TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 21, 2025

Marcella Lanzillotti
Project Manager
TCEQ Nonpoint Source Program
12100 Park 35 Circle, Building F
Austin, TX 78753

Subject: Approval: Brays Bayou and Sims Bayou Watershed Protection Plan Modeling Quality Assurance Project Plan (QAPP) Revision 0

Federal Grant # 99614629

Dear Ms. Lanzillotti:

The above-referenced Quality Assurance Project Plan (QAPP) was approved today, May 21, 2025.

Please ensure the QAPP is distributed in a timely manner to the appropriate entities listed in Section A7 of the QAPP. Distribution documentation must be available for review during an audit.

Should you have questions, feel free to contact me at james.babcock@tceq.texas.gov.

Sincerely,

James Babcock

James Babcock
Lead NPS Quality Assurance Specialist

Enclosure

Cc: Tina Treviño, TCEQ Quality Assurance Team Lead
D. Jody Koehler, TCEQ Quality Assurance Manager
Faith Hambleton, TCEQ NPS Program Manager
Kristin DeBone, TCEQ NPS Quality Assurance Coordinator

A1 TITLE PAGE

Brays Bayou and Sims Bayou Watershed Protection Plan Modeling Quality Assurance Project Plan (QAPP)
Revision 0

Funding Source: Nonpoint Source (NPS) Program Clean Water Act (CWA) §319(h)

Prepared in cooperation with
the Texas Commission on Environmental Quality (TCEQ)
and the U.S. Environmental Protection Agency (EPA)
Federal ID # 99614629

QTRAK # 25-301

Effective Period: Three years from date of final approval

Questions concerning this QAPP should be directed to:

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A2 APPROVAL PAGE

By signing this document, signatories acknowledge their respective organizations' awareness of and adherence to requirements contained in this QAPP in accordance with roles and responsibilities as described in Section A8 Project Organization and throughout.

Texas Commission on Environmental Quality

Air Monitoring Division
Laboratory and Quality Assurance (QA) Section

D. Jody Koehler, TCEQ QA Manager — Date: 05/21/2025

James Babcock, Lead NPS QA Specialist (QAS) — Date: 05/21/2025

Water Quality Planning Division
NPS Program

Faith Hambleton, Team Leader — Date: 5/21/25

Kristin DeBone, NPS QA Coordinator — Date: 5/20/2025

Marcella Lanzillotti, NPS Project Manager — Date: 5/19/25

H-GAC

Cornell Evans Jr

Cornell Evans, Jr., Project Manager — Date: 05/19/25

Jenny Oakley, Quality Assurance Officer (QAO) — Date: 05/19/2025

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Jessica Casillas, Data Manager — Date: 05/19/2025

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Rachel Windham, Senior Planner — Date: 05/19/2025

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Megha Shrestha, Environmental Modeler — Date: 5/19/2025

A3 TABLE OF CONTENTS

Table A3.1 List of Acronyms

Acronym	Definition
AU	Assessment Unit
AVMA	American Veterinary Medicine Association
CAP	Corrective Action Plan
CRP	Clean Rivers Program
CWA	Clean Water Act
DAR	Drainage Area Ratios
DMR	Discharge Monitoring Reports
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
FDC	Flow Duration Curve
GIS	Geographic Information System
H-GAC	Houston-Galveston Area Council
LOADEST	Load Estimation
LDC	Load Duration Curve
MS4	Municipal Separate Storm Sewer
NPS	Nonpoint Source
OSSF	On-Site Sewage Facility
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QMP	Quality Management Plan
SAS	Statistical Analysis Software
SELECT	Spatially Explicit Load Enrichment Calculation Tool
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks & Wildlife Department
TSSWCB	Texas State Soil and Water Conservation Board
WPP	Watershed Protection Plan
WWTF	Wastewater Treatment Facility
USGS	United States Geological Survey

A4 PROJECT PURPOSE, PROBLEM DEFINITION, AND BACKGROUND

Brays Bayou flows east and south from its headwaters near the crossing of State Highway 6 and the Westpark Tollway (Appendix A). Sims Bayou is just south of Brays Bayou, also flowing east from its headwaters near the border between Harris and Fort Bend counties. The Brays and Sims Bayou watershed is composed of the drainage area of the unclassified segments Brays Bayou Above Tidal (1007B) and Sims Bayou Above Tidal (1007D), as well as smaller unclassified segment tributaries, and a network of natural and manmade drainage channels. This watershed area spans approximately 220 square miles of portions of Harris and Fort Bend counties.

Land cover in the watershed is mostly developed with the exception of a small percentage of forest, wetland, and pasture (mostly in the Sims Bayou watershed). Major transportation corridors include Interstate 10, Interstate 45, Interstate 69/US Highway 59, US Highway 90, the Sam Houston Tollway/Beltway 8, the Westpark Tollway, State Highway 6, State Highway 35, and State Highway 288. The watersheds overlap portions of Bellaire, Four Corners, Houston, Mission Bend, Meadows Place, South Houston, Southside Place, Stafford, University Place, and small portions of Missouri City, Pasadena, and Sugar Land.

The principal water quality issues in the Brays Bayou and Sims Bayou watershed are elevated levels of fecal indicator bacteria and nutrients as well as low levels of dissolved oxygen. These parameters have been noted in several assessment units (AUs) in segments of Brays Bayou, Sims Bayou, and its tributaries as documented by the *2024 Texas Integrated Report of Surface Water Quality for Clean Water Act Sections 305(b) and 303(d)*[1].

The development of a watershed protection plan (WPP) for the Brays Bayou and Sims Bayou watershed will identify and further characterize causes and sources of pollution in the watershed through SELECT and Load Duration Curve modeling (Section A5) as informed by stakeholder input and feedback, and will identify management measures to address them.

To facilitate the development of the WPP, H-GAC needs to provide enough information to guide stakeholder discussion, characterize the causes and sources of pollution in the watershed, and identify the reductions needed to meet state standards, and additional information to achieve other water quality goals identified by the stakeholders[2]. The efforts outlined in this QAPP are designed to generate the information needed to guide decisions and allow for feedback and revision from the stakeholders. To ensure that the data generated (and subsequent decisions which rely

[1] https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

[2] Water quality goals for this WPP will always include compliance with state water quality standards. Compliance with state standards is always the primary purpose of the WPP, and the development of data therefore. Additional goals may be developed by the stakeholders as part of the public engagement process, for contaminants or issues for which standards and/or numeric criteria do not exist (trash, etc.). Data generated under the efforts covered by this QAPP (water quality analysis, etc.) may assist stakeholders in identifying solutions that achieve multiple benefits or coordinate efforts with existing programs.

on it) are defensible and of appropriate quality, H-GAC will conduct its modeling and data evaluation tasks in a manner consistent with this QAPP.

The purpose of the QAPP is to clearly delineate H-GAC's QA policy, management structure and procedures to implement the QA requirements necessary to verify, calibrate, and validate the output of the modeling process associated with this project.

This QAPP is reviewed and approved by the TCEQ to help ensure that the outputs and data generated for the purposes described within are of known and documented quality and deemed acceptable for their intended use. This process will facilitate the use of project outputs and data by the NPS Program and other programs deemed appropriate by the TCEQ.

A5 PROJECT/TASK DESCRIPTION AND SCHEDULE

The data needs described in A4 relate to characterizing water quality data concerning causes and sources of pollution to guide stakeholder decisions in the development of the WPP. A review of the concerns and impairments showed that elevated levels of fecal indicator bacteria, low levels of dissolved oxygen and high nutrient concentrations are the primary water quality issues in the project waterways.

Specifically, H-GAC will conduct modeling and data evaluation efforts to:

- Evaluate trends and variability in current and historical water quality data, including the use of Statistical Analysis Software (SAS).
- Define the spatial distribution and amount of fecal bacteria[1] loading using the Spatially Explicit Load Enrichment Calculation Tool (SELECT) model.
- Characterize fecal bacteria and dissolved oxygen concentrations in varying flow conditions and identify the bacteria reductions necessary to meet applicable standards instream using Flow Duration Curves (FDCs) and Load Duration Curves (LDCs).

Water Quality Analysis

The acquisition and analysis of water quality data will be conducted for Brays Bayou and Sims Bayou based on existing data in the Surface Water Quality Monitoring Information System (SWQMIS), data collected under H-GAC's Clean Rivers Program's (CRP) existing monitoring QAPP, and sanitary sewer overflow (SSO) and discharge monitoring reports (DMRs) from TCEQ data. SWQMIS/CRP data, indicator bacteria, nutrients, temperature, pH, chlorophyll-a, total suspended solids, flow, and dissolved oxygen (DO) data will be evaluated for trends, seasonal variation, and spatial patterns. Data for current 24-hour DO monitoring will be reviewed for at least one CRP site in each segment if sufficient data are available. H-GAC will evaluate TCEQ's DMR/SSO data for the most recent five years. The output of this effort will be the acquired datasets, the trends and variability analyses derived from SAS, a report on the data to be used for updating modeling, and a report on the trend and variability analyses results. This effort will identify trends, guide decision-making, and provide inputs for the SELECT and LDC modeling.

[1]Throughout this QAPP, "fecal bacteria" will generally refer to *E. coli* and Enterococcus, the bacteria indicators for fecal waste in freshwater and tidal systems, respectively.

Load Characterization with SELECT

The SELECT[1] model will be developed based on currently available data and stakeholder feedback. SELECT uses existing spatial data in a geographic information system (GIS) framework and literature values to characterize the extent and spatial distribution of bacteria sources. This methodology was originally selected for this purpose based on use in similar projects and because it represented a good match between the level of precision needed for the project with the complexity of the model (and the resources available). Spatial data used in SELECT include land use/land cover, point sources, roads, hydrology/stream network, subwatershed boundaries, aerial imagery, Texas Pollutant Discharge Elimination System (TPDES) permit outfall locations (including wastewater treatment facilities [WWTFs], concentrated animal feeding operations, and municipal separate storm sewer [MS4s] permits), on-site sewage facility (OSSF) locations, soil data, census tracts, regional demographic projections (spatial), elevations, and other related watershed-specific spatial locations (impoundments, etc.). Non-spatial data, or spatial data not used wholly in a spatial context, will include agricultural census data, DMRs, SSO violation data, wildlife population data, and non-domestic animal population data (feral hogs). Literature values or assumptions[2] derived from the data to be used will include population and loading rates for all sources, unpermitted septic system locations, pollutants in WWTF flows, and prevalence of specific sources in different land cover types.

H-GAC will use SELECT to develop analyses for the project area for current and future conditions. The analyses will be broken out by subwatershed. Assumptions and results will be reviewed with stakeholders, TCEQ, and other partners to ensure that they reflect local knowledge and provide an accurate reflection of loading in the watershed. The output of this effort will be visual displays of loading data, potential load estimates, and characterization of relative contribution by sources for current and future conditions. These outputs will guide stakeholder decisions concerning the identification and prioritization of management measures and serve as a basis for updating derived reduction targets in conjunction with the LDC analyses.

For all SELECT analyses, the scenarios will include a weighting factor in which loads generated within 300 feet of waterways will be weighted as 100%. Loads originating outside this “buffer” area will be weighted as 25%. The “buffered” approach utilizes a weighting factor to accentuate the probability of proximate load to waterways having greater impact[3].

Load Duration Curves

[1]Additional information on the purpose, methodology, and use of the SELECT model from which this SELECT approach is derived can be found in Teague *et al.* 2009 at https://ssl.tamu.edu/media/11291/select-aarin.pdf.

[2]Additional loading factors may be included based on stakeholder input, including conservative estimates of populations not able to be estimated through existing data (e.g., adding load for wildlife other than deer, or decreasing load from pets based on pet waste station usage).

[3] SELECT does not account for the effects of proximity on bacteria transmission, which may skew source contribution ratios and impact stakeholder decisions. The weighting approach is based on previous WPP approaches (e.g., West Fork San Jacinto River and Lake Creek, Cypress Creek, Spring Creek, East Fork San Jacinto River) using some extent of the same approach, as developed and approved by stakeholders.

This project effort will develop LDCs[1] for bacteria and DO. The LDCs will be used to derive load reductions for bacteria and to evaluate any patterns in exceedances of the water quality standard based on flow conditions for all constituents.

LDCs will be completed for at least two stations in the project watershed (see Table A5.1), utilizing quality assured water quality data from SWQMIS and/or CRP sources and daily flow data from United States Geological Survey (USGS) gauges. Additional LDCs will be developed as needed from the list of stations in Table A5.1. Site selection for LDC analyses will depend on the level of site-specific assessment indicated by the results of the water quality analyses, evaluation of sources, and the need to characterize individual tributaries, subwatersheds, or sections of a segment. If a representative USGS flow gauge is not available to generate 10 years of data needed for FDC development but there is sufficient instantaneous flow data in SWQMIS, H-GAC will use linear regression analyses between the instantaneous flow and the nearest USGS gauge to generate a 10-year period of estimated daily flow data. Alternatively, drainage area ratios (DARs) between the drainage area of a gauged station and the drainage area of a station without a USGS gauge applied to the daily gauged values may be used to estimate a 10-year period of daily flows based on the assessment of the Environmental Modeling Manager. FDCs will be used in conjunction with SWQMIS data (bacteria or DO) to generate daily pollutant loading estimates or LDCs with the USGS Load Estimation (LOADEST) tool[2]. Prior to developing the LDCs, H-GAC will evaluate the preliminary information from water quality data analyses to confirm that selected LDC sites are appropriate for characterizing their respective water bodies. The outputs of the LDC analysis will be visual characterizations of the relationship between flow levels and constituent concentrations, and reduction estimates for fecal bacteria loading and DO improvement. The use of this effort will be to help identify variation in loading based on flow and to inform stakeholder decisions regarding scale and type of management measures. The USGS stream gauge and potential monitoring site locations for LDCs are summarized in Table A5.1.

Table A5.1 LDC Monitoring Site Locations

Site Description	Segment ID	Station ID	USGS Gage
SIMS BAYOU AT GALVESTON ROAD IN HOUSTON	1007	20736	NA
SIMS BAYOU AT LAWNDALE AVE. IN HOUSTON	1007	11302	NA
BERRY BAYOU AT HOWARD DRIVE IN SOUTH EAST HOUSTON	1007	16660	NA
SIMS BAYOU SOUTH BRANCH AT TIFFANY DRIVE IN SOUTH HOUSTON	1007A	16656	NA
SIMS BAYOU AT HIRAM CLARKE RD IN HOUSTON	1007D	11135	NA
SIMS BAYOU ABOVE TIDAL AT SOUTH POST OAK	1007D	17976	NA

[1]Additional information on the use and methodology of the LDC model being used for this and previous efforts can be found at https://www.epa.gov/sites/production/files/2015-07/documents/2007_08_23_tmdl_duration_curve_guide_aug2007.pdf.
[2]See: https://water.usgs.gov/software/loadest/

Site Description	Segment ID	Station ID	USGS Gage
ROAD			
SIMS BAYOU AT CULLEN BLVD. SOUTH OF HOUSTON	1007D	11133	NA
SIMS BAYOU AT ALMEDA RD IN SOUTH HOUSTON	1007D	15876	NA
SIMS BAYOU AT SWALLOW AVE IN SE HOUSTON	1007D	15878	NA
SIMS BAYOU AT TELEPHONE ROAD (SH 35) IN HOUSTON	1007D	11132	08075500
SIMS BAYOU AT M.L. KING AVE IN SOUTH HOUSTON	1007D	15877	NA
BERRY BAYOU AT SOUTH RICHEY STREET IN SOUTH EAST HOUSTON	1007F	16661	NA
PINE GULLY AT OLD GALVESTON ROAD IN SOUTH EAST HOUSTON	1007H	16659	NA
PLUM CREEK AT OLD GALVESTON ROAD IN SOUTH EAST HOUSTON	1007I	16658	NA
UNNAMED TRIBUTARY OF SIMS BAYOU AT DULCIMER STREET IN SOUTH HOUSTON	1007N	16655	NA
BRAYS BAYOU AT 75TH STREET	1007	11306	NA
BRAYS BAYOU TIDAL AT SCOTT STREET IN HOUSTON	1007	11309	NA
BRAYS BAYOU AT GRAHAM LANE IN HOUSTON	1007	16479	NA
BRAYS BAYOU AT SOUTH MAIN ST IN HOUSTON	1007B	11139	08075000
BRAYS BAYOU AT SOUTH GESSNER IN HOUSTON	1007B	11140	08074810
BRAYS BAYOU AT DIARY ASHFORD RD IN WEST HOUSTON	1007B	15850	NA
BRAYS BAYOU AT BEECHNUT AVE IN WEST HOUSTON	1007B	15852	NA
BRAYS BAYOU AT HILLCROFT AVE. IN WEST HOUSTON	1007B	15853	NA
BRAYS BAYOU AT STELLA LINK RD IN HOUSTON	1007B	15855	NA
BRAYS BAYOU AT ALMEDA ROAD SOUTHWEST OF HOUSTON	1007B	11138	NA
BRAYS BAYOU AT WILCREST DR IN WEST HOUSTON	1007B	15851	NA
BRAYS BAYOU AT SOUTH RICE AVE. IN WEST HOUSTON	1007B	15854	NA
BRAYS BAYOU AT SH 6 IN WEST HOUSTON	1007B	15848	NA
KEEGAN'S BAYOU AT SYNOTT ROAD 1.1 KM SOUTH OF THE INTERSECTION OF SYNOTT ROAD AND BISSONET STREET IN SOUTHWEST HOUSTON	1007C	20211	NA
KEEGANS BAYOU AT ROARK ROAD NEAR US 59 JUST SOUTHWEST OF HOUSTON CITY LIMITS	1007C	11169	08074800
WILLOW WATERHOLE AT MCDERMED DRIVE IN SOUTHWEST HOUSTON	1007E	16652	NA
KUHLMAN GULLY AT BROCK STREET IN	1007G	16653	NA

Site Description	Segment ID	Station ID	USGS Gage
SOUTHEAST CENTRAL HOUSTON			
COUNTRY CLUB BAYOU (TRIB. OF BRAYS BAYOU) AT SOUTH WAYSIDE DRIVE (US90A) JUST S OF INTERSECTION POLK STREET IN CENTRAL HOUSTON	1007K	16650	NA
COUNTRY CLUB BAYOU (TRIB. OF BRAYS BAYOU) AT HUGHES STREET IN CENTRAL HOUSTON	1007K	16651	NA
UNNAMED TRIBUTARY OF BRAYS BAYOU AT DUMFRIES DRIVE IN SOUTH WEST HOUSTON	1007L	16654	NA
POOR FARM DITCH TRIBUTARY OF BRAYS BAYOU AT EASTBOUND NORTH BRAESWOOD BLVD APPROX 200 M E OF BUFFALO SPEEDWAY IN SW HOUSTON	1007S	18692	NA
BINTLIFF DITCH TRIBUTARY OF BRAYS BAYOU UNDER CENTER OF BISSONNET ST BRIDGE 317 M NE OF BISSONNET AT FONDREN RD IN SW HOUSTON	1007T	18690	NA
MIMOSA DITCH TRIBUTARY OF BRAYS BAYOU AT NEWCASTLE DR IN SOUTHWEST HOUSTON	1007U	18691	NA
HCFCD CHANNEL D138 (CHIMNEY DITCH) AT CAVERSHAM DRIVE	1007W	21180	NA

This modeling approach was chosen based on applicability of the models to the project questions; level of precision needed for development of the watershed protection plan; similarity to other WPP modeling efforts; and through discussions with TCEQ project staff. The fundamental goal of these modeling efforts is to provide data to facilitate informed stakeholder decisions.

The contract that this QAPP is associated with was executed on September 1, 2024 and is estimated to be completed by August 31, 2027. All task and deliverable dates are estimates. Work covered under this QAPP will not begin until the QAPP is executed.

See Appendix A for a project location map.

See Appendix B for the contract tasks referenced in this QAPP.

Amendments
Amendments to the QAPP must be approved to reflect changes in project organization, tasks, schedules, objectives, and methods; address deficiencies and nonconformances; improve operational efficiency; and accommodate unique or unanticipated circumstances. Requests for amendments are submitted by the H-GAC Project Manager to the TCEQ NPS Project Manager in writing using the NPS QAPP Amendment Shell. The changes are effective immediately upon approval by the TCEQ QA Manager, TCEQ NPS Project Manager, and TCEQ Lead QAS, or their designees.

Amendments to the QAPP and the reasons for the changes will be documented, and full copies of the amendments will be forwarded to all persons on the QAPP distribution list by the H-GAC QAO. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual certification process or within 120 days of the initial approval in cases of significant changes.

Annual QAPP Reviews, Certifications, and Revisions
This QAPP shall be reviewed in its entirety and certified annually by the H-GAC Project Manager and the TCEQ NPS Project Manager. A letter certifying this annual review must be submitted to the TCEQ NPS Project Manager no later than 90 days prior to the QAPP anniversary date. Amendments approved since QAPP approval or the previous annual certification should be included as an attachment along with the letter. Only nonsubstantive changes not affecting the project design or quality or quantity of work to be performed can be included in the annual certification letter. This includes organizational changes or schedule changes based on a contract amendment that do not impact data deliverables. If changes beyond these are necessary, a QAPP amendment must be submitted and approved before the annual review may be certified. The TCEQ NPS Project Manager is required to review the QAPP and provide certification of annual reviews to the TCEQ QA Manager and EPA Region 6 Project Officer no later than 30 days before QAPP anniversary dates. If the QAPP expires, work described within this document must be halted.

If the project will extend beyond the third QAPP anniversary date, a full QAPP revision is required. If the QAPP expires, work described within this document must be halted.

A6 INFORMATION/DATA QUALITY OBJECTIVES AND PERFORMANCE/ACCEPTANCE CRITERIA FOR MODEL INPUTS/OUTPUTS

The general quality objectives for the project are to produce data analyses and updated modeling outcomes that accurately characterize conditions in the watershed and are a sufficient platform on which to base stakeholder decisions concerning the selection and scale of management measures. This is achieved using the best available data (quality-assured[1] as applicable), review of products and inputs with stakeholders and knowledgeable partners and adhering to the preponderance of literature (as amended by reasonable stakeholder review) for modeling assumptions. These goals are fostered by continual and robust engagement with stakeholders, especially partners with specific technical experience.

Data quality objectives for each component effort are described below.

Water Quality Analysis

[1]For the purpose of water quality trends analyses, modeling inputs, and in support of decision-making for the WPP, water quality data used will be limited to quality-assured data processed through a TNI-accredited lab, unless it meets an exception as indicated in 30 TAC, Chapter 25.6. Volunteer data (e.g., Texas Stream Team, or other non- accredited lab data) will only be used for anecdotal purposes or for general watershed information.

The primary data quality objectives for this effort are to ensure data inputs are from quality assured sources (e.g., data collected under existing TCEQ/EPA approved QAPPs or similar sources), and that analysis outputs accurately reflect water quality trends in the watershed. The focus of the analyses are long-term trends, although short-term or seasonal trends may be reviewed based on a review of the available dataset, requirements of the stakeholders, and area-specific circumstances. Data that are not quality assured may be used to help characterize the watershed in a qualitative sense, or as indicators where additional analysis may be needed, but will not be considered equal to data produced under a QAPP. These data sources will not be used for the water quality analyses or mingled with quality-assured data, but only for informal/informative review of potential problem areas not covered by formal monitoring.

Performance criteria for outputs include a proper data management trail (per Appendix E) and relevant document retention requirements of this QAPP) of the data evaluation process, and trends/variability analyses that properly utilized SAS methods (See Appendix E), performed by experienced staff. The outputs will be acceptable if the performance criteria are met (this is a qualitative measure, as no calibration or validation of data other than initial validation in submission to SWQMIS is performed on these analyses). The intended use of these outputs will be to display water quality trends for stakeholder decision-making processes, including the development of pollutant reduction targets based on the results of the SELECT modeling outputs.

Hardware and software to be used will conform to industry standards (e.g., Microsoft Office products and SAS utilized in a Windows 7 environment). Configuration of SAS analyses will be based on similar water quality analyses conducted by H-GAC CRP staff using the same data management and data evaluation processes and tools to ensure the data are comparable with those of other regional and regulatory efforts.

Data completeness will be evaluated based on whether all existing data, as submitted to SWQMIS, have been used. Flagged data in the SWQMIS dataset will be qualitatively reviewed by the H-GAC Data Manager to assess whether to include it in project analyses or omit it from the dataset. Data representativeness will be based on whether all available data from stations in the watershed is utilized, thus representing the broadest picture of conditions throughout the area.

Trend analysis will include assessment of which ambient monitoring constituents have statistically significant trends. Information about each constituent will include the number of samples evaluated. Evaluation of constituents will be based on their respective water quality standard numeric criteria or equivalent measure (e.g., screening level). Analyses will mirror the approach taken in the development of water quality trends analyses for similar area WPPs. Because the data and methods to be used have previously been reviewed as part of quality-assured processes, no appreciable bias in the data is expected. Systemic bias in water quality sampling is based on skewing of data collection to daylight hours. Systemic uncertainty is found in the lack of continuous data (i.e., periodic grab samples under CRP, etc.). However, these sources of uncertainty are endemic to monitoring programs, and are not expected to produce serious issues for data analysis acceptability.

Load Characterization with SELECT

The primary data quality objectives for this effort are to ensure data inputs are from the best available sources (quality assured or industry standard), that assumptions are scientifically defensible and vetted by stakeholders, and that outputs are driven by appropriate data and stakeholder review. Performance criteria for inputs are that they represent the best available data, and in the case of data sources which may differ from place to place, the most locally appropriate data (e.g., deer population numbers for the specific area as opposed to a statewide average). All spatial data used in SELECT are from sources that are quality-assured, widely used data products appropriate for this task, or based on assumptions used and vetted under previous area WPPs. Performance criteria for outputs include modeling outcomes that are sufficient to guide stakeholder discussion, and which are demonstrably defensible based on the source and vetting of data and assumptions. The outputs will be acceptable if these criteria are met (this is a qualitative measure, as no model calibration or validation of data is performed for SELECT). The intended uses of these outputs will be to generate potential pollutant load estimates and characterize their spatial relationship, and to guide stakeholder discussions of the scope of management measures. Hardware and software to be used will conform to industry standard (e.g., Microsoft Office products, and the SELECT model utilized in a Windows/ArcGIS environment). Configuration of SELECT assumptions analyses will be based on similar SELECT analyses to ensure the data are comparable with those of other regional and regulatory efforts.

Data completeness will be based on whether enough data are available to generate loads using SELECT. Data representativeness will be evaluated based on whether spatial data and assumptions are indicative of conditions throughout the watersheds. Because the selection of assumptions and the stakeholder review process can introduce some subjectivity in decision-making, some level of bias in the outcomes is expected. Bias will be considered reasonable if modifications to outputs or assumptions are based on reasonable expectations that local knowledge or data are more appropriate than more general values. Systemic uncertainty is inherent to the use of assumptions and literature value. However, these sources of uncertainty are endemic to SELECT modeling and do not compromise the objectives for this modeling effort. SELECT is not intended to be a model of a precision level that would be impacted by these levels of bias and/or uncertainty. Table A6.1 indicates all foreseeable assumptions or literature values that will be applied to the models.

Table A6.1 Modeling Assumptions

Assumption/ Literature Value	Model	Review with Stakeholders?	Source	Value
Feral Hog Density	SELECT	Yes	Texas A&M Agrilife Research (Agrilife) Densities	AgriLife has used a variety of hog densities, with a generic Texas range of 8.9-16.4 hogs per square mile[1], depending on land cover type. This value is expected to be

[1] http://agrilife.org/feralhogs/files/2010/04/FeralHogPopulationGrwothDensityandHervestinTexasedited.pdf

Assumption/ Literature Value	Model	Review with Stakeholders?	Source	Value
				heavily modified by local stakeholders to reflect area or subwatershed populations.
Livestock Populations	SELECT	Yes	United States Department of Agriculture National Agricultural Statistics Service Agricultural Census Data (most recent)	County-level data are used to derive a ratio of animals per land cover type. This ratio is then applied to the area of the watershed in each county.
OSSFs Number and Location	SELECT	Yes	H-GAC OSSF Database	Permitted systems are based on actual location data. Unpermitted systems are based on occupied locations outside of service areas, without permitted OSSFs.
OSSF Failure Rates	SELECT	Yes	H-GAC OSSF Data, Stakeholder Input	As these rates are highly variable by location, failure rates will be heavily modified by stakeholder (especially Authorized Agent) input. An estimated 15% failure rate was used in preliminary SELECT outputs.
Animal Excretion/Bacterial Densities	SELECT	No	Literature Value	Based on values indicated in Teague, 2009[1].
WWTF Discharge Concentrations	SELECT	Yes	DMR Data from Each Plant (TCEQ)	Geomean of DMR data, using an assumed 60% of permitted flow as daily average flow to determine total load.
Land Cover Change	SELECT	Yes	H-GAC Regional Demographic Projections	Proprietary data used in most regional WPPs.
Pet Populations	SELECT	Yes	American Veterinary Medicine Association (AVMA)	AVMA estimates of household ownership (0.8 pets/household) used as a starting figure, multiplied by number of households. This will be modified by stakeholders and area-specific reconnaissance. A decrease factor in load may be applied if pet waste station/pet bag use is found to be common in the watershed, based on research and stakeholder input.
Bird Populations/Fecal	SELECT	Yes	Texas Parks &	Bird populations are based primarily on TPWD staff

[1]"Spatially explicit load enrichment calculation tool to identify potential *E. coli* sources in watersheds." A. Teague, *et al.* 2009. http://ssl.tamu.edu/media/11291/select-aarin.pdf

Assumption/ Literature Value	Model	Review with Stakeholders?	Source	Value
Concentrations			Wildlife Department (TPWD), Stakeholders, EPA, Texas State Soil and Water Conservation Board (TSSWCB)	knowledge (if available) and stakeholder knowledge. Of primary concern are the presence of colonial rookeries, swallow nesting sites over water, gulls concentrated at landfills, and other large concentrations of birds. EPA and TSSWCB values[1] for bird fecal rates are used if stakeholder input indicates substantial, or substantially proximate (swallow colonies over bridges, etc.), numbers of birds exist on an annual basis to model. Values dependent on species of concern.
WWTF Outfall Locations	SELECT	No	TCEQ Spatial Data	WWTF outfalls are spatially explicit data.
Other Wildlife	SELECT	Yes	TPWD, Stakeholder input	If data for other wildlife populations exist, they will be considered for inclusion with stakeholders. If data does not exist, a conservative background load expressed as a percent of total may be applied based on stakeholder input and microbial source tracking studies in the state and local area.

Load Duration Curves

The primary data quality objectives for this effort are to ensure data inputs are from quality assured sources (e.g., data collected under existing TCEQ/EPA approved QAPPs or other similar sources); that modeling assumptions are based on the best available literature, established methodologies for specific circumstances, and best professional judgment; and that outputs reflect load durations and related reduction needs (for bacteria, and improvement needs for DO) in a manner that is reflective of the diverse conditions of the project area. Performance criteria for outputs include a proper data management trail of the data evaluation process, and LDC analysis using established methods[2], performed by experienced staff. The outputs will be acceptable if these criteria are met (this is a qualitative measure, as no calibration or validation of data other than initial validation in submission to SWQMIS is performed on these analyses).

The intended use of these outputs will be to develop updated bacteria reductions and define impacts to bacteria and related constituents under various flow conditions. Hardware and software to be used will conform to industry standards (e.g., Microsoft Office products and LOADEST in a current Windows environment). Configuration of

[1]Based on studies referenced by EPA and TSSWCB, including http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2771205/ and https://www.tsswcb.texas.gov/sites/default/files/files/programs/nonpoint-source-managment/Completed%20Projects/BBBB_Report_23Sep13_Clean.pdf
[2]http://www.epa.gov/tmdl/approach-using-load-duration-curves-development-tmdls

LDC assumptions will be based on TCEQ guidance to ensure the data are comparable with those of other regional and regulatory efforts. However, specific configuration of assumptions will be based on best available data, professional judgment, and stakeholder review. Data completeness will be based on whether enough data are available to generate updated LDCs. Data representativeness will be evaluated based on whether selected LDC sites have enough data for an update and are representative of their respective water bodies in general. Because the selection of assumptions and the stakeholder review process can introduce some subjectivity in decision-making, some level of bias in the outcomes is expected. Bias will be considered reasonable if modifications to outputs or assumptions are based on reasonable expectations that local knowledge or data are more appropriate than more general values or specific choices (e.g., level of reduction to be used in relation to bacteria). Systemic uncertainty is inherent to the simplicity of the model and the complexity of real-world systems. However, these sources of uncertainty are endemic to LDC modeling and do not compromise the objectives for this modeling effort. LDCs are not intended to be a modeling approach of a precision level that would be impacted by these levels of bias and/or uncertainty. If insufficient USGS flow data are available, estimated daily flow data will be projected using linear regression analyses between instantaneous flow and gauged data or DAR analysis between the drainage areas of gauged sites and sites without gauges. The data objectives for the estimated flow conform to the same intended uses as the other LDC inputs and outputs. The intent of estimating flow is to provide stakeholders with information for an area that may otherwise not have enough flow data on which to base an LDC.

A7 DISTRIBUTION LIST

The Lead NPS QAS will provide approved versions of this QAPP and any amendments or revisions of this plan to the TCEQ NPS Project Manager. The TCEQ NPS Project Manager will provide approved copies to the H-GAC Project Manager and EPA Project Officer within two weeks of approval. The TCEQ NPS Project Manager will document transmittal of the plan to EPA and maintain this documentation as part of the project's quality assurance records. This documentation will be available for review in the event of an audit.

D. Jody Koehler
TCEQ QA Manager
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(512) 239-1990

Melissa Benfer, Project Officer
benfer.melissa@epa.gov
EPA Region 6
(214) 665-8423

H-GAC will provide copies of this project plan and any amendments or revisions of this plan to each project participant defined in the list below. H-GAC will document receipt of the plan by each participant and maintain this documentation as part of the

project's quality assurance records. This documentation will be available for review in the event of an audit.

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Rachel Windham, Senior Planner
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(713)-993-2497

A8 PROJECT ORGANIZATION

TCEQ

Air Monitoring Division

D. Jody Koehler
TCEQ QA Manager
Responsible for coordination, development, and implementation of TCEQ's QA program. Provides QA oversight and guidance for TCEQ's programs and is responsible for the development and maintenance of the TCEQ Quality Management Plan (QMP). TCEQ's QA Manager, or designated QA staff in the Laboratory and Quality Assurance Section of the Monitoring Division, is responsible for review and approval of program/project QAPPs to ensure QAPPs conform to applicable requirements as detailed in TCEQ's QMP.

James Babcock
Lead NPS QAS
Assists the TCEQ NPS Project Manager in QA related issues. Participates in the planning, development, approval, implementation, and maintenance of the QAPP. Determines conformance with program quality system requirements. Coordinates or performs audits as necessary, using a wide variety of assessment guidelines and tools. Concurs with proposed corrective actions and verifications. Provides technical expertise and/or consultation on quality services. Recommends to TCEQ management that work be stopped in order to safeguard project and programmatic objectives, worker safety, public health, or environmental protection.

Water Quality Planning Division

Faith Hambleton,
NPS Program Team Leader
Responsible for management and oversight of the TCEQ NPS Program. Oversees the development of QA guidance for the NPS program to be sure it is within pertinent frameworks of the TCEQ. Monitors the effectiveness of the program quality system. Reviews and approves all NPS projects, internal QA audits, program corrective actions, work plans, and contracts. Enforces program corrective action, as required. Ensures NPS personnel are fully trained and adequately staffed.

Marcella Lanzillotti
TCEQ NPS Project Manager
Maintains a thorough knowledge of work activities, commitments, deliverables, and time frames associated with projects. Develops lines of communication and working relationships between the contractor, the TCEQ, and the EPA. Tracks deliverables to ensure that tasks are completed as specified in the contract. Responsible for ensuring that the project deliverables are submitted on time and are of acceptable quality and quantity to achieve project objectives. Serves on planning team for NPS projects. Participates in the development, approval, implementation, and maintenance of the

QAPP. Conducts independent technical review of the QAPP to ensure compliance with project needs and requirements. Responsible for verifying that the approved QAPP is implemented by the contractor. Notifies the TCEQ Lead NPS QAS of circumstances which adversely affect the quality of data derived from the collection and analysis of samples. Monitors and enforces corrective action.

Kristin DeBone
NPS QA Coordinator
Assists Lead QAS with NPS QA management. Serves as liaison between NPS management and TCEQ QA management. Responsible for NPS guidance development related to program QA. Assists with development and maintenance of data management-related standard operating procedures (SOP) for NPS data management. Participates in the development, approval, implementation, and maintenance of the QAPP. Provides input and oversight regarding corrective actions. Maintains record of corrective actions.

H-GAC

Cornell Evans, Jr.
H-GAC Project Manager
Responsible for ensuring tasks and other requirements in the contract are executed on time and are of acceptable quality. Monitors and assesses the quality of work. Coordinates attendance at conference calls, training, meetings, and related project activities with the TCEQ. Responsible for verifying the QAPP is followed and the project is producing data of known and acceptable quality. Ensures adequate training and supervision of all monitoring and data collection activities. Complies with corrective action requirements. Responsible for maintaining records of QAPP distribution, including appendices, and amendments.

Jenny Oakley
H-GAC QAO
Responsible for coordinating development and implementation of the QA program. Responsible for ensuring the most recent version of the NPS QAPP shell document is used for writing and maintaining an official approved copy of the QAPP. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ NPS Project Manager to resolve QA-related issues. Notifies the H-GAC Project Manager and TCEQ NPS Project Manager of and documents circumstances which may adversely affect the quality of data. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Facilitates, conducts, and documents any technical systems audits.

Jessica Casillas
H-GAC Data Manager
The Project Data Manager is responsible for acquisition and verification of data, documentation of data sources, and ensuring the accuracy of data. Responsible for maintaining project data quality assurance records. Responsible for validation and verification of all data modeled, collected, and acquired. Oversees data management for the study. Performs data quality assurances prior to transfer of analysis output to

the TCEQ. Responsible for transferring analysis output to the TCEQ in an acceptable format. Ensures analysis output is submitted according to work plan specifications.

Rachel Windham
H-GAC Senior Planner
Responsible for assisting the H-GAC Project Manager with administration of the project. Assists in the development of project scope of work, contracts, and QAPPs. Monitors and assesses the quality of work. Assists in the development of project reports. Communicates with the H-GAC Environmental Modeling Manager and Environmental Modeler to evaluate data prior to use in FDC/LDC analysis to ensure data meets minimum FDC/LDC requirements and to report any issues or concerns to the H-GAC Project Manager. Responsible for the execution of FDC and LDC analysis and reporting the results to the H-GAC Project Manager. Provides the point of contact for the H-GAC Project Manager to resolve issues related to the LDCs and FDCs and assumes responsibility for the correction of any analysis errors.

Thushara Ranatunga
H-GAC Environmental Modeling Manager
Responsible for the operation or oversight of all computer models and associated documentation of model operation. Responsible for accuracy of input data to models. Performs operation of the models to ensure valid results are being predicted. Responsible for formulating model input to reflect the scenarios and situations to be emulated by each model. Provides oversight for H-GAC Environmental Modeler.

Megha Shrestha
H-GAC Environmental Modeler
Responsible for acquisition, analysis, and metadata management of wastewater discharge monitoring report data, sanitary sewer overflow data, ambient surface water quality data, and forecasting data used in modeling analyses.
U.S. EPA Region 6

Melissa Benfer, EPA Project Officer
Responsible for managing the CWA Section 319(h) funded grant on behalf of EPA. Assists the TCEQ in approving projects that are consistent with the management goals designated under the State's NPS management plan and meet federal guidance. Coordinates the review of project workplans, draft deliverables, and works with the State in making these items approvable. Meets with the State at least annually to evaluate the progress of each project and when conditions permit, participates in a site visit on the project. Fosters communication within EPA by updating management and others, both verbally and in writing, on the progress of the State's program and on other issues as they arise. Assists in grant close-out procedures ensuring all deliverables have been satisfied prior to closing a grant.

A9 PROJECT QA MANAGER INDEPENDENCE

TCEQ uses a semi-decentralized QA program, which is organizationally independent of operational programs and activities within the agency. TCEQ's QA program has sufficient access and authority to coordinate the development and implementation of the agency's quality system.

The TCEQ QA Manager and designated TCEQ QA staff are independent of activities performed by NPS Program. No NPS staff have authority to sign QAPPs or amendments on behalf of TCEQ's QA Manager or the Lead NPS QAS. Similarly, TCEQ's QA Manager and the Lead NPS QAS cannot sign QAPPs or amendments on behalf of NPS staff.

Roles of project QA staff are described in Section A8. An illustration of QA independence and lines of communication and supervision for this project are detailed in the project organization chart in Section A10.

A10 PROJECT ORGANIZATION CHART AND COMMUNICATIONS

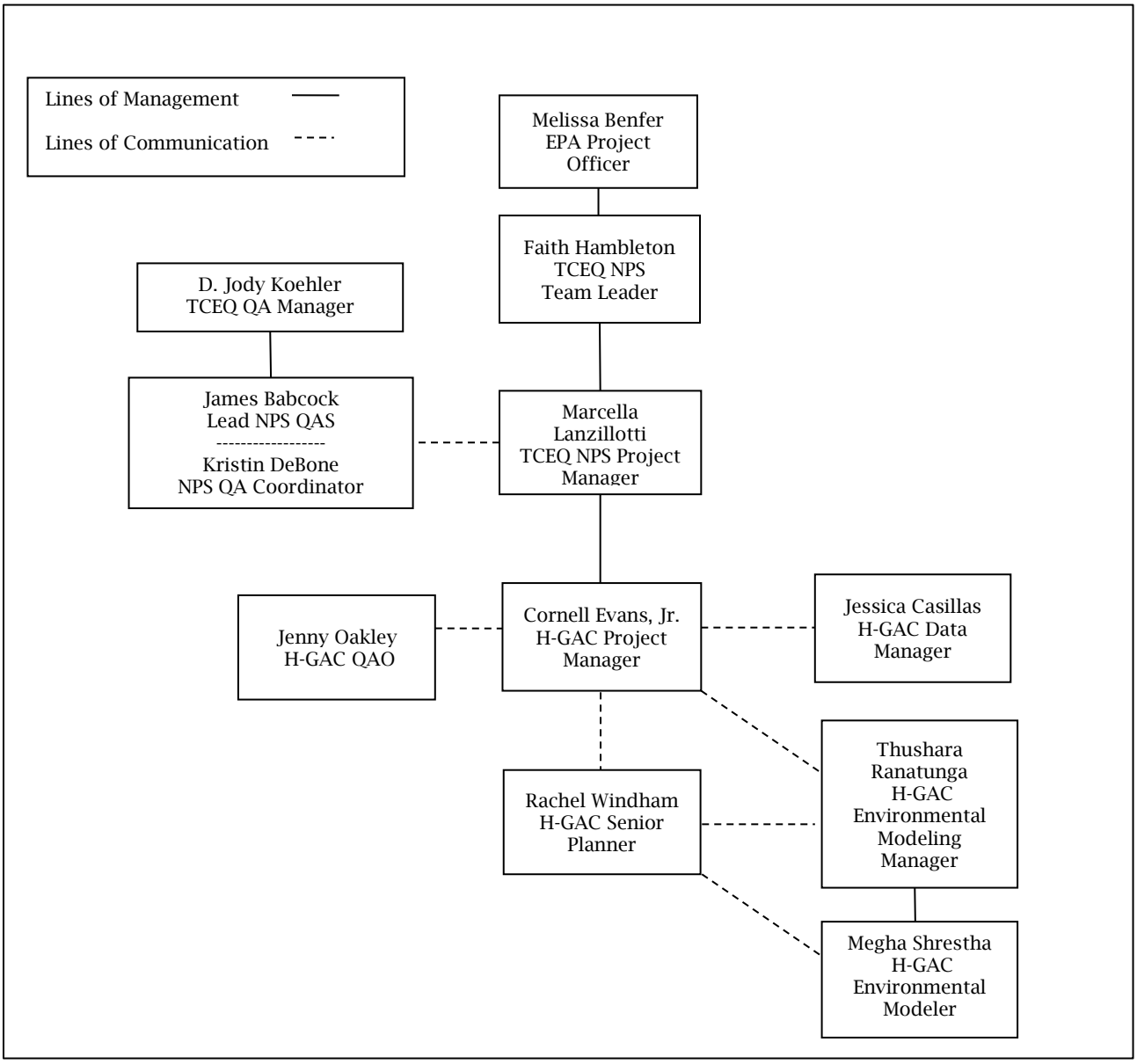


Figure A10.1. Organization Chart

A11 PERSONNEL TRAINING/CERTIFICATION

No formal certification is required for the efforts to be conducted under this QAPP. The modeling and project management staff have conducted previous training in all modeling and data evaluation efforts discussed. Any additional staff members that conduct work under this project will have, or receive, training specific to their work. Training taking place within the time frame of this contract will be recorded and maintained by the H-GAC Project Manager.

The H-GAC Environmental Modeling Manager, H-GAC Environmental Modeler, and H-GAC Senior Planner have conducted SELECT and LDC analyses (including the use of LOADEST for the specific purpose of generating daily pollutant loading estimates) on a variety of watershed projects and have attended multiple formal training events on SELECT and LDCs. Additionally, they have advanced knowledge of data quality needs and objectives common to modeling approaches in general based on experience and training. LOADEST will use existing data resources, and staff are already trained in its use and application for these purposes, so no additional training is required. Training will be provided to new project staff directly by the H-GAC Environmental Modeling Manager and H-GAC Senior Planner as needed.

The H-GAC Data Manager and H-GAC QAO for this project are the lead staff for CRP data analysis, and have extensive training in data management, QA, and SAS operation (data manager). They routinely attend training specific to SWQMIS procedures, and/or SAS operation. Their daily activities have heavy focus on this type of data analysis and QA. Records of educational credentials, training, demonstrations of competency, assessments, and corrective actions are retained by project management and are available for review.

All staff members have worked with QAPPs under prior projects. No additional training is expected to be needed to complete the project efforts.

A12 DOCUMENTS AND RECORDS

All digital and paper documentation for the project is kept for the period of retention noted in Table A12.1. The H-GAC Project Manager has final responsibility for ensuring project files are compiled in accordance with this QAPP. The H-GAC Data Manager will ensure that the H-GAC Project Manager has appropriate documentation for water quality data analyses and records for data from acquired data sources including but not limited to SWQMIS and CRP data. The H-GAC Environmental Modeling Manager will ensure that all modeling records, notes, literature referenced, and other records from modeling efforts compiled by any H-GAC team member are maintained during the project and relinquished to the H-GAC Project Manager for proper retention. Electronic data on the project computers and the network server are backed up daily to the network drive and weekly to external storage. In the event of a catastrophic systems failure, the backups can be used to restore the data in less than one day's time. Data generated on the day of the failure may be lost but can be reproduced from raw data in most cases. Quarterly progress reports disseminated to the TCEQ Project Manager and maintained by the H-GAC Project Manager will note activities conducted in connection with the water quality modeling project, items or areas identified as potential problems, and any variations or supplements to the QAPP.

In addition to general information regarding data and modeling activities, any stakeholder input received, or notes generated regarding input, will be included with modeling files and project documentation.

Modeling Log

Modeling notes created by the H-GAC Environmental Modeling Manager, H-GAC Environmental Modeler, and H-GAC Senior Planner will be recorded electronically with model files, on paper, or in a separate electronic file (e.g., Word document). All electronic files will be stored in the same folder as the modeling files, and all paper files will be retained by the H-GAC Environmental Modeling Manager until the end of the project. At that time, they will be included with project files maintained by the H-GAC Project Manager and retained for the time listed in Table A12.1.

The H-GAC Environmental Modeling Manager will document references and compile any references developed by the H-GAC Environmental Modeler and H-GAC Senior Planner for model assumptions (and adjustments thereof), stakeholder feedback provided by the H-GAC Project Manager, and model runs. The level of detail will be sufficient to allow another modeler to duplicate the modeling method given the same data and model.

Table A12.1 Project Documents and Records

Document/Record	Location	Retention*[a]	Form*[b]
QAPPs, amendments, and appendices	H-GAC	5 years	Paper/Electronic
QAPP distribution documentation	H-GAC	5 years	Paper/Electronic
SOPs	H-GAC	5 years	Paper/Electronic
Model User's Manual or Guide (including application-specific versions)	H-GAC	5 years	Paper/Electronic
Assessment reports for acquired data	H-GAC	5 years	Paper/Electronic
GIS Files	H-GAC	5 years	Electronic
Raw data files	H-GAC	5 years	Paper/Electronic
Data used for FDCs/LDCs	H-GAC	5 years	Electronic
Model input files	H-GAC	5 years	Electronic
Modeling notes	H-GAC	5 years	Paper/Electronic
Model output files	H-GAC	5 years	Electronic
Statistical Computation Documentation	H-GAC	5 years	Electronic
Code Verification Reports	H-GAC	5 years	Paper/Electronic
Model Assessment Reports	H-GAC	5 years	Paper/Electronic
Progress report/CAP/final report/data	H-GAC	3 years	Paper/Electronic

*a – After the close of the project
*b – Electronic files should be ASCII (DOS) pipe delimited text files or PDF/MS Word/Excel; model input and output files can be archived in the format used by the modeling software, provided the capability of conversion to ASCII (DOS) pipe delimited text files or PDF/MS Word/Excel (TCEQ compatible version) is maintained over the time of retention.

The TCEQ may request records at any time and/or elect to take possession of records at the conclusion of the specified retention period.

B1 IDENTIFICATION OF PROJECT ENVIRONMENTAL INFORMATION OPERATIONS

Does not apply to this QAPP. No new data will be collected under this QAPP.

B2 METHODS FOR ENVIRONMENTAL INFORMATION ACQUISITION

No new data will be collected under this QAPP. Methods for environmental information acquisition are described below.

Analytical Methods

Analytical methods are described in A5.

Existing Information

The modeling and water quality data analysis efforts described in this QAPP will make use of non-direct/acquired data from a variety of sources. The sources and their characteristics are included in Table B2.1.

The primary sources of data for model development are:

- Water quality monitoring data from SWQMIS
- DMRs, SSO violation data, other permit reporting data from TCEQ databases
- Regional demographic forecasting data created by H-GAC
- OSSF location data created by H-GAC for TCEQ
- Spatial datasets and databases created by other state and federal agencies (e.g., H-GAC land cover data, USGS flow data and precipitation data)
- Literature values for model assumptions (see Table A6.1)

All non-direct data being used have been previously deemed to be acceptable acquired data sources under other QAPP efforts or was prepared under QAPP coverage or similar quality-assured processes. In all instances, the best available data in terms of quality, quality control, and comparability with other QAPP covered modeling efforts have been selected for use.

Ambient Water Quality Data

No data will be collected specifically for this project nor submitted for inclusion in SWQMIS. The collection and qualification of the TCEQ and USGS data are addressed in the TCEQ Surface Water Quality Monitoring QAPP. Data acquired for this project will include those parameters needed to characterize the watershed; develop, operate, or validate models; or meet other user requirements. These data include conventional parameters, field parameters, bacteriological parameters, and biased sampling conducted under special projects.

TCEQ's SWQMIS is the largest and most complete repository for water quality data collected under accepted QAPP procedures in the State of Texas and was selected for that reason for these efforts. The water quality data to be acquired for this project will include routine water quality data collected by TCEQ and sampling partners such as CRP, USGS, and TSSWCB, including available 'non-qualified,' routine or special study, ambient, fixed station water quality data and associated field parameters.

H-GAC's FY2024-2025 CRP QAPP[11] Section B9 explains which TCEQ method codes are used to describe comparable parameters contributing to the CRP dataset. Sections A7, B5, and Appendix A of the FY2024-2025 CRP QAPP also describe limits of quantitation and the process by which analytical results reported to the CRP are required to reflect parameter ranges in excess of those limits. Assessments of CRP data conducted under the Basin Highlights Report(s) and Basin Summary Report falling within this project timeline may be used to supplement analyses conducted under this project. All CRP work is conducted under its own QAPP and is not intended to be covered under this QAPP. However, the data, staff, and processes used are identical to those intended for this project.

TCEQ Permit and Violation Data
This project will make use of data from TPDES and other permittees acquired and maintained by TCEQ. This will include DMRs, SSO violation data, TPDES permit information and compliance history, and other data relevant to TCEQ or EPA-permitted facilities in the watershed. These data are assumed to be of acceptable quality based on inclusion in TCEQ- or EPA-approved datasets, including those prepared by H-GAC for TCEQ under QAPP-covered efforts funded by 604(b) Water Quality Management Plan projects. H-GAC will work with TCEQ staff to identify, acquire, and update these data sources.

Regional Demographic Forecasting
H-GAC conducts regional demographic forecasting as part of a quality-assured effort. Data to be used for this project include current and future population projections, land cover change projections, and household and job change projections. Additionally, H-GAC develops proprietary land cover data based on satellite imagery that is more current and regionally specific than other land cover data sources. This data source is the standard for the region and is used in comparable QAPP-covered planning efforts as well as broader regional planning efforts.

OSSF Location Data
H-GAC maintains a spatial database of permitted OSSF locations for the region, including the project area. This database was developed and maintained by H-GAC under a TCEQ-approved QAPP as part of an ongoing EPA CWA 604(b) Water Quality Management Plan grant funded through TCEQ.

USGS Flow Data
This project will make use of data from USGS stream gages within the project area and in nearby areas in FDC/LDC analyses. These data are assumed to be of acceptable quality based on USGS QA procedures.

Geospatial Data
The H-GAC Community and Environmental Planning Department's (C&E) Data Management Plan (DMP; Appendix E outlines how both tabular (non-geographic)

[11] H-GAC's FY2024-2025 CRP QAPP can be viewed at https://www.h-gac.com/getmedia/4b53e3a4-c629-4ac7-b48e-362c3c90d77e/FY24-25-QAPP

and spatial (geographic) datasets are captured, manipulated, analyzed, stored, and displayed within the Geospatial/GIS environment as it relates to sharing of data, development of geospatial applications, cartography, and underlying GIS resources (see Appendix E for more detail). Existing geospatial data resources at H-GAC will be combined with additional data from appropriate local, regional, state, and federal organizations as needed. Geospatial data used for modeling exercises will be of acceptable quality based on the data quality objectives of this project and will have been published with appropriate metadata. The publishing of geospatial data by various organizations implies that the data are of known quality, that is, has been subject to review and approval by the publishing organization and has required metadata to prove its accuracy and completeness.

All outside data sources will be reviewed to determine level of quality, compatibility, and completeness. Procedures used to collect these outside sources will also be reviewed to determine compatibility and determine level of sampling bias and uncertainty. Generally, data used from outside sources will be acceptable if they were collected under an existing QAPP, published in peer reviewed literature or if sufficient and documented quality assurance/quality control procedures were employed during project data collection and analysis.

H-GAC utilizes ESRI's ArcGIS for all geospatial analysis and mapping needs. The ESRI ArcGIS Pro.3.1 platform includes integrated Python programming capabilities, which allows for the creation of programming scripts or batch programs to improve efficiency and documentation of processes. The Python programming language is an Open Source platform and is freely distributable.

Derived GIS layer data from other QAPP-covered CRP assessments (e.g., potential sources of contamination in a watershed identified under a Basin Highlights Report or Basin Summary Report) may be utilized if it is of equal or greater adherence with the data quality objectives for this project.

Modeling Assumptions and Literature Values
The SELECT and LDC models rely on a mix of actual measurements and assumptions/literature values. The application of the LOADEST tool to generate a simple pollutant load estimation relies on values internal to the tool. Some model values are integral to the models, while others can be modified or are based on local data/accounts. Literature values intended to be used for these modeling efforts include rate, volume, and character of fecal deposition by various sources; event mean bacteria concentrations specific to land cover types; nutrient loading characteristics of land cover types; source population estimates (e.g., number of feral hogs per mile); and impacts of various best management practices. Selection of literature values will show preference to peer-reviewed scientific literature, most locality-specific references, and currency of reference, as modified by agency and stakeholder feedback. User-selected assumptions for SELECT include the use of the buffer approach in discounting loading outside a defined buffer distance from the waterway, and the distribution of some sources for which data are not specific to the watershed (e.g., cattle populations based on county-level data).

Other Data

Data used for qualitative assessment, stakeholder discussion, and watershed characterization not related to modeling efforts covered under this QAPP may include Texas Stream Team volunteer monitoring data, spatial data generated by other entities active in the project area (e.g., habitat data generated by local non-governmental organizations), and other local data as encountered during the course of the WPP development project. These data sources are not intended to be used directly for the modeling efforts covered under this QAPP, but may influence staff and stakeholder decisions regarding assumptions, etc.

Table B2.1 Data Sources Used for Analysis*

Geospatial Data or Data Type	Source	Date(s)	Analysis and/or Processing**	QA Information	Data Use(s)
Monitoring Data (Field measurements: Temperature, dissolved oxygen, pH, etc.)	TCEQ SWQM Program	All available data; most recent iteration.	TCEQ	TCEQ SWQM QAPP; SWQMIS database	Summary statistics, trend analysis
TPDES outfall locations (GIS)	TCEQ	All available data; most recent iteration.	Add TCEQ Permit numbers and NPDES IDs. Filter out MUDs and non-residential outfalls as well as pending permits.	https://www.tceq.texas.gov/gis/StandardsIndex.html	Determining outfall locations.
TPDES permit records	TCEQ	All available data; most current versions	Limit data is imported to calculate flow data and then combined with categorized permit data and then merged with historical permit records to create the complete permit record data.	Data is acquired from TCEQ and is assumed to be preliminarily accurate.	Identifying regional facilities and their associated permit limits
DMR data	EPA	Most current five years at the time of acquisition.	TCEQ outfall data is combined with permit and EPA DMR datasets. Data bacteria limits are identified and compliance/exceedance rates with daily loads are calculated. Data is aggregated by facility, year, and monitoring period and summary table is produced.	Data is acquired from TCEQ and is assumed to be preliminarily accurate. Data is submitted to EPA. TCEQ outfall data is combined with permit and EPA DMR datasets. Data bacteria limits are identified and compliance/exceedance rates with daily loads are calculated. Data is aggregated by facility, year, and monitoring period and	Evaluating discharges of permitted constituents from WWTFs

Geospatial Data or Data Type	Source	Date(s)	Analysis and/or Processing**	QA Information	Data Use(s)
				summary table is produced.	
TCEQ SSO data	TCEQ (originally reported by TPDES facilities) Permittees	Most current five years at the time of acquisition.	SSO categories created based on descriptions and merged with permit information. Events are summarized with permit and waterbody information and estimated volumes are produced. Summary statistics of SSO data are created for the H-GAC region.	Email communication with TMDL team at TCEQ. TMDL team provides an Excel file for the State of Texas. No known QA procedures. H-GAC cleans the dataset for our region.	Characterizing patterns for regional SSOs
Service Area Boundaries	H-GAC Service Area Boundary dataset CADs PUC CCN data	All available data; most current versions	Match new boundaries from the CCN and Water district datasets with the new outfalls layer. Digitize the CAD drawings to get new development boundaries. Merge the new boundaries with the existing dataset and transfer attributes such as Permit Numbers and IDs.	https://www.fgdc.gov/metadata	Identifying service area boundaries; coordinating with permit data and outfall locations; identification of areas to exclude from unpermitted OSSF estimation.
H-GAC Regional Growth Forecast	H-GAC Regional Growth Forecast dataset	All available data; most current versions	Assess population and household growth within the project area and apply to SELECT calculations for future loading	https://www.h-gac.com/getmedia/6f706efb-9c6d-4b6a-b3aa-7dc7ad10bd26/read-documentation.pdf	Estimating future pollution loading in project area
Permitted OSSF Locations	Various	Most current additions/changes to existing data, time frame dependent on partner	Geocode permit information is created if GPS coordinates are not provided by the Authorized Agents.	NA	Spatial locations and related permit information.
Tax parcels	Various (County appraisal districts, et al.)	Most current, time frame dependent on partner	Process parcels from various appraisal districts to create ROW and Water polygons.	NA	Defining individual properties for

Geospatial Data or Data Type	Source	Date(s)	Analysis and/or Processing**	QA Information	Data Use(s)
					unpermitted OSSF evaluation
9-1-1 address points	H-GAC 9-1-1 Address Dataset	Most current data	N/A	GDMP	Spatial locations of 9-1-1 address data
Census blocks	US Census Bureau	Most current data	N/A	N/A	Defining areas for unpermitted OSSF evaluation
Flow Data	USGS flow data	All available data; most recent iteration.	USGS	USGS QAPP; USGA database	FDCs, Loading calculations
Literature values	Various	Various	Standard load per source estimates referenced in literature will be used to calculate pollution loading estimates	Specific to each publication	Calculate pollution loading estimates
Digital Elevation Model (DEM)	USGS	2024	All 30 Meter DEMs available for the project area will be downloaded. The DEMs will be appended together. The ArcHydro extension will be used to perform spatial analysis to delineate the boundary of the project watershed.	USGS	Watershed boundary identification and illustrative purposes.

*Metadata that contains the Federal Geographic Data Committee (FGDC) minimum documentation requirements will be created for any acquired spatial data manipulated through data analysis and/or processing.
**More detailed information on spatial analysis and data processing is provided in Sections B2 (Methods for environmental information acquisition), B4 (Quality Control), and B7 (Environmental information Management).

Existing geospatial data available from various local, regional, state, and federal organizations may be used for project cartographic and illustrative purposes. These types may include land use, precipitation, soil type, ecoregion, TCEQ monitoring location, TCEQ permitted outfall, gage location, city/county/state boundary, stream hydrology, reservoir, drought, road, watershed, MS4 system, urbanized area, basin, railroad, recreational area, area landmark, aerial photography, and park information. The above data come from the following reliable sources: EPA, USGS, TCEQ, and US Census Bureau. Geospatial data from these sources are accepted for use in project maps based on the reputability of these data sources and the fact that there are no known comparable sources for these data. Geospatial data will be cited in reports.

As the project progresses, additional data sources and/or data types may be identified as necessary to complete project tasks. Once identified, the H-GAC Project Manager will notify the TCEQ NPS Project Manager and request approval prior to use. If data will be analyzed or used for any purposes beyond cartographic or illustrative purposes, the QAPP must be amended and approved prior to use. All approved data sources will be clearly documented where such data sources are reported (e.g., technical documents, technical reports, and final reports).

B3 SAMPLE HANDLING AND CUSTODY

Does not apply to this QAPP. No samples will be collected under this QAPP.

B4 QUALITY CONTROL

Quality control measures are described in A6.

B5 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Does not apply to this QAPP. No sampling instruments or equipment will be used under this QAPP.

B6 INSPECTION/ACCEPTANCE OF SUPPLIES AND SERVICES

Does not apply to this QAPP. No inspection or acceptance of supplies and services will be required under this QAPP.

B7 ENVIRONMENTAL INFORMATION MANAGEMENT

Model Calibration

No formal calibration (or sensitivity analysis) is used for the data analyses (SAS), SELECT, or standard LDCs, including the generation of continuous flow data in absence of representative USGS gauge data by linear regression or DAR analysis. Informal adjustment of the model inputs or outputs may be applied based on stakeholder feedback and more specific local knowledge compared to general assumptions.

Data Management

Data evaluated, acquired, produced, or maintained under this QAPP will be handled in accordance with the DMP (attached as Appendix E). H-GAC uses this DMP for all related water quality efforts requiring QAPP coverage (e.g., CRP).

Data Dictionary
H-GAC standard data terminology and definitions are discussed in Appendix E.

Data Migration, Transfer, and Conversion
Migration, transfer, and conversion of data, as well as data history and model outputs, are discussed in Appendix E.

Information Dissemination
Project updates will be provided to the TCEQ NPS Project Manager in progress reports and the information will be made available at stakeholder meetings. Input data and model outputs resulting from the project described in this QAPP will be accessible to the general public and the TCEQ. Additional procedures are discussed in Appendix E.

Archives/Data Retention
Complete original data sets are archived on external hard drives and retained on-site by H-GAC for a retention period specified in Table A12.1 Project Documents and Records. Additional discussion of archiving procedure is indicated in Appendix E.

Backup/Disaster Recovery
All work and file storage takes place on a shared network drive(s) which are continuously backed up on the network servers and archived on a regular basis. In the event of a catastrophic systems failure, the archival backups can be used to restore the data in less than one day's time. Data generated on the day of the failure may be lost but can be reproduced from raw data in most cases.

C1 ASSESSMENTS AND RESPONSE ACTIONS

The following table presents types of assessments and response action for activities applicable to this QAPP.

Table C1.1 Assessments and Response Actions

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	H-GAC Project Manager	Monitoring of the project status and records to ensure QAPP requirements are being fulfilled. Monitoring and review of subcontractors performance and data quality.	Report to TCEQ in Quarterly/Monthly Report. Ensure project requirements are being fulfilled.

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Technical Systems Audit	Dates to be determined by TCEQ	TCEQ QAS	The assessment will be tailored in accordance with objectives needed to assure compliance with the executed QAPP.	30 days to respond in writing to TCEQ to provide corrective actions addressing audit findings.

Internal Assessment

Since this project is primarily a modeling endeavor, traditional performance and system audits are not appropriate. Instead, the data generated as part of the modeling results will be evaluated during the validation and model output interpretation processes. H-GAC and the TCEQ NPS Program will continually assess model performance per the quality objectives and criteria listed in Section A6, and by evaluation of tasks listed in Section D. H-GAC and the TCEQ NPS Program will also assess any informal adjustments to the model inputs based on stakeholder feedback referenced in Section B7 as needed.

Modeling data and project deliverables will be internally quality controlled by the TCEQ NPS Project Manager's in-house review. The TCEQ NPS Project Manager will maintain overall responsibility for examining the contracted work to ensure methodologies and processes are consistent with the procedures outlined in this QAPP.

Corrective Action

Deficiencies are any unauthorized deviations from the approved QAPP and procedures referenced in the QAPP. Deficiencies may invalidate resulting data. All deficiencies from the QAPP require documentation of the nonconformance and corrective action. Deficiencies must be documented in a Corrective Action Plan (CAP) (See Appendix C for the form and an example) and corrected in a timely manner. Corrective action may include the need for additional model runs. Deficiencies are documented in digital logbooks by modeling staff. It is the responsibility of the H-GAC Project Manager, in consultation with the H-GAC QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP.

Nonconformances must be communicated to the TCEQ NPS Project Manager immediately via email. A CAP Form (See Appendix C for the form and an example) must be submitted to the TCEQ NPS Project Manager within 14 days of the deficiency occurring. Once it is approved, the TCEQ NPS Project Manager will send the CAP to the QA Coordinator who will then email the CAP to the Lead NPS QAS within 30 days of the initial notice of deficiency per TCEQ QMP and after it is reviewed by the TCEQ NPS Project Manager. The deficiency must also be communicated to the TCEQ NPS Project Manager through the Corrective Action Status Table (see Appendix D for the table and an example) to be included with the quarterly progress report.

The H-GAC Project Manager is responsible for implementing and tracking corrective actions. All CAPs will be documented on the Corrective Action Status Table, which will be submitted to the TCEQ NPS Project Manager with the quarterly progress report for review and approval. Records of TCEQ audit findings and corrective actions are maintained by both the TCEQ and the H-GAC QAO. Documentation of corrective action to address audit findings will be submitted to the TCEQ within 30 days of receipt of audit report.

If audit findings and corrective actions cannot be resolved, then the authority and responsibility for terminating work are specified in the TCEQ QMP.

Corrective Action Plans

CAPs should:

- Identify the deficiency, problem, nonconformity, or undesirable situation.
- Identify immediate remedial actions if possible.
- Identify the root cause(s) of the problem.
- Describe the programmatic impact.
- Identify whether the problem is likely to recur or occur in other areas.
- Include a description of the need for Corrective Action.
- Include a description of cause(s), determine solution, and propose an action plan.
- Identify personnel responsible for action.
- Establish timelines and provide a schedule.
- Document the corrective action and verify its effectiveness.

C2 OVERSIGHT AND REPORTS TO MANAGEMENT

Reports to H-GAC Project Management

H-GAC project staff will report to the H-GAC Project Manager on an ongoing basis, but at a frequency no less than once per week. These reports will be informal unless corrective action, relevant modeling notes, or other documentation as discussed in this QAPP apply.

Reports to TCEQ Project Management

Progress Report – Submittal of progress reports will be at least quarterly. Format of the submitted progress report will be as specified in the contract or work orders. Reports should provide enough information so the TCEQ NPS Project Manager can evaluate the modeling effort.

Acquired Data Analysis Report – Describes and summarizes the data acquired, evaluation methodologies, and the analysis results to be presented in the WPP for Brays Bayou and Sims Bayou. H-GAC will submit the Final Acquired Data Analysis Report to the TCEQ Project Manager.

Modeling Report – Details and summarizes the modeling results to identify extent, causes, and spatial distribution of bacterial contamination and reduction goals for the Brays Bayou and Sims Bayou WPP. H-GAC will submit a Draft and Final Modeling Report to the TCEQ NPS Project Manager.

Watershed Protection Plan – Presents prioritized strategies for the implementation of watershed best management practices to restore and protect the water quality of Brays Bayou and Sims Bayou. The WPP will incorporate decisions made by stakeholders through the watershed planning process and incorporate findings from project reports. The WPP will be submitted to stakeholders and TCEQ for review, and the H-GAC will respond to all comments.

Project Final Report – Summarizes H-GAC's activities for the entire project period including a description and documentation of major project activities, evaluation of the project results and environmental benefits, and a conclusion. H-GAC will submit the final report in the form of a Final Quarterly Progress Report with substantive summary of the project, within 15 days of the end of the last fiscal quarter of the project. Any comments from TCEQ will be summarized in a comment response document in the interim.

CAP Documentation – Identifies any deficiencies and nonconformances. The cause(s) and program impacts are discussed. CAPs are submitted to the TCEQ Project Manager within 30 days if the occurrence or its discovery. The completed corrective actions are documented in the first progress report occurring after the deficiencies and/or nonconformance was identified.

Audit Report and Response – Following any audit performed by H-GAC, a report of findings, recommendations, and responses will be sent to the TCEQ NPS Project Manager in the quarterly/monthly progress report. Such reports will include model performance assessments, calibration, and validation performance determination.

Reports by TCEQ Project Management

Contractor Evaluation – H-GAC is evaluated in a Contractor Evaluation by the TCEQ annually for compliance with administrative and programmatic standards. Results of the evaluation are submitted to the TCEQ Financial Administration Division, Procurements and Contracts Section.

D1 ENVIRONMENTAL INFORMATION REVIEW

Validation - Validation is an extension of the calibration process that reduces uncertainty. No calibration processes are used for the tools and approaches selected for this project and covered under this QAPP other than routine electronic and/or visual screening for errors.

Model Validation

The water quality data analyses are not subject to model validation. The SAS outputs are reviewed by H-GAC staff, as part of normal data management procedures.

LDCs are also not validated in a traditional sense, as they are not predictive models. The results of LDC runs are similarly validated by H-GAC staff, and through review with TCEQ project staff and stakeholders. Because LDCs are descriptive rather than predictive, no validation against additional data is possible.

The SELECT runs are predictive of potential load, but without linkage to observed data (i.e., they are not predictive of instream concentrations.) SELECT results are not calibrated to observed data because potential load is not a measurable/measured constituent. Non-technical validation of SELECT inputs and outputs is primarily based on H-GAC, TCEQ, and stakeholder review of model assumptions and outputs. Criteria in these reviews include the applicability and sufficiency of assumptions and subjective comparison of model outputs with local conditions as experienced by stakeholders. This process is not intended as a technical validation.

Data collected by TCEQ, USGS, Texas CRP partners, and other listed sources have been reviewed, verified, and validated according to the requirements of the respective programs prior to their use in this project. Data compilations created for this project will be electronically and/or visually screened for errors. For more information on data management procedures see Appendix E.

D2 USEABILITY DETERMINATION

The primary purposes of the data outputs from these analyses and updated modeling efforts are to characterize the conditions in the watershed and guide stakeholder decision-making. The user requirements for WPP development are to provide a high-level understanding of the causes and sources of pollutants in spatial and flow contexts. The modeling framework developed for this project will be used to evaluate contaminant loading in the Brays Bayou and Sims Bayou watershed. It will provide information pertaining to historical trends in water quality[1], relationship of pollutant loads to flow regimes and bacteria reductions (LDCs), and potential loading from pollutant within the watershed (SELECT). These analyses will provide critical information for the stakeholders to support the development of the Brays Bayou and Sims Bayou WPP. The user requirements do not assume a detailed and complex hydrologic model with predictive linkage between source loading and instream concentrations. Source load reduction projections sufficient to guide stakeholder decisions will be obtained by applying load reduction percentages generated through updated LDCs to source loads generated in updated SELECT analyses.

The outputs will be evaluated at several levels. First, H-GAC project staff will review outputs for obvious inconsistencies and errors, for compliance with QAPP procedures, and against best professional judgment. Secondly, outputs will be reviewed with TCEQ project staff. Lastly, outputs will be reviewed with stakeholders and technical advisors

[1]The methodology, uses, and data types for the water quality trends analysis are described in detail in Section A6, under the subsection Water Quality Analysis.

to ensure local input is acquired and incorporated as appropriate. Additional review will follow revised model runs and scenarios. The final data will be reviewed to ensure that it meets the requirements as described in this QAPP. CAP process will be initiated in cases where invalid or incorrect data have been detected. Data that have been reviewed, verified, and validated will be summarized for their ability to meet the data quality objectives of the project and the informational needs of water quality agency decision-makers. The sufficiency of the data to support stakeholder requirements will be based on review of the data with the stakeholders and agency staff.

Some limitations are assumed for the use of the model outputs. The usability of the modeling results will be limited to their intended purposes as part of an EPA 9-element WPP development process. The model results are not intended or designed to provide a level of accuracy or precision beyond what is described or the stated ability of the models. Model results are not intended to be used for legal purposes, to describe property conditions in lieu of environmental assessments, or to be used for other official purposes not stated in this QAPP. The design of the modeling approach is intended to allow the flexibility, as described, to incorporate stakeholder input on assumptions, outputs, and specific locales or events in the watershed.

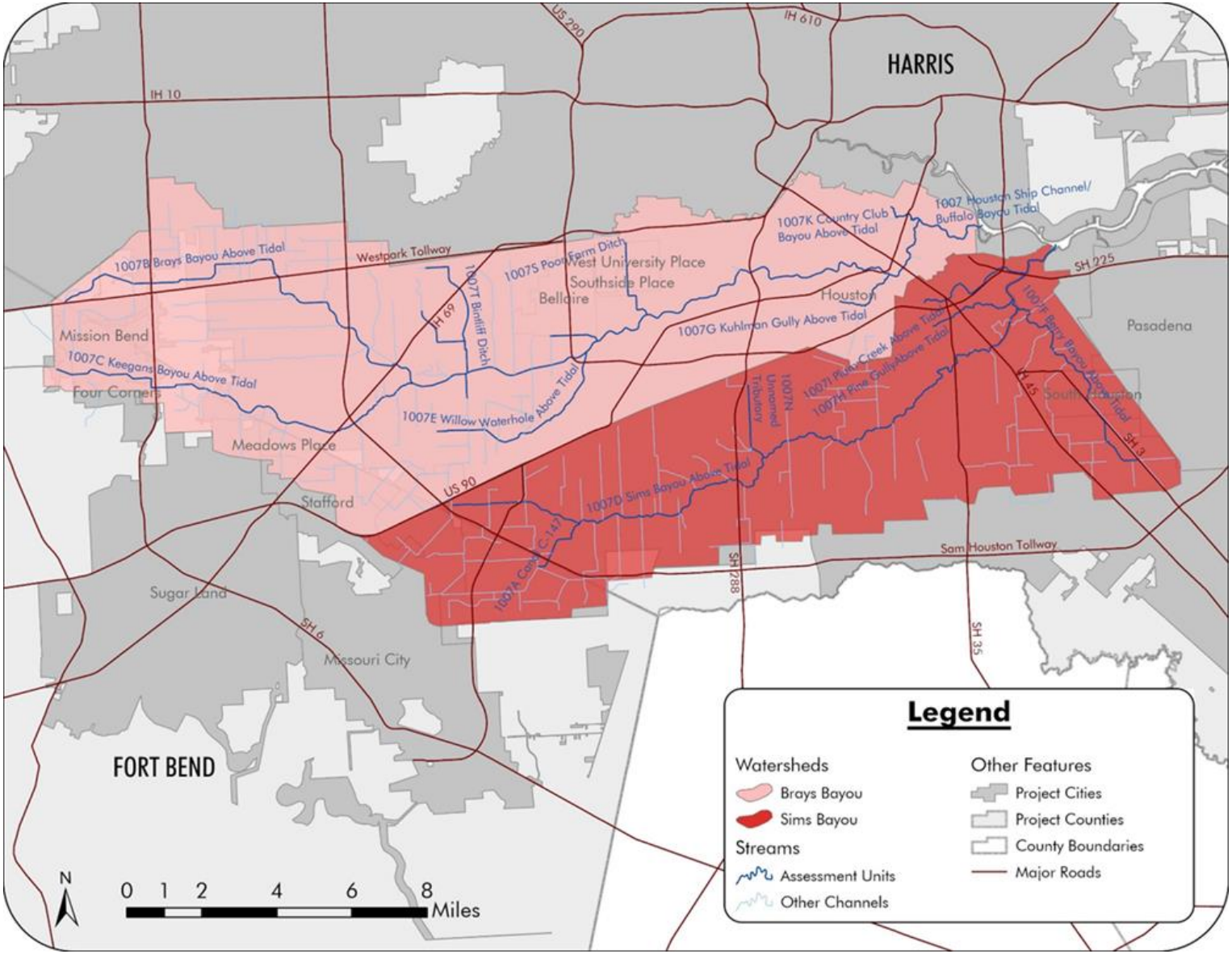
Model results may be subsequently analyzed and used by the TCEQ for calculating estimated reductions in pollutant loadings resulting from management measures implemented.

The water quality data analyses, SELECT, and LDCs are not calibrated models, and are not predictive of instream water quality conditions[1].

Departure from established criteria may impact the accuracy of model outputs. Sources of discrepancy may be insufficiency of available data and/or locally applicable assumptions. However, given the intended uses of the data (i.e., to facilitate stakeholder decision-making on a broad basis) these potential discrepancies are not expected to have an appreciable impact on model results.

[1]Future scenarios projected under SELECT are based on regional demographic projections but are only predictive of potential loads. They cannot be calibrated against observed values, as they do not predict ambient water quality conditions.

APPENDIX A. AREA LOCATION MAP



The Brays Bayou and Sims Bayou Watershed

APPENDIX B. CONTRACT SCOPE OF WORK AND DELIVERABLE DUE DATES

Brays Bayou and Sims Bayou Watershed Protection Plan Development

Scope of Work

This Contract will develop a watershed protection plan (WPP) for the Brays Bayou and Sims Bayou watersheds in Harris and Fort Bend counties, Texas. H-GAC will conduct technical analyses and facilitate participation among local stakeholders to complete a nine-element WPP for the watersheds.

All Deliverable dates are calendar days unless otherwise specified.

Task 1: Project Administration

Objective: To effectively administer, coordinate, and monitor all work performed under this project including technical and financial supervision and submittal of Progress Reports.

Subtask 1.1: Project Oversight — The Performing Party will provide technical and fiscal oversight of the staff and/or subgrantee(s)/subcontractor(s) to ensure Tasks and Deliverables are acceptable and completed as scheduled and within budget. Project oversight status will be provided to the TCEQ Project Manager with the quarterly Progress Reports.

Subtask 1.2: Progress Reports (PRs) — The Performing Party will submit PRs to the TCEQ Project Manager by the 15th of the month following the end of each quarter. PRs will include reporting on the status of Deliverables and proposed revisions to due dates, narrative description of progress by Task, and status of nonconformances/corrective actions. The TCEQ Project Manager will provide a PR template to the Performing Party.

Subtask 1.3: Reimbursement Forms (Financial Status Reports) — The Performing Party will submit reimbursement forms in accordance with the Special Terms and Conditions in the Contract.

Subtask 1.4: Contract Communication — The Performing Party will maintain regular telephone and/or email communication with the TCEQ Project Manager regarding the status and progress of the project and any matters that require attention between PRs. The Performing Party will participate in project meetings (in person or virtual) with the TCEQ Project Manager to discuss items such as Tasks, financial status, Quality Assurance Project Plans (QAPPs), and corrective actions. The TCEQ Project Manager may request additional information from the Performing Party prior to the project meetings. The Performing Party will provide meeting notes and identify action items within seven days of each project meeting.

The Performing Party will attend a contractor workshop hosted by TCEQ and a project specific post award meeting with the TCEQ Project Manager to discuss details of the project and due dates for Deliverables at the beginning of the project. The post award meeting will serve as the first project meeting.

Project related matters that are not specifically included in the Scope of Work or require additional notification must be communicated to the TCEQ Project Manager. These communications may include, but are not limited to:

- Notification of non-contractual events or circumstances that may require changes to the Budget, Scope of Work, or Deliverable Due Dates.
- Requests for prior approval of activities or expenditures for which the Contract requires advance approval.

Subtask 1.5: Contractor Evaluation — The Performing Party will participate in an annual

Contractor Evaluation at the end of each state fiscal year. The TCEQ Project Manager will provide a draft annual evaluation to the Performing Party for comment before a final evaluation is completed.

Subtask 1.6: Coordination Call with EPA — Upon request by TCEQ and EPA, the Performing Party will participate in a call with EPA to share progress on goals, measures of success, challenges, and draft documents.

Subtask 1.7: Project Article — The Performing Party, upon request by TCEQ, will provide a project article that will state the project's purpose, describe the activities of the past fiscal year, and include photographs of the project. The Performing Party will address TCEQ comments on the draft version and provide a final article.

Subtask 1.8: Contract Budget Updates — The Performing Party will provide updated budget estimates on a quarterly basis. These updates, recorded in PRs, will be revised when fiscal year spending projections change, or upon request by the TCEQ Project Manager. In the second year of the Contract, the Performing Party will provide an Annual Budget Update for the current state fiscal year detailing spending projections associated with planned project activities. The TCEQ Project Manager will provide a template for the Annual Budget Update.

Deliverables:

1.2 PRs (quarterly)
1.3 Reimbursement forms (see Special Terms and Conditions in the Contract)
1.4 Project meeting notes and action items (quarterly, within seven days following the meeting)
1.4 Post award meeting notes and action items (within seven days following the meeting)
1.5 Documentation of the Performing Party's participation in the Contractor Evaluation (annually, within seven days following request)
1.6 Coordination call with EPA (upon request)
1.7 Project Article and photographs (upon request)
1.8 Annual Budget Update (within two weeks following request)

Task 2: Quality Assurance

Objective: To refine, document, and implement data quality objectives (DQOs) and quality assurance/quality control (QA/QC) activities that ensure data of known and acceptable quality are generated by this project.

Subtask 2.1: QAPP Planning Meetings — The Performing Party will schedule a QAPP planning meeting with the TCEQ Project Manager within 30 days of Contract execution, discuss project activities and the elements in the applicable QAPP Shell. The information developed during this meeting will be incorporated into a QAPP by the Performing Party. The TCEQ Project Manager will provide the appropriate shell(s) to the Performing Party.

Subtask 2.2: QAPP — The Performing Party will develop and submit to TCEQ a QAPP with project specific DQOs and other components consistent with the following documents:

TCEQ QAPP Shell(s)/example(s) – provided by TCEQ Project Manager EPA Quality Assurance Project Plan Standard (CIO 2105-S-02.0) TCEQ Surface Water Quality Monitoring (SWQM) Procedures

The Performing Party will develop the QAPP in consultation with the TCEQ Project Manager, QA staff, and contractors. The Performing Party will address comments and submit a final QAPP for review. The QAPP must be signed/fully approved by TCEQ before any environmental data

operations begin.

Subtask 2.3: QAPP Annual Reviews and Revisions — The Performing Party will submit documentation certifying its annual review of the QAPP at least 90 days prior to the QAPP anniversary or expiration date. Amendments approved since the initial QAPP approval or a subsequent certified annual review (if applicable) must be submitted along with the certification. For multi-year QAPPs, if extensive changes are necessary, a full revision is required. No work described in a QAPP will be conducted outside the effective period of the QAPP.

Subtask 2.4: QAPP Amendments — The Performing Party will submit Draft QAPP Amendments for TCEQ review when changes to the QAPP are necessary. The TCEQ Project Manager will provide a QAPP Amendment Shell. Draft QAPP Amendments should be submitted at least 90 days prior to the scheduled initiation of changes and must be accompanied by a justification, summary of changes, and detail of changes. The Performing Party will submit Final QAPP Amendments within 30 days of receipt of any comments provided by TCEQ. Final QAPP Amendments will be submitted to TCEQ with the Performing Party's signatures and responses to comments and circulated for appropriate TCEQ signatures. QAPP Amendments must be approved by TCEQ before any changes conveyed within Amendments are implemented.

Subtask 2.5: Corrective Action Plans (CAPs) — The Performing Party will provide CAPs, as needed, to document deviations from the approved QAPP, including, but not limited to sampling method requirements or sample design, failures associated with chain-of-custody procedures, or failures associated with field and laboratory measurement systems. Draft CAPs will be submitted to TCEQ for review by TCEQ's designated due date. The Performing Party will address TCEQ's comments. The Performing Party will submit final CAPs to TCEQ by the designated due date.

Subtask 2.6: Quality Assurance Audits — The Performing Party will participate in quality assurance-related auditing activities by TCEQ as described in the QAPP. The Performing Party will provide responses to any audit finding or deficiencies.

Deliverables:

2.1 QAPP Planning Meeting and notes (meeting within 30 days of Contract execution, notes within seven days following the meeting)
2.2 Draft QAPP (120 days prior to the scheduled initiation of environmental data operations)
2.2 Final QAPP (60 days prior to the scheduled initiation of environmental data operations)
2.3 QAPP Annual Reviews (at least 90 days prior to the QAPP approval anniversary)
2.4 Draft QAPP Amendments (at least 90 days prior to the scheduled initiation of changes or additions to activities listed in the current QAPP)
2.4 Final QAPP Amendments (at least 30 days prior to the scheduled initiation of changes or additions to activities listed in the current QAPP)
2.5 Draft CAPs (as needed; within 14 days of receiving request)
2.5 Final CAPs (within 14 days of receiving comments)
2.6 Documentation of participation in Quality Assurance Audits, including dates audits were conducted (as needed, in PRs)

Task 3: Data Acquisition and Source Identification

Objective: To acquire, compile, and evaluate existing relevant water quality data, historical information, and other related information needed to complete a watershed protection plan (WPP) for Brays Bayou and Sims Bayou. The Performing Party will work with stakeholders to identify and address any gaps in existing data. This Task will provide information to partially complete Elements A and B of EPA's nine key elements for a watershed-based plan. All water

body impairments and concerns (except for toxics, metals, organics, and biological indicators) in the watershed will be addressed by the watershed characterization.

Subtask 3.1: Acquire, Compile, and Evaluate Existing Data — The Performing Party will acquire, compile, and evaluate existing data and information pertaining to water quality impairments and issues in the watershed, including data acquired from the Clean Rivers Program (CRP), TCEQ's sanitary sewer overflow (SSO) database, on-site sewage facility (OSSF) permits, and discharge monitoring reports (DMRs). DMR and SSO data will be acquired for the last five years for all permitted wastewater facilities in the Brays Bayou and Sims Bayou watersheds per the approved QAPP. Acquired data and information will, to the extent possible:

- Describe relevant watershed characteristics and conditions (e.g., watershed boundary, hydrology, climate, soils, land use/cover, water quality trends analysis).
- Evaluate trends in wastewater volume by year, volume by cause, number of events by year, and number of events by cause for each reporting permitted entry.
- Support Geographic Information Systems (GIS) analysis
- Identify the potential sources of pollution and causes of water quality impairments and issues.

The Performing Party will assess the existing data and information to determine if it allows for determination of sources and quantities of pollution. If data gaps are identified, the Performing Party will work with stakeholders to determine how to address them. The data and information will be presented to stakeholders in appropriate formats including graphs, tables, and maps.

Subtask 3.2: Acquired Data Analysis Report — The Performing Party will develop a report describing, detailing, and summarizing all data evaluations to be presented in the WPP for Brays Bayou and Sims Bayou. The report will document the data acquired, the evaluation methodologies, and the analysis results. The Performing Party will assess the existing data and information to determine quality and adequacy in defining the pollutant sources. If data gaps are identified, the Performing Party will work with stakeholders to determine how to address them.

The report will:

- Describe the outcomes of data acquisition and evaluation, including:
    - Watershed characteristics
    - Potential sources of pollution and causes of water quality impairments and issues
    - Sources of pollution
    - Plan for addressing data gaps
- Identify indicator parameter(s) that can be used to assess conditions and measure progress toward meeting water quality goals.
- Describe trends in the data for the identified indicator parameters.
- Describe conditions when water quality impairments occur and possible sources of pollution.
- Identify and justify the analytical methods that will be used to estimate pollutant loadings.

Deliverables:

3.1 Documentation of data compilation and review (by the end of quarter 3)
3.2 Draft Acquired Data and Analysis Report (by the end of quarter 4)
3.2 Final Acquired Data and Analysis Report (by the end of quarter 8)

Task 4: Modeling

Objective: To develop modeling results for the Brays Bayou and Sims Bayou watersheds to identify extent, causes, and spatial distribution of bacterial contamination and reduction goals. This Task will provide information to complete Elements A, B, and C of EPA's nine key elements for a watershed-based plan.

Subtask 4.1: Load Duration Curves (LDCs) — The Performing Party will develop LDCs as needed for water quality impairments in the Brays Bayou and Sims Bayou watersheds to further define conditions under which loadings occur and to calculate the pollutant load reductions (or percent improvement for dissolved oxygen) needed to meet water quality standards or screening levels or continue meeting standards in the Brays Bayou and Sims Bayou watersheds.

Subtask 4.2: Spatially Explicit Load Enrichment Calculation Tool (SELECT) — The Performing Party will develop a SELECT model for Brays Bayou and Sims Bayou watersheds with the most current data as appropriate. Findings may be revised based on stakeholder feedback. SELECT will be used in the WPP to identify the relative prominence of bacteria sources, their spatial distribution, and the total potential bacterial load to the watershed. Both current and future condition scenarios will be developed.

Subtask 4.3: Modeling Report — The Performing Party will develop a report detailing activities conducted under this Task and summarize the results of the modeling for inclusion in the WPP.

Deliverables:

4.1 Load Durations Curves, in Modeling Report (by the end of quarter 4)
4.2 SELECT results, in Modeling Report (by the end of quarter 4)
4.3 Draft Modeling Report (by the end of quarter 4)
4.3 Final Modeling Report (within 15 business days of receiving comments)

Task 5: Stakeholder Coordination and Support

Objective: To engage and maintain a stakeholder group representative of interests in the watershed, for the purpose of developing and implementing the WPP, and coordinating related efforts. This Task will also provide educational programs and a plan for media outreach.

Subtask 5.1: Public Participation Plan (PPP) — The Performing Party will develop a PPP detailing the strategy for engaging the public and stakeholders in the watershed planning process for the Brays Bayou and Sims Bayou watersheds. The PPP shall, at a minimum, include 1) stakeholder group ground rules, 2) stakeholder group structure (i.e., steering committee, work groups) and membership, 3) stakeholder meetings topic/purpose and tentative schedule, and 4) a targeted outreach and education plan to increase public participation in the process.

Subtask 5.2: Brays Bayou and Sims Bayou Watershed Partnership Formation — The Performing Party will compile and maintain a contact list of watershed stakeholders and affected parties for use in engaging the public in the watershed planning process for each primary subwatershed outreach area. A stakeholder group (the Brays Bayou and Sims Bayou Watershed Partnership) will be established from this list and other interested parties and will represent a diverse cross section of the stakeholders from the Brays Bayou and Sims Bayou watersheds.

Subtask 5.3: Communication with Stakeholders — The Performing Party will facilitate communication with stakeholders to engage the public and affected entities in the watershed planning process, assisted by local organizations helping to advertise and host meetings. The Performing Party will utilize all appropriate communication mechanisms including direct mail, email, a project website, social media, and mass media (print, radio, television). The Performing

Party will submit all project-related content in any educational materials and publications to the TCEQ Project Manager for review and approval at least two weeks prior to distribution.

Subtask 5.4: Stakeholder Facilitation — The Performing Party will facilitate public participation and stakeholder involvement in the watershed planning process, specifically through project meetings and related outreach activities. At least six stakeholder meetings will be held throughout the project. However, if more meetings are deemed necessary, they will be scheduled accordingly. The Performing Party will coordinate meetings, secure meeting locations, and submit all meeting presentations, notices, and agendas to the TCEQ Project Manager for review and approval at least two weeks prior to public dissemination.

The Performing Party will maintain a record of individuals and organizations invited to meetings, as well as a sign-in sheet of attendees. The Performing Party will maintain a record of public comments via meeting notes, and coordinate with Partners to document response to stakeholders. Meeting summaries will be prepared and posted to the project website within 30 days after each meeting is held.

Subtask 5.5: Presentations at Public Meetings — The Performing Party will attend and present project updates at other public meetings as appropriate to communicate project goals, activities, and accomplishments to affected parties. Such meetings may include meetings of city councils, county commissioners' courts, regional water supply planning groups, environmental flows groups, the CRP Basin Steering Committee, local soil and water conservation districts (SWCDs), the Galveston Bay Council and its subcommittees, and other appropriate meetings of critical watershed stakeholder groups. The Performing Party will present project updates in at least six of these meetings. The Performing Party will submit all presentation materials used at public meetings to the TCEQ Project Manager for review and approval at least two weeks prior to distribution.

Subtask 5.6: Education and Outreach Events — The Performing Party will host at least two education and outreach events whose purpose is to engage stakeholders, raise general awareness of watershed issues, or address specific water quality concerns raised in the WPP development process. The events will include, but not be limited to at least one OSSF workshop for homeowners, and at least one partner program specific to watershed protection, chosen based on partner availability (e.g., Texas Watershed Stewards).

Deliverables:

5.1 Draft Public Participation Plan (by the end of quarter 1)
5.1 Final Public Participation Plan (within 15 business days of receiving comments)
5.2 Stakeholder contact list, updated (quarterly, with PRs)
5.3 Educational materials and publications, as needed (at least two weeks prior to distribution)
5.3 Documentation of communication with stakeholders (quarterly, with PRs)
5.4 Documentation of stakeholder meetings, including, presentations, agendas, attendance lists, and summaries, minimum of six (with PRs)
5.5 Presentation materials for public meetings, as needed (at least two weeks prior to the meeting)
5.5 Documentation of presentation at public meetings, including agendas, minimum of six (with PRs)
5.6 Documentation of education and outreach events, minimum of two (with PRs)

Task 6: Watershed Protection Plan Development

Objective: To develop a stakeholder driven WPP that will present prioritized strategies for the implementation of watershed best management practices to restore and protect the water

quality of Brays Bayou and Sims Bayou. The WPP will satisfy EPA's nine-element criteria.

Subtask 6.1: Timeline Development and WPP Review Plan — The Performing Party will develop a timeline and document review plan at the beginning of the project. The review plan will include a timeframe for submittal of the draft WPP to TCEQ for review and a timeframe for TCEQ to submit the draft WPP to EPA for review. The Performing Party will notify stakeholders and TCEQ of any changes to the timeline.

Subtask 6.2: WPP Development — The Performing Party, in collaboration with project partners, will develop a WPP for the Brays Bayou and Sims Bayou watersheds. The WPP will incorporate decisions made by stakeholders through the watershed planning process and incorporate findings from project reports. Drafts will be submitted to stakeholders and TCEQ for review, and the Performing Party will respond to all comments. TCEQ will submit the draft WPP to EPA for review after the Performing Party has addressed TCEQ's comments. The Performing Party will respond to all EPA comments and produce a final WPP.

Subtask 6.3: WPP Distribution — The Performing Party will make the final WPP documents available to stakeholders through the project website. The Performing Party will submit an electronic copy of the EPA-accepted WPP to TCEQ Project Manager. The Performing Party will develop an Executive Summary document based on the WPP and make it available on the project website along with the WPP.

Deliverables:

6.1 WPP timeline and document review plan (by the end of quarter 2)
6.2 Draft WPP to stakeholders (by the end of quarter 9)
6.2 Address stakeholder comments and finalize draft (within 30 days of receiving comments)
6.2 Draft WPP to TCEQ (by the end of quarter 10)
6.2 Address TCEQ comments and finalize draft (within 30 days of receiving comments)
6.2 Address EPA comments (within 30 days of receiving comments)
6.2 Final electronic copy of the WPP (by the end of quarter 11)
6.3 Draft Executive Summary (within 15 business days of receiving WPP acceptance from EPA)
6.3 Final Executive Summary (within 15 business days of receiving comments)
6.3 Documentation of Executive Summary and EPA-accepted WPP posted to the project website (within 30 days of receiving acceptance from EPA)
6.3 Electronic copy of EPA-accepted WPP submitted to TCEQ (within 30 days of receiving acceptance from EPA)

Task 7: Final Report

Objective: To produce a Final Report that summarizes all completed activities and the amount of funds spent on the project.

Subtask 7.1: Final Report — The Performing Party will submit the final PR as the Final Report. This final PR will follow the template provided by the TCEQ Project Manager and summarize all project activities and document submittal of all Deliverables. If the TCEQ Project Manager determines that the Draft Final Report requires no edits by the Performing Party, the Draft Final Report will also serve as the Final Report.

Deliverables:

7.1 Draft Final Report (the 15th of the month following the last fiscal quarter of the project)
7.2 Final Report (within 30 days of end of Contract)

APPENDIX C. CORRECTIVE ACTION PLAN FORM

Corrective Action Plan Form

Deficiency Report and Corrective Action Plan			
QAPP Title:			
QAPP Contractor:		Date of deficiency:	
CAP Number:		Date deficiency reported to TCEQ:	
CAP submitted by:		Date CAP submitted:	
TCEQ Project Manager:		Date CAP closed:	
Description of deficiency:			
Root cause of deficiency:			
Programmatic impact of deficiency:			
Corrective Action to address the deficiency and prevent its recurrence:			
Proposed Completion Date for Each Action:			
Individual(s) Responsible for Each Action:			
Method of Verification:			

Example Corrective Action Plan Form

Deficiency Report and Corrective Action Plan			
QAPP Title:	WPP Implementation – LID BMP Monitoring QAPP		
QAPP Contractor:	River Authority	Date of deficiency:	9/25/2023
CAP Number:	1 *(# sequentially)*	Date deficiency reported to TCEQ:	9/25/2023
CAP submitted by:	Jane Doe	Date CAP submitted:	10/9/2023
TCEQ Project Manager:	John Doe	Date CAP closed:	*Added by TCEQ PM when CAP approved.*
Description of deficiency:	The pavement monitoring station at the university is measuring a larger runoff volume than is estimated possible. Runoff measured is higher than the total precipitation volume calculated by multiplying the catchment area by the precipitation measured at the site.		
Root cause of deficiency:	(1) It is possible that the drainage area was not measured accurately, it may be larger. (2) The outfall of the monitoring station might not adequately allow runoff to flow through causing pooling around the flow-measuring point. The accumulation of non-flowing water could be confounding the flow meter since its physical principal of measurement is hydrostatic pressure caused by water depth.		
Programmatic impact of deficiency:	The illogical results of the pavement runoff measurement indicate that further calibration of the equipment is necessary. Data collected at this event are not able to be used in analysis or results.		
Corrective Action to address the deficiency and prevent its recurrence:	A survey will be conducted on the site to determine the ridge of the catchment area. A wider and deeper channel will be dug out at the monitoring point outfall to ensure all the flow drains away from the measuring point. Storm event runoff will not be measured at this site until this work has been completed.		
Proposed Completion Date for Each Action:	11/30/2023		
Individual(s) Responsible for Each Action:	Joe Schmo, River Authority Project Manager		
Method of Verification	Results of the catchment area survey will be emailed to the TCEQ Project Manager. Photos of the modified measurement site will be emailed to the TCEQ Project Manager.		

APPENDIX D. CORRECTIVE ACTION PLAN STATUS FORM

Corrective Action Status Table

The Corrective Action Status Table is included as a tab in the quarterly progress report template provided by the TCEQ NPS Project Manager.

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Corrective Action Status Table Example

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed
1	7/25/2021	Runoff measured at pavement was greater than total area runoff.	The area is being surveyed to ensure the catchment area size is correct. The monitoring station location is being modified to ensure runoff flows through properly.	
2	8/1/2021	Sample residual insufficient for analysis of TSS.	Data estimated but questionable, not will not be submitted to TCEQ.	8/8/2021

APPENDIX E. SUMMARY OF DATA MANAGEMENT PLAN

Geospatial Data Management Plan

June 2024

HOUSTON-GALVESTON AREA COUNCIL
Community & Environmental Planning Department

Prepared in cooperation with the
Texas Commission on Environmental Quality
under the authorization of the Texas Clean Rivers Act

The Data Management Plan (The Plan) outlines the standard policies and procedures for data management within the C&E Department. The Plan covers the management of both tabular (non-geographic) and spatial (geographic) datasets. Its primary purpose is to ensure the efficient access and maintenance of these datasets within the C&E Geospatial/GIS environment.

GIS technology provides a systematic means to capture, manipulate, analyze, store and display spatially referenced data. GIS supports a wide variety of applications ranging from site assessments, environmental planning, urban planning, and spatial analysis to support organizational strategies. In general, GIS supports the overall departmental goals of guiding regional planning, enhancing the quality of the region's natural environment, and public education through outreach programs. The C&E GIS team supports various programs within the C&E department through data development, spatial analysis, geospatial applications development, cartography in support of departmental goals.

The Plan is considered a dynamic working document which responds to changing technology, funding, staffing, and project requirements. Consequently, the Plan is reviewed on an annual basis and amended as necessary. The current and complete version of The Plan can be accessed at https://www.h-gac.com/getmedia/cd73d7d0-d906-4544-96d3-71fb7d5a8889/2024-Geospatial-Data-Management-Plan.