	173.1	126	1.37
168	1302E_01	San Bernard River Above Tidal	E. Coli	10/6/2021	28	172.4	126	1.37
169	2431C_01	Moses Lake	Enterococci	10/5/2021	28	47.6	35	1.36
170	1006_07	Houston Ship Channel Tidal	Enterococci	8/11/2020	83	47.5	35	1.36
171	1102_02	Clear Creek Above Tidal	E. Coli	1/7/2020	18	162.6	126	1.29
172	1015_02	Lake Creek	E. Coli	10/7/2021	13	162.3	126	1.29
173	1002A_01	Tarkington Bayou (unclassified water body)	E. Coli	10/12/2021	27	160.7	126	1.28
174	1011_01	Peach Creek	E. Coli	10/13/2021	97	159.6	126	1.27
175	1105A_03	Flores Bayou (unclassified water body)	E. Coli	10/11/2021	28	159.1	126	1.26
176	1007A_01	Canal C-147 Tributary of Sims Bayou Above Tidal (unclassified water body)	E. Coli	11/15/2021	56	157.7	126	1.25
177	1305_02	Caney Creek Above Tidal	E. Coli	2/4/2020	19	155.7	126	1.24
178	1304_01	Caney Creek Tidal	Enterococci	7/30/2019	16	42.2	35	1.20
179	1003C_01	Boswell Creek	E. Coli	10/12/2021	15	149.9	126	1.19
180	1008B_01	Upper Panther Branch (unclassified water body)	E. Coli	10/13/2021	27	149.5	126	1.19
181	1103B_01	Bordens Gully (unclassified water body)	Enterococci	7/6/2017	11	40.1	35	1.15
182	2426C_01	Goose Creek Tidal (unclassified water body)	Enterococci	8/24/2020	34	39.7	35	1.13
183	1006B_01	Carpenters Bayou (unclassified water body)	Enterococci	1/15/2020	14	39.5	35	1.13
184	1004D_01	Crystal Creek	E. Coli	11/18/2020	34	138.0	126	1.09
185	1304A_01	Linnville Bayou	E. Coli	2/4/2020	18	136.6	126	1.08
186	1006_01	Houston Ship Channel Tidal	Enterococci	8/25/2020	148	37.5	35	1.07
187	2422D_01	Double Bayou East Fork (unclassified water body)	Enterococci	1/6/2020	16	36.9	35	1.05
188	1102A_01	Cowart Creek (unclassified water body)	E. Coli	7/3/2017	4	132.6	126	1.05
189	1008C_02	Lower Panther Branch (unclassified water body)	E. Coli	10/13/2021	28	129.4	126	1.03
190	1008C_01	Lower Panther Branch (unclassified water body)	E. Coli	10/13/2021	28	128.9	126	1.02
191	1103_01	Dickinson Bayou Tidal	Enterococci	10/5/2021	28	34.0	35	0.97
192	1010C_01	Spring Branch	E. Coli	10/14/2021	27	122.0	126	0.97
193	1006_02	Houston Ship Channel Tidal	Enterococci	8/25/2020	80	33.4	35	0.95
194	1003B_01	Nebletts Creek	E. Coli	10/11/2021	18	118.7	126	0.94
195	1302D_01	San Bernard River Above Tidal	E. Coli	10/19/2021	28	116.0	126	0.92
196	1002_06	Lake Houston	E. Coli	12/9/2020	82	114.0	126	0.90

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
197	1105D_01	Unnamed Tributary of Bastrop Creek (unclassified water body)	E. Coli	10/11/2021	28	110.5	126	0.88
198	1102C_01	Hickory Slough (unclassified water body)	E. Coli	10/13/2021	27	108.5	126	0.86
199	1113_02	Armand Bayou Tidal	Enterococci	11/18/2021	75	29.1	35	0.83
200	1101_04	Clear Creek Tidal	Enterococci	7/23/2020	33	27.8	35	0.79
201	1008E_01	Bear Branch (unclassified water body)	E. Coli	10/13/2021	28	99.7	126	0.79
202	1015_01	Lake Creek	E. Coli	10/7/2021	43	99.5	126	0.79
203	2432B_01	Willow Bayou (unclassified water body)	E. Coli	10/18/2021	28	99.3	126	0.79
204	1305A_01	Hardeman Slough (unclassified water body)	E. Coli	10/4/2021	28	97.5	126	0.77
205	2438_01	Bayport Channel	Enterococci	10/28/2019	17	26.8	35	0.77
206	2501_02	Gulf of Mexico	Enterococci	11/12/2020	22	26.1	35	0.75
207	2501_01	Gulf of Mexico	Enterococci	11/12/2020	45	25.5	35	0.73
208	1302_02	San Bernard River Above Tidal	E. Coli	7/18/2017	4	87.0	126	0.69
209	2421C_01	Upper Galveston Bay	Enterococci	11/12/2020	21	23.2	35	0.66
210	1005_01	Houston Ship Channel/San Jacinto River Tidal	Enterococci	8/24/2020	135	22.8	35	0.65
211	2424A_01	Highland Bayou (unclassified water body)	Enterococci	10/5/2021	28	21.9	35	0.63
212	2423A_01	Oyster Bayou	Enterococci	9/12/2019	13	21.8	35	0.62
213	1007_03	Houston Ship Channel/Buffalo Bayou Tidal	Enterococci	11/4/2021	70	21.0	35	0.60
214	1305_01	Caney Creek Above Tidal	E. Coli	10/4/2021	15	70.3	126	0.56
215	1113_01	Armand Bayou Tidal	Enterococci	10/12/2021	41	19.4	35	0.55
216	1006_04	Houston Ship Channel Tidal	Enterococci	1/30/2020	15	18.6	35	0.53
217	2425_01	Clear Lake	Enterococci	7/23/2020	94	18.3	35	0.52
218	1101F_01	Unnamed Tributary of Clear Creek Tidal (unclassified water body)	E. Coli	10/12/2021	28	62.5	126	0.50
219	1008B_02	Upper Panther Branch (unclassified water body)	E. Coli	10/13/2021	28	60.9	126	0.48
220	2425A_02	Taylor Bayou (unclassified water body)	Enterococci	7/23/2020	33	16.7	35	0.48
221	2425E_01	Harris County Flood Control Ditch A (unclassified water body)	Enterococci	7/23/2020	33	16.5	35	0.47
222	1005_03	Houston Ship Channel/San Jacinto River Tidal	Enterococci	8/24/2020	136	16.1	35	0.46
223	1002B_01	Luce Bayou (unclassified water body)	E. Coli	11/18/2020	35	57.2	126	0.45
224	2424E_01	English Bayou	Enterococci	10/14/2021	28	15.8	35	0.45
225	1008F_01	Lake Woodlands (unclassified water body)	E. Coli	10/13/2021	27	55.9	126	0.44
226	1002_05	Lake Houston	E. Coli	1/15/2020	18	53.9	126	0.43
227	2426_01	Tabbs Bay	Enterococci	8/24/2020	34	14.5	35	0.41
228	1001_01	San Jacinto River Tidal	Enterococci	8/11/2020	134	14.0	35	0.40
229	1006_06	Houston Ship Channel Tidal	Enterococci	7/20/2017	8	13.0	35	0.37
230	2427_01	San Jacinto Bay	Enterococci	8/24/2020	73	12.9	35	0.37
231	2425A_01	Taylor Lake	Enterococci	7/23/2020	33	12.9	35	0.37
232	2428_01	Black Duck Bay	Enterococci	8/24/2020	34	12.9	35	0.37
233	1001_02	San Jacinto River Tidal	Enterococci	8/11/2020	280	12.5	35	0.36
234	2432_01	Chocolate Bay	Enterococci	10/20/2021	38	12.5	35	0.36
235	2423_01	East Bay	Enterococci	2/25/2020	13	11.9	35	0.34
236	2434_02	Christmas Bay	Enterococci	12/5/2019	9	11.0	35	0.32
237	2436_01	Barbours Cut	Enterococci	8/24/2020	34	10.9	35	0.31
238	2439_01	Lower Galveston Bay	Enterococci	11/5/2019	23	10.9	35	0.31
239	2430_01	Burnett Bay	Enterococci	8/24/2020	39	10.6	35	0.30

Rank	AU ID	Segment Name	Parameter	Max Date of Data Assessed	# of Results	Geometric Mean (MPN/100 mL)	WQ Std (MPN/100 mL)	Ratio of Geomean to Std
240	2431_01	Moses Lake	Enterococci	11/5/2019	25	10.4	35	0.30
241	2424B_01	Lake Madeline (unclassified water body)	Enterococci	10/14/2021	28	10.2	35	0.29
242	1005_02	Crystal Bay	Enterococci	1/30/2020	18	10.0	35	0.29
243	2421_01	Upper Galveston Bay	Enterococci	7/18/2019	22	10.0	35	0.28
244	2424D_02	Offatts Bayou (unclassified water body)	Enterococci	10/14/2021	27	9.7	35	0.28
245	2430A_01	Crystal Bay (unclassified water body)	Enterococci	8/24/2020	34	9.0	35	0.26
246	2429_01	Scott Bay	Enterococci	8/24/2020	34	8.8	35	0.25
247	1002_02	Lake Houston	E. Coli	12/9/2020	135	30.5	126	0.24
248	2421_03	Upper Galveston Bay	Enterococci	10/28/2019	42	8.1	35	0.23
249	1002_04	Lake Houston	E. Coli	12/9/2020	75	28.7	126	0.23
250	2424D_03	Offatts Bayou (unclassified water body)	Enterococci	10/14/2021	27	7.9	35	0.23
251	1008F_03	Lake Woodlands (unclassified water body)	E. Coli	10/13/2021	28	28.2	126	0.22
252	2421_02	Upper Galveston Bay	Enterococci	10/28/2019	31	7.5	35	0.21
253	2439_02	Lower Galveston Bay	Enterococci	3/11/2020	162	7.5	35	0.21
254	1111_01	Old Brazos River Channel Tidal	Enterococci	12/18/2019	15	7.5	35	0.21
255	2437_01	Texas City Ship Channel	Enterococci	3/11/2020	17	7.3	35	0.21
256	2424_01	West Bay	Enterococci	12/5/2019	51	7.2	35	0.21
257	1002_07	Lake Houston	E. Coli	12/9/2020	67	25.8	126	0.21
258	2423_02	East Bay	Enterococci	2/25/2020	46	7.1	35	0.20
259	2424_02	West Bay	Enterococci	10/14/2021	27	6.9	35	0.20
260	2422_01	Trinity Bay	Enterococci	2/27/2020	82	6.6	35	0.19
261	1002_01	Lake Houston	E. Coli	12/22/2020	138	22.2	126	0.18
262	2422_02	Trinity Bay	Enterococci	2/27/2020	62	6.0	35	0.17
263	1008F_02	Lake Woodlands (unclassified water body)	E. Coli	10/13/2021	28	21.1	126	0.17
264	2501_06	Gulf of Mexico	Enterococci	1/28/2020	15	5.7	35	0.16
265	1005_04	Houston Ship Channel/San Jacinto River Tidal	Enterococci	1/30/2020	13	5.6	35	0.16
266	1008F_04	Lake Woodlands (unclassified water body)	E. Coli	10/13/2021	28	14.7	126	0.12
267	1002_03	Lake Houston	E. Coli	12/9/2020	67	12.6	126	0.10
268	1012_01	Lake Conroe	E. Coli	12/1/2021	77	5.5	126	0.04
269	1012_07	Lake Conroe	E. Coli	12/1/2021	76	3.1	126	0.02
270	1012_03	Lake Conroe	E. Coli	12/1/2021	77	3.1	126	0.02
271	1012_08	Lake Conroe	E. Coli	12/1/2021	76	2.5	126	0.02
272	1012_06	Lake Conroe	E. Coli	12/1/2021	77	2.3	126	0.02
273	1012_11	Lake Conroe	E. Coli	12/1/2021	153	2.1	126	0.02
274	1012_05	Lake Conroe	E. Coli	12/1/2021	76	2.0	126	0.02
275	1012_02	Lake Conroe	E. Coli	12/1/2021	77	2.0	126	0.02
276	1012_04	Lake Conroe	E. Coli	12/1/2021	77	1.7	126	0.01

APPENDIX SS-3: Targeted Monitoring Data Sheet

H-GAC – Targeted Monitoring Data Sheet

Date: _____/_____/_____ Sampling Conducted by:_____

Time (military):_____ Waterbody Surveyed:_____

Outfall Location: _____

_____ Site ID:_____

Latitude		Material of outfall pipe	1 – concrete; 2 – PVC; 3 – metal; 4 - other	
Longitude		Describe "Other" pipe material		
# of Days Since Last Significant Rainfall		Inner Diameter of Pipe	Inches	
Rainfall accumulation in last 3 days (inches)		Depth of Water flowing from outfall pipe	Inches	

Comments or Other Field Observation	

Photographs taken: Yes / No

Computer File Name and Pathway:_____

BACTERIA ANALYSIS – UPSTREAM

Distance upstream of dry weather flow:_____ Bacteria results:_____

BACTERIA ANALYSIS – DOWNSTREAM

Distance downstream of dry weather flow: _____ Bacteria results:_____

Referral? Yes No Referral ID_____

Data Entry: Date & Initials_____ Data Entry Checked: Date & Initials_____

Updated: September 10, 2020