Amendment #3 to the Quality Assurance Project Plan for Guadalupe-Blanco River Authority

933 E. Court St.
Seguin, Texas 78155

Clean Rivers Program

Water Quality Planning Division

Texas Commission on Environmental Quality

P.O. Box 13087, MC 234

Austin, Texas 78711-3087

Effective Period: FY 2022 to FY 2023

Effective immediately upon approval by all parties

Questions concerning this QAPP should be directed to:
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Justification

This document details the changes made to the basin-wide Quality Assurance Project Plan to correct oversight in the original FY22-23 QAPP, update personnel changes, and update monitoring locations.

Detail of Changes

List each section in which a change is proposed and provide a description of the change(s) in the table below.

Section/Figure/Table	Page	Change	Justification
Title Page	1	Updated QAPP Contact	Change in personnel duties at GBRA
A1 Approval Page	5-9	Replaced Kyle Girten with Sarah Whitley as new CRP/WQS team lead. Updated CRP work lead title to Water Quality Standards and Clean Rivers Program team leader to reflect change in TCEQ organization.	Personnel changes at TCEQ. Supervisory title changed to reflect changes in TCEQ organization.
		Replaced Luis Medina with Katrina Smith as CRP Project Manager	Personnel changes at TCEQ
		Replaced Luis Medina with Sarah Whitley as acting CRP project Quality Assurance Specialist	Personnel changes at TCEQ
		Replaced Kyle Girten with Andrew Sullivan as acting Section Manager for Monitoring and Assessment Division	Personnel changes at TCEQ
		Added D. Jody Koehler as TCEQ Quality Assurance manager	Personnel changes at TCEQ
		Fixed typo in Nicole Shepherd's name	Fix typo
		Added Elizabeth Malloy as GBRA Field Technician. Replaced Kristyn Armitage with Elizabeth Malloy as GBRA QAO. Added Elizabeth Malloy as a GBRA backup data manager	Added GBRA Field Technician and changed QAO due to personnel changes at GBRA
		Tara Bushnoe replaced with Shelby Taber as the UGRA CRP Project Manager, QAO, and Data Manager	Change in personnel at UGRA
		Tara Bushnoe and Travis Linscomb added as UGRA backup data managers	UGRA backup data managers added
		Replaced Charles Morrow with James Babcock as SATL Laboratory Quality Manager	Change in personnel at SATL

		Replaced Nick Dornak with Jenna Walker as MCWE Project Manager	Change in MCWE personnel
Table of Contents	11	Added Appendix G to list	Appendix G missing from table of contents.
A3 Distribution List	13-14	Corrected typos Luis Medina replaced with Katrina Smith as TCEQ CRP project manager. Added Elizabeth Malloy as new Field Technician and Backup Data Manager. QAO contact changed from Kristyn Armitage to Elizabeth Malloy Tara Bushnoe replaced with Shelby Taber as UGRA CRP Manager. Travis Linscomb and Tara Bushnoe added as UGRA backup data managers Phone contact information updated for Tara Bushnoe Replaced Charles Morrow of SATL with James Babcock as Laboratory Quality Manager Replaced Nick Dornak with Jenna Walker as MCWE Project Manager	Corrected typos in section Updated TCEQ Project Manager to reflect TCEQ personnel changes Added GBRA Field Technician, QAO, Backup Data Manager Change in UGRA personnel Phone number extension changed UGRA personnel. Change in SATL personnel Change in MCWE personnel
A4 Description of Responsibilities	15-20	Elizabeth Malloy added as a GBRA Field Technician and as a backup data manager. Kristyn Armitage replaced with Elizabeth Malloy as QAO Tara Bushnoe replaced with Shelby Taber as UGRA CRP project manager, QAO officer, and data manager. Tara Bushnoe and Travis Linscomb added as backup data managers. Added language to allow Travis Linscomb to ensure training of staff. Added language for Sandra Arismendez (MCWE & WVWA QAO) to train staff and ensure maintenance of training records Kyle Girten replaced with Sarah Whitley as the TCEQ CRP supervisor. CRP lead position title changed from CRP work lead to CRP and Water Quality	Added GBRA Field Technician Change in personnel and personnel duties at UGRA Added language to allow MCWE & WVWA QAO to train staff Change in TCEQ personnel and TCEQ organization

		Standards Team Lead. Luis Medina replaced with Katrina Smith as TCEQ CRP project manager, and Luis Medina replaced with Sarah Whitley as acting TCEQ QAO Fixed typo in Nicole Shepherd's name Replaces Charles Morrow with James Babcock as SATL Laboratory quality manager	 Change in TCEQ personnel Fixed typo Change in SATL personnel
Figure A4.1	21	Kyle Girten replaced with Sarah Whitley as the TCEQ CRP supervisor. CRP lead position title changed from CRP work lead to WQS & CRP Team Lead. Luis Medina replaced with Sarah Whitley as acting TCEQ CRP QAO. Luis Medina replaced with Katrina Smith as TCEQ CRP project manager. Elizabeth Malloy added as GBRA field technician and backup data manager. Kristyn Armitage replaced with Elizabeth Malloy as GBRA QAO. Tara Bushnoe replaced with Shelby Taber as UGRA CRP project manager, UGRA QAO, and UGRA Data manager. Travis Linscomb and Tara Bushnoe added as backup UGRA data managers. Fixed typo in Nicole Shepherd's name Replaced Charles Morrow with James Babcock as SATL QAO Replaced Nick Dornak with Jenna Walker as MCWE Project Manager	Changes in personnel at TCEQ and changes in position title due to changes in TCEQ organization Changes in GBRA personnel Changes in UGRA personnel Fixed spelling error Change in SATL personnel Change in MCWE personnel
A8 Special Training/Certification	25	Updated training section	Clarified details on who can train and added details on who is eligible
Table B2.1	29-30	Updated hold time for chlorophyll a for GBRA. Updated footnotes to remove typos and inconsistencies.	Updated hold time to reflect method. Corrected typos and inconsistencies in footnotes.
Table B2.2	30	Updated hold time for chlorophyll a for UGRA. Updated footnotes to explain holding times	Updated hold time to reflect method. Updated footnotes to explain holding times and remove inconsistencies.

		and remove errors.	
B2 Sampling Methods	32	Updated field sheet recording method	Added electronic sheets as an option for WVWA.
B10 Data Management	43	Updated field sheet recording method	Clarified field sheet recording electronically or on paper
Table A7.1f	69	Removed duplicate table	Duplicate GBRA habitat table removed
Table A7.2a	73	Removed Chlorine from field parameters	Chlorine removed from UGRA field parameters. Not tested for any stations.
Table A7. 3c	79	TKN parameter removed from table	TKN was added erroneously and removed from MCWE table.
Table A7.3c	83	Corrected LOQ for phosphorus and nitrate nitrogen	LOQ was reported wrong for WVWA for phosphorus and nitrate nitrogen.
Sample Design Rationale	87-88	Fixed typos Updated critical period ALM sampling year Added new WVWA site	Corrected typos from previous version Changed GBRA FY22 critical period ALM sampling to FY23 Details added for new site monitored by WVWA, per the FY23 CMM
Table B1.1	89-97	Monitoring stations removed New WVWA Monitoring station added Station 12685 ALM updated	Removed TCEQ monitoring stations 12577, 12597, 12601, 12600, 12628, 12631, 12635, & 12668. These sites were erroneously added to previous QAPP version. Some of these sites are also monitored by MCWE, those are still listed in table B1.1 Added Monitoring station 17528 to FY23 sampling schedule, following discussion at FY23 Coordinated Monitoring Meeting. Fixed station number error. Updated station to reflect CMS.
Station Location Maps	99	Maps Updated	Updated to include new station 17528

Distribution

QAPP Amendments and Revisions to Appendices will be distributed to all personnel on the distribution list maintained by the Planning Agency.

These changes will be incorporated into the QAPP document and TCEQ and the Guadalupe-Blanco River Authority will acknowledge and accept these changes by signing this amendment.

A1 Approval Page

Texas Commission on Environmental Quality

Water Quality Planning Division

Electronically Approved 3/30/2023

Sarah Whitley, Team Leader Date
Water Quality Standards and Clean Rivers Program

Electronically Approved 3/30/2023

Sarah Whitley, Date
Acting Project Quality Assurance Specialist
Clean Rivers Program

Electronically Approved 3/21/2023

Cathy Anderson, Team Leader Date
Data Management and Analysis

Electronically Approved 3/30/2023

Andrew Sullivan, Acting Section Manager Date
Monitoring and Assessment Section

Electronically Approved 3/30/2023

Katrina Smith, Project Manager Date
Clean Rivers Program

Monitoring Division

Electronically Approved 3/30/2023

Jason Natho Date
Acting Lead CRP Quality Assurance Specialist

Electronically Approved 3/30/2023

D. Jody Koehler Date
TCEQ Quality Assurance Manager

Guadalupe Blanco River Authority (GBRA)

Electronically Approved 3/1/2023

Elizabeth Edgerton Date
GBRA CRP Project Manager

Electronically Approved 3/1/2023

Elizabeth Malloy Date
GBRA Field Technician, Quality Assurance Officer, and Backup Data Manager

Electronically Approved 3/1/2023

Kristyn Armitage Date
GBRA Field Technician and Data Manager

Electronically Approved 3/1/2023

Lee Gudgell Date
GBRA Backup Data Manager

Electronically Approved 3/1/2023

Jana Gray Date
GBRA Backup Data Manager

Guadalupe Blanco River Authority (GBRA) Laboratory

Electronically Approved 3/1/2023

Kylie Gudgell Date
GBRA Laboratory Quality Assurance Officer

Electronically Approved 3/1/2023

Miliana Hernandez Date
GBRA Laboratory Lead Analyst

Upper Guadalupe River Authority (UGRA)

Electronically Approved	3/1/2023
Shelby Taber UGRA CRP Project Manager, Quality Assurance Officer, Data Manager	Date

Electronically Approved	3/1/2023
Nicole Shepherd UGRA Laboratory Manager and Laboratory Quality Assurance Officer	Date

Electronically Approved	3/1/2023
Travis Linscomb UGRA Field Technician, Back Up Data Manager	Date

Electronically Approved	3/1/2023
Tara Bushnoe UGRA Back Up Data Manager	Date

Wimberley Valley Watershed Association (WVWA)

Electronically Approved	3/14/2023	Electronically Approved	3/2/2023
David Baker WVWA CRP Project Manager	Date	Sandra Arismendez WVWA CRP Quality Assurance Officer & Field Technician	Date

The Meadows Center for Water and the Environment (MCWE)

Electronically Approved	3/2/2023	Electronically Approved	3/2/2023
Jenna Walker MCWE CRP Project Manager	Date	Sandra Arismendez MCWE CRP Quality Assurance Officer & Field Technician	Date

Ana-Lab Corporation Environmental Laboratory (Ana-Lab)

Electronically Approved	3/30/2023	Electronically Approved	3/30/2023
William Peery Ana-Lab Technical Director	Date	Tracey Varvel Ana-Lab Quality Manager	Date

San Antonio Testing Lab, LLC (SATL)

Electronically Approved	3/23/2023	Electronically Approved	3/23/2023
Sairam Abburu San Antonio Testing Lab, LLC Laboratory Director	Date	James Babcock San Antonio Testing Lab, LLC Laboratory Quality Manager	Date

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List of Acronyms

AWRL	Ambient Water Reporting Limit
BMP	Best Management Practices
CAP	Corrective Action Plan
CE	Collecting Entity
COC	Chain of Custody
CRP	Clean Rivers Program
DMRG	Surface Water Quality Monitoring Data Management Reference Guide, July 2019, or most recent version
DM&A	Data Management and Analysis
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GBRA	Guadalupe-Blanco River Authority
GIS	Geographical Information System
GPS	Global Positioning System
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LIMS	Laboratory Information Management System
LOD	Limit of Detection
LOQ	Limit of Quantitation
MCWE	Meadows Center for Water and the Environment
MT	Monitoring Type
NELAP	National Environmental Laboratory Accreditation Program
QA	Quality Assurance
QM	Quality Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QC	Quality Control
QMP	Quality Management Plan
RT	Routine Monitoring
SATL	San Antonio Testing Lab, LLC
SE	Submitting Entity
SLOC	Station Location
SOP	Standard Operating Procedure
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TMDL	Total Maximum Daily Load
TCEQ	Texas Commission on Environmental Quality
TNI	The NELAC Institute
TSWQS	Texas Surface Water Quality Standards
UGRA	Upper Guadalupe River Authority
USDA	United States Department of Agriculture
VOA	Volatile Organic Analytes
WVWA	Wimberley Valley Watershed Association

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The Guadalupe-Blanco River Authority (GBRA) will provide copies of this project plan and any amendments or appendices of this plan to each person on this list and to each sub-tier project participant, e.g., subcontractors, subparticipants, or other units of government. The GBRA will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and ensure the documentation is available for review.

A4 Project/Task Organization

Description of Responsibilities

TCEQ

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

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

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

Cathy Anderson
Team Leader, Data Management and Analysis (DM&A) Team
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Ensures DM&A staff perform data management-related tasks.

Scott Delgado
CRP Data Manager, DM&A Team
Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Ensures that data are reported following instructions in the Data Management Reference Guide, July 2019 or most current version (DMRG). Runs automated data validation checks in the Surface Water Quality Management Information System (SWQMIS) and coordinates data verification and error correction with CRP Project Managers. Generates SWQMIS summary reports to assist CRP Project Managers' data review. Identifies data anomalies and inconsistencies. Provides training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related SOPs for CRP data management. Coordinates and processes data correction requests. Participates in the development, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).

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

Guadalupe-Blanco River Authority

Elizabeth Edgerton
Guadalupe-Blanco River Authority Project Manager
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that sub-participants are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of deficiencies and corrective actions, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TCEQ. The GBRA Quality Assurance Officer (QAO) will assist with completion of the job tasks of the GBRA Project Manager when delegated by the GBRA PM. The GBRA Project Manager will assist with completion of the job tasks of the GBRA Quality Assurance Officer, Data Manager, or Field Technician when requested by the primary GBRA QAO/DM/Field Technician.

Kristyn Armitage
Guadalupe-Blanco River Authority Data Manager
Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Maintains quality-assured data on ***GBRA*** internet sites. The GBRA Backup Data Manager will assist with completion of the job tasks of the GBRA Data Manager when delegated by the GBRA Data Manager.

Kristyn Armitage
Guadalupe-Blanco River Authority Field Technician
Performs field data collections for project as specified in Appendix A. Ensures that field staff are properly trained. Notifies the GBRA Laboratory Quality Assurance Officer of particular circumstances, which may adversely affect the quality of data. Assists with the preparation of quarterly progress reports to the TCEQ CRP Project Manager. Will assist with UGRA duties when requested.

Elizabeth Malloy
Guadalupe-Blanco River Authority Quality Assurance Officer
Responsible for coordinating the implementation of the QA program. Responsible for writing and maintaining the QAPP and monitoring its implementation. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Notifies the GBRA Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Coordinates and maintains records of data verification and validation. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that training records are properly maintained for field staff. The GBRA Backup Data Manager will assist with completion of the job tasks of the GBRA QAO when delegated by the GBRA Quality Assurance Officer.

Elizabeth Malloy
Guadalupe-Blanco River Authority Backup Data Manager
Serves as a backup for the duties of the GBRA data manager (DM) when delegated by the primary DM. The backup data manager responsibilities include assisting with the review and verification of laboratory and field data for integrity, continuity, reasonableness and conformance to project requirements, and validation of data against the measurement performance specifications listed in this QAPP. Assisting with the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Assisting with upload of quality-assured data to the GBRA internet sites. The GBRA Backup Data Manager will assist with completion of other job tasks defined in this QAPP as requested by the GBRA Project Manager (PM).

Elizabeth Malloy
Guadalupe-Blanco River Authority Field Technician
Performs field data collections for project as specified in Appendix A. Ensures that field staff are properly trained. Notifies the GBRA Laboratory Quality Assurance Officer of particular circumstances, which may adversely affect the quality of data. Assists with the preparation of quarterly progress reports to the TCEQ CRP Project Manager. Will assist with UGRA duties when requested.

Jana Gray
Guadalupe-Blanco River Authority Backup Data Manager
Serves as a backup for the duties of the GBRA data manager (DM) when delegated by the primary DM. The backup data manager responsibilities include assisting with the review and verification of laboratory and field data for integrity, continuity, reasonableness and conformance to project requirements, and validation of data against the measurement performance specifications listed in this QAPP. Assisting with the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Assisting with upload of quality-assured data to the GBRA internet sites. The GBRA Backup Data Manager will assist with completion of other job tasks defined in this QAPP as requested by the GBRA Project Manager (PM).

Lee Gudgell
Guadalupe-Blanco River Authority Backup Data Manager
Serves as a backup for the duties of the GBRA data manager (DM) when delegated by the primary DM. The backup data manager responsibilities include assisting with the review and verification of laboratory and field data for integrity, continuity, reasonableness and conformance to project requirements, and validation of data against the measurement performance specifications listed in this QAPP. Assisting with the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Assisting with upload of quality-assured data to the GBRA internet sites. The GBRA Backup Data Manager will assist with completion of other job tasks defined in this QAPP as requested by the GBRA Project Manager (PM).

Kylie Gudgell
Guadalupe-Blanco River Authority Laboratory Quality Assurance Officer
Responsible for the overall quality control and quality assurance of analyses performed by the GBRA laboratory. Responsible for identifying, receiving, and maintaining project QA records. Notifies the GBRA Project Manager of particular circumstances that may adversely affect the quality of laboratory data. Coordinates and monitors deficiencies and corrective actions associated with laboratory data. Responsible for conducting or hiring an outside party to conduct internal audits annually in compliance with NELAP requirements. The GBRA Laboratory Lead Analyst will assist with completion of the job tasks of the GBRA Laboratory QAO when requested by the GBRA Laboratory QAO. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Ensures that all laboratory data generated for this project has received a review and verification for integrity, continuity, reasonableness and conformance to project requirements.

Miliana Hernandez
Guadalupe-Blanco River Authority Laboratory Lead Analyst
Responsible for overall performance, administration, and reporting of analyses performed by GBRA Laboratory. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. The responsibilities of the GBRA laboratory lead analyst include supervision of laboratory, purchasing of equipment, and supervision of lab safety program. Trains laboratory analysts to validate data against measurement

performance specifications listed in this QAPP. The GBRA Laboratory QAO will assist with completion of the job tasks of the GBRA Laboratory Lead Analyst when delegated by the GBRA Laboratory Lead Analyst.

Guadalupe-Blanco River Authority Laboratory Analysts/Technicians

Perform laboratory analysis and assist in collection of field data for project as specified in Appendix A. Notifies the GBRA Laboratory Quality Assurance Officer of particular circumstances, which may adversely affect the quality of data. Performs sample custodial duties. Review and verify laboratory data for integrity, continuity, reasonableness and conformance to project requirements, and validates the lab data against the measurement performance specifications listed in this QAPP.

Upper Guadalupe River Authority

Shelby Taber
Upper Guadalupe River Authority Project Manager

Responsible for directing CRP activities in the upper Guadalupe River Basin, in Kerr County, and for one CRP monitoring station in Kendall County. Assures strict compliance with the CRP requirements for project administration and quality assurance. Responsible for coordinating and conducting sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains records of field data collection and observations. The GBRA Project Manager will assist with completion of the job tasks of the UGRA Project Manager when requested by the UGRA PM. The UGRA Field Technician will assist the UGRA PM with completion of job tasks when delegated.

Shelby Taber
Upper Guadalupe River Authority Quality Assurance Officer

Maintains operating procedures that comply with this QAPP, amendments and appendices. Provides requested information and documentation regarding UGRA monitoring and analysis of CRP data to the GBRA during scheduled monitoring system audits. Ensures that field staff are properly trained and that training records are maintained. Additionally, the UGRA QAO will review and verify all field and laboratory data for integrity and continuity, reasonableness and conformance to project requirements, validating the field and lab data in accordance with the measurement performance specifications listed in this QAPP. The GBRA QAO will assist with completion of the job tasks of the UGRA QAO when requested by the UGRA PM.

Shelby Taber
Upper Guadalupe River Authority Data Manager

Responsible for ensuring that field and lab data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with the DMRG. Maintains link from the water monitoring section of the UGRA web page to the CRP Data Tool web page. The GBRA Data Manager will assist with completion of the job tasks of the UGRA Data Manager when requested by the UGRA PM

Travis Linscomb
Upper Guadalupe River Authority Field Technician

Performs field data collections for project as specified in Appendix A. Assists the UGRA QAO in ensuring that field staff are properly trained and that training records are maintained. Notifies the UGRA Quality Assurance Officer of particular circumstances, which may adversely affect the quality of data. Calibrates and maintains UGRA field instrumentation. Transfers CRP laboratory and field data to an electronic format for review, verification, and validation by the UGRA QAO. The UGRA Project Manager will assist with completion of the job tasks of the UGRA Field Technician when requested by the UGRA Field Technician.

Travis Linscomb
Upper Guadalupe River Authority Backup Data Manager

Serves as a backup for the duties of the UGRA data manager (DM) when delegated by the primary DM. The backup data manager responsibilities include assisting with the review and verification of laboratory and field data for integrity, continuity, reasonableness and conformance to project requirements, and validation of data against the measurement performance specifications listed in this QAPP. Assisting with the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. The UGRA Backup Data Manager will assist with completion of other job tasks defined in this QAPP as requested by the UGRA Project

Manager (PM).

Tara Bushnoe
Upper Guadalupe River Authority Backup Data Manager
Serves as a backup for the duties of the UGRA data manager (DM) when delegated by the primary DM. The backup data manager responsibilities include assisting with the review and verification of laboratory and field data for integrity, continuity, reasonableness and conformance to project requirements, and validation of data against the measurement performance specifications listed in this QAPP. Assisting with the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. The UGRA Backup Data Manager will assist with completion of other job tasks defined in this QAPP as requested by the UGRA Project Manager (PM).

Nicole Shepherd
Upper Guadalupe River Authority Laboratory Manager and Laboratory Quality Assurance Officer
Responsible for overall performance, administration, quality control, quality assurance, and reporting of analyses performed by UGRA Laboratory. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Responsible for maintaining quality assurance manual for laboratory operations, maintaining project QA records, and supervision of lab safety program. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. The lab manager will review and validate all laboratory data for integrity and continuity, reasonableness and conformance to project requirements in accordance with the measurement performance specifications listed in this QAPP. Notifies the UGRA Quality Assurance Officer of particular circumstances, which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective actions associated with laboratory data. Responsible for conducting or hiring an outside party to conduct internal audits annually in compliance with NELAP requirements.

Upper Guadalupe River Authority Laboratory Analysts and Sample Receipt Clerks
Perform laboratory analyses for this project as specified in Appendix A. Notifies the UGRA Laboratory Manager of particular circumstances, which may adversely affect the quality of data. Performs sample custodial duties at time of sample receipt, enters sample information in UGRA LIMS.

Meadows Center for Water and the Environment

Jenna Walker
Meadows Center for Water and the Environment Project Manager
Responsible for directing CRP activities for MCWE. Assures strict compliance with the CRP requirements for project administration and quality assurance.

Sandra Arismendez
Meadows Center for Water and the Environment Quality Assurance Officer and Field Technician
Responsible for coordinating and conducting sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains operating procedures that comply with this QAPP. Maintains records of field data collection and observations. Responsible for ensuring that data for the MCWE are properly reviewed and verified. Provides information and documentation for partner monitoring systems audits by the GBRA. Responsible for the transfer of MCWE CRP field data to the GBRA Project Manager. Ensures that field staff is properly trained and that training records are maintained.

Wimberley Valley Watershed Association

David Baker
Wimberley Valley Watershed Association Project Manager
Responsible for directing CRP activities for the Wimberley Valley Watershed Association. Assures strict compliance with the CRP requirements for project administration and quality assurance.

Sandra Arismendez
Wimberley Valley Watershed Association Quality Assurance Officer and Field Technician
Responsible for coordinating and conducting sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains operating procedures that comply with this QAPP. Maintains records of field data collection and observations. Responsible for ensuring that data for the WVWA are properly reviewed and verified. Provides information and documentation for partner monitoring systems audits by the GBRA. Responsible for the transfer of WVWA CRP field data to the GBRA Project Manager. Ensures that field staff is properly trained and that training records are maintained.

Ana-Lab Corporation Environmental Laboratory

William Peery
Ana-Lab Laboratory Technical Director
The responsibilities of the lab director include supervision of laboratory, purchasing of equipment, and supervision of lab safety program. The Ana-Lab lab director will review and verify all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validates against the measurement performance specifications listed in this QAPP.

Tracy Varvel
Ana-Lab Laboratory Quality Manager
Maintains quality assurance manual for laboratory operations, maintains operating procedures that are in compliance with this QAPP, amendments and appendices. Conducts in-house audits to ensure compliance with written SOPs, NELAP requirements and to identify potential problems. Responsible for the overall quality control and quality assurance of analyses performed by Ana-Lab laboratories. Reviews and verifies all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validates against the measurement performance specifications listed in this QAPP.

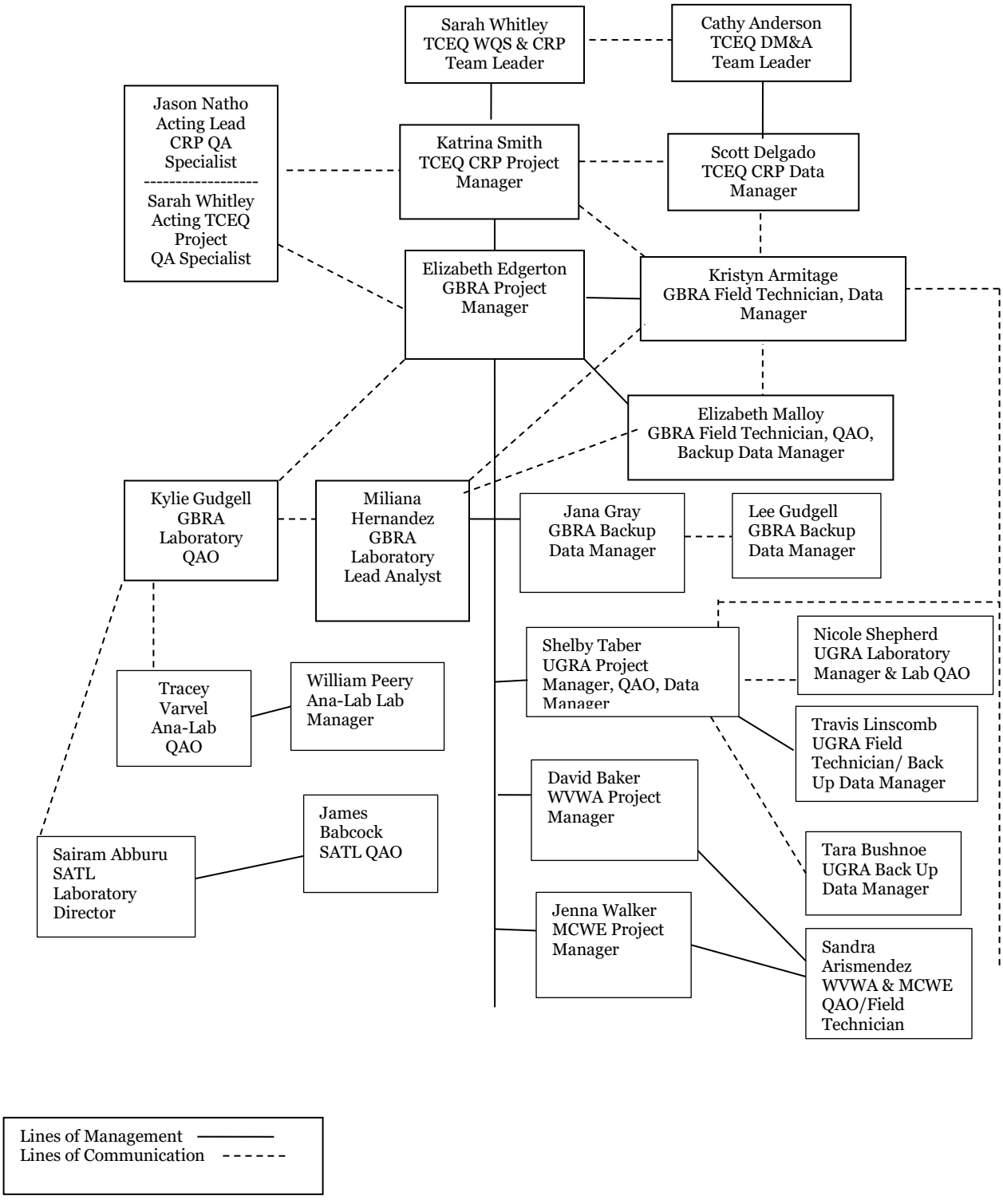
San Antonio Testing Lab, LLC

Sairam Abburu
San Antonio Testing Lab, LLC Laboratory Director
The responsibilities of the lab director include supervision of laboratory, purchasing of equipment, and supervision of lab safety program. The San Antonio Testing Lab, LLC lab director will review and verify all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validates against the measurement performance specifications listed in this QAPP.

James Babcock
San Antonio Testing Lab, LLC Laboratory Quality Manager
Maintains quality assurance manual for laboratory operations, maintains operating procedures that are in compliance with this QAPP, amendments and appendices. Conducts in-house audits to ensure compliance with written SOPs, NELAP requirements and to identify potential problems. Responsible for the overall quality control and quality assurance of analyses performed by SATL. Reviews and verifies all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validates against the measurement performance specifications listed in this QAPP.

Project Organization Chart

Figure A4.1. Organization Chart – Lines of Communication



A5 Problem Definition/Background

In 1991, the Texas Legislature passed the Texas Clean River Act (Senate Bill 818) in response to growing concerns that water resource issues were not being pursued in an integrated, systematic manner. The act requires that ongoing water quality assessments be conducted for each river basin in Texas, an approach that integrates water quality issues within the watershed. The CRP legislation mandates that each river authority (or local governing entity) shall submit quality-assured data collected in the river basin to the commission. Quality-assured data in the context of the legislation means data that comply with TCEQ rules for surface water quality monitoring (SWQM) programs, including rules governing the methods under which water samples are collected and analyzed and data from those samples are assessed and maintained. This QAPP addresses the program developed between the GBRA and the TCEQ to carry out the activities mandated by the legislation. The QAPP was developed and will be implemented in accordance with provisions of the TCEQ Quality Management Plan, January 8 2019 or most recent version (QMP).

The purpose of this QAPP is to clearly delineate GBRA QA policy, management structure, and procedures which will be used to implement the QA requirements necessary to verify and validate the surface water quality data collected. The QAPP is reviewed by the TCEQ to help ensure that data generated for the purposes described above are of known and documented quality, deemed acceptable for their intended use. This process will ensure that data collected under this QAPP and submitted to SWQMIS have been collected and managed in a way that guarantees its reliability and therefore can be used in water quality assessments, total maximum daily load (TMDL) and water quality standards development, permit decisions, and other program activities deemed appropriate by the TCEQ. Project results will be used to support the achievement of CRP objectives, as contained in the *Clean Rivers Program Guidance and Reference Guide FY 2022-2023*.

The GBRA in conjunction with UGRA have been monitoring water quality since the mid-1980s and have been actively involved in water quality planning since the early 1970s. By implementing the TCEQ's Surface Water Quality Monitoring Program through the Clean Rivers Program, the river authorities have enhanced and modified their existing programs. The expansion of existing monitoring efforts has allowed the river authorities to gather data to characterize water quality conditions in areas not previously monitored.

The monitoring goals for the CRP program in the Guadalupe River Basin are to verify the overall health of water bodies evaluated and identify water quality issues. UGRA has been a long-term participant in the Clean Rivers Program data collection efforts. These efforts ensure that TCEQ maintains a consistent historic record of water quality for the Upper Guadalupe River. This long-term water quality dataset allows the river authorities to identify any threats to water quality or degradation in the health of the waterway.

The Wimberley Valley Watershed Association is a monitoring entity in the Guadalupe River Basin that has collected data under the GBRA CRP QAPP since 2003. WVWA currently funds the Blanco River Water Quality Monitoring Program. The purpose of this program is to protect Wimberley area water resources proactively. The objectives of the monitoring program are to detect and describe spatial and temporal changes, determine impacts of point and nonpoint sources, and assess compliance with established water quality standards for the Blanco River. The WVWA will collect data at sites on the Blanco River quarterly. These sites are coordinated with the GBRA and TCEQ monitoring schedule annually.

The Meadows Center for Water and The Environment has been monitoring under the GBRA QAPP since 2020. MCWE is a part of the Texas State University System and is focused on environmental issues related to water quantity and quality. They monitor along Cypress Creek and their sites are coordinated with the GBRA and TCEQ monitoring schedule annually.

A6 Project/Task Description

The locations of monitoring sites and scheduled parameters are determined at the Guadalupe River Basin Coordinated Monitoring Meeting. Entities that collect water quality data on the Guadalupe River and its tributaries attend the coordinated monitoring meeting annually. The collecting entity associated with each monitoring site on the state wide coordinated monitoring schedule is responsible for sample collection and data maintenance at the specified site. The respective collecting entities selected sites for routine monitoring,

biological assessment, and diurnal data collection based on stakeholder input, TCEQ assessment needs, budgetary considerations, data gaps and support of ongoing collection efforts. Each entity collects conventional samples on a monthly or quarterly basis, as specified in the coordinated monitoring schedule. GBRA collects and analyzes ammonia and total kjeldahl nitrogen (TKN) at all quarterly collection events and bimonthly at all monthly routine monitoring stations. Ammonia nitrogen is analyzed by the UGRA at station 15113 and 12682 quarterly, but TKN is collected and analyzed during all routine quarterly collection events. WVWA monitors ammonia nitrogen at all routine quarterly collection events, but only monitors TKN at stations 12661 and 21804. See Appendix B for the project-related work plan tasks and schedule of deliverables for a description of work defined in this QAPP.

See Appendix B for the project-related work plan tasks and schedule of deliverables for a description of work defined in this QAPP.

See Appendix B for sampling design and monitoring pertaining to this QAPP.

Amendments to the QAPP

Revisions to the QAPP may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the GBRA Project Manager to the CRP Project Manager electronically. The Basin Planning Agency will submit a completed QAPP Amendment document, including a justification of the amendment, a table of changes, and all pages, sections, and attachments affected by the amendment. Amendments are effective immediately upon approval by the GBRA Project Manager, the GBRA QAO, the CRP Project Manager, the CRP Lead QA Specialist, the CRP Project QA Specialist, and additional parties affected by the amendment. Amendments are not retroactive. No work shall be implemented without an approved QAPP or amendment prior to the start of work. Any activities under this contract that commence prior to the approval of the governing QA document constitute a deficiency and are subject to corrective action as described in section C1 of this QAPP. Any deviation or deficiency from this QAPP which occurs after the execution of this QAPP will be addressed through a Corrective Action Plan (CAP). An amendment may be a component of a CAP to prevent future recurrence of a deviation.

Amendments will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the GBRA Project Manager. If adherence letters are required, GBRA will secure an adherence letter from each sub-tier project participant (e.g., subcontractors, sub-participant, or other units of government) affected by the amendment stating the organization's awareness of and commitment to requirements contained in each amendment to the QAPP. GBRA will maintain this documentation as part of the project's QA records, and ensure that the documentation is available for review.

Special Project Appendices

Projects requiring QAPP appendices will be planned in consultation with the GBRA and the TCEQ Project Manager and TCEQ technical staff. Appendices will be written in an abbreviated format and will reference the Basin QAPP where appropriate. Appendices will be approved by the GBRA Project Manager, the GBRA QAO, the Laboratory (as applicable), and the CRP Project Manager, the CRP Project QA Specialist, the CRP Lead QA Specialist and additional parties affected by the Appendix, as appropriate. Copies of approved QAPP appendices will be distributed by the GBRA to project participants before data collection activities commence. The Basin Planning Agency will secure written documentation from each sub-tier project participant (e.g., subcontractors, subparticipants, other units of government) stating the organization's awareness of and commitment to requirements contained in each special project appendix to the QAPP. The GBRA will maintain this documentation as part of the project's QA records, and ensure that the documentation is available for review.

A7 Quality Objectives and Criteria

The purpose of routine water quality monitoring is to collect surface water quality data that can be used to characterize water quality conditions, identify significant long-term water quality trends, support water quality standards development, support the permitting process, and conduct water quality assessments in accordance with TCEQ's Guidance for Assessing and Reporting Surface Water Quality in Texas, June 2015 or most recent version (https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_guidance.pdf).

These water quality data, and data collected by other organizations (e.g., United States Geological Survey (USGS), TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

In order to supplement the data collected during routine monitoring, GBRA performs systematic watershed monitoring with 24 hour diel measurements and aquatic life monitoring events that are biased for season in waters that have been identified by attendees of the annual CRP coordinated monitoring meeting or basin steering committee meetings as having impairments, concerns or a lack of data. Systematic watershed monitoring is defined as sampling that is planned for a short duration (1 to 2 years), and is designed to screen waters that would not normally be included in the routine monitoring program, investigate areas of potential concern, and investigate possible sources of water quality impairments or concerns. Due to the limitations regarding these data (e.g., not temporally representative, limited number of samples, biological sampling does not meet the specimen vouchering requirements), the data will be used to determine whether any locations have values exceeding the TCEQ's water quality criteria and/or screening levels (or in some cases values elevated above normal). GBRA will use this information to determine future monitoring priorities. These water quality data and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

The measurement performance specifications to support the project purpose for a minimum data set are specified in Appendix A.

Ambient Water Reporting Limits (AWRLs)

For surface water to be evaluated for compliance with Texas Surface Water Quality Standards ("TSWQS") and screening levels, data must be reported at or below specified reporting limits. To ensure data are collected at or below these reporting limits, required ambient water reporting limits ("AWRL") have been established. A full listing of AWRLs can be found at https://www.tceq.texas.gov/assets/public/waterquality/crp/QA/awrlmaster.pdf .

The limit of quantitation (LOQ) is the minimum reporting limit, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence by the laboratory analyzing the sample. Analytical results shall be reported down to the laboratory's LOQ (i.e., the laboratory's LOQ for a given parameter is its reporting limit) as specified in Appendix A.

The following requirements must be met in order to report results to the CRP:

- The laboratory's LOQ for each analyte must be set at or below the AWRL.
- Once the LOQ is established in the QAPP, that is the reporting limit for that parameter until such time as the laboratory amends the QAPP and lists an updated LOQ.
- The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check sample for each analytical batch of CRP samples analyzed.
- When reporting data, no results may be reported below the LOQ stated in this QAPP.
- Measurement performance specifications for LOQ check samples are found in Appendix A.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria are provided in Section B5.

Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. It is a measure of agreement among replicate measurements of the same property, under prescribed similar conditions, and is an indication of random error.

Laboratory precision is assessed by comparing replicate analyses of Laboratory Control Samples (LCS) in the sample matrix (e.g. deionized water, sand, commercially available tissue), Matrix Spike/Matrix Spike Duplicate (MS/MSD), or sample/duplicate (DUP) pairs, as applicable. Precision results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for precision are defined in Appendix A.

Bias

Bias is the systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). Bias is a statistical measurement of correctness and includes multiple components of systematic error. Bias is determined through the analysis of LCS and LOQ check samples prepared with verified and known amounts of all target analytes in the sample matrix (e.g. deionized water, sand, commercially available tissue) and by calculating percent recovery. Results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for bias are specified in Appendix A.

Representativeness

Site selection, the appropriate sampling regime, comparable monitoring and collection methods, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected under CRP are considered to be spatially and temporally representative of ambient water quality conditions. Water quality data are collected on a routine frequency and are separated by approximately even time intervals. At a minimum, samples are collected over at least two seasons (to include inter-seasonal variation) and over two years (to include inter-year variation) and include some data collected during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets will not be biased toward unusual conditions of flow, runoff, or season. The goal for meeting maximum representation of the water body will be tempered by funding availability.

Comparability

Confidence in the comparability of routine data sets for this project and for water quality assessments is based on the commitment of project staff to use only approved sampling and analysis methods and QA/QC protocols in accordance with quality system requirements as described in this QAPP and in TCEQ guidance. Comparability is also guaranteed by reporting data in standard units, by using accepted rules for rounding figures, and by reporting data in a standard format as specified in the Data Management Plan in Section B10.

Completeness

The completeness of the data describes how much of the data are available for use compared to the total potential data. Ideally, 100% of the data should be available. However, the possibility of unavailable data due to accidents, insufficient sample volume, broken or lost samples, etc. is to be expected. Therefore, it will be a general goal of the project(s) that 90% data completion is achieved.

A8 Special Training/Certification

Before new field personnel independently conduct field work, the Field Technician (or designee) trains him/her in proper instrument calibration, field sampling techniques, and field analysis procedures. The QA officer (or designee) will document the successful field demonstration. The QA Officer (or designee) will retain documentation of training and the successful field demonstration an electronic archive and ensure that the documentation will be available during monitoring systems audits. All full-time employees are eligible to be trained to conduct field work independently. Any part-time employees or students who wish to receive this training must get written approval from the GBRA PM.

The requirements for Global Positioning System (GPS) certification are located in Section B10, Data Management.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in The NELAC Institute Standard (TNI) (2016) Volume 1, Module 2, Section 4.5.5 (concerning Subcontracting of Environmental Tests).

A9 Documents and Records

The documents and records that describe, specify, report, or certify activities are listed. The list below is limited to documents and records that may be requested for review during a monitoring systems audit.
All documents generated by GBRA are saved as electronic copies for retention. If a document cannot be produced electronically, then a paper copy will be created and saved as an electronic copy. Paper files are retained for at least one month after creation and electronic files are retained for at least 5 years. Project documents (e.g., QAPPs, field and laboratory SOPS, copies of laboratory quality manuals, etc.) may be retained up to the period of record of the most recent TCEQ 2020 Integrated Report (e.g. 5 years). GBRA submits the monitoring data collected by the GBRA, WVWA and MCWE directly to TCEQ in a format compatible with SWQMIS

All monitoring analysis data generated by the GBRA laboratory is recorded on electronic bench sheets or in electronic instrument files. The results from these files are transferred into the GBRA laboratory information system (LIMS) with an electronic parsing program. Electronic bench sheets and instrument files associated with monitoring data are archived for at least 5 years.

The GBRA Field Technician uses a computer to record field data and instrument calibration logs onto electronic data sheets. The GBRA Field Technician transfers the data that they record on electronic field sheets into the GBRA laboratory information system (LIMS) with an electronic parsing program. The GBRA Field Technician saves the electronic data sheets associated with monitoring data for at least 5 years. Alternatively, the GBRA Field Technician may record field data and instrument calibrations on paper data sheets. The GBRA Field Technician transcribes the data from the paper field sheets into the GBRA LIMS manually. The GBRA field technician retains paper data sheets for at least one month, and then transfers the files to GBRA records retention staff for long term electronic archiving. The GBRA Field Technician will determine the method in which field data is collected based upon electronic equipment availability and access to wireless communications.

The WVWA and MCWE Field Technicians record data on a computer into electronic field sheets that they email to the GBRA Project Manager along with associated equipment calibration logs following routine monitoring collection events. The GBRA Project Manager or Field Technician electronically parses the data from these field sheets into the GBRA laboratory information system (LIMS). Alternatively, the WVWA and MCWE Field Technicians may record field data and instrument calibrations on paper data sheets as a back up if electronic means malfunction or are not available. The WVWA and MCWE Field Technicians will determine the method in which field data is collected based upon electronic equipment availability and access to wireless communications.

The GBRA, WVWA, and MCWE all save electronic copies of these field sheets and calibration logs as pdf's for at least 5 years. If changes are needed for a file saved as a pdf, the original will not be deleted, but a new pdf will be saved with the same name and the date that it was updated as well as the initials of the person who updated the file.

UGRA maintains all paper and electronic laboratory bench sheets, field sheets and instrument calibration logs associated with their routine monitoring stations for at least 5 years. UGRA submits the routine monitoring data that they collect directly to TCEQ in a format compatible with SWQMIS. The UGRA Field Technician submits UGRA twenty-four hour diel data associated with GBRA Aquatic Life Monitoring (ALM) events to GBRA electronically via email in an excel spreadsheet. GBRA transcribes the data from these ALM events into a format compatible with SWQMIS and submits them to TCEQ.

Table A9.1 Project Documents and Records

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments, and appendices	GBRA/UGRA[1]/WVWA/MCWE/Ana-Lab[4]/SATL[5]	5 years	Electronic[6]
Field SOPs	GBRA/UGRA[1]/WVWA/MCWE	5 years	Electronic[6]
Laboratory Quality Manuals	GBRA/UGRA[1]/Ana-Lab[4]/SATL[5]	5 years	Electronic[6]
Laboratory SOPs	GBRA/UGRA[1]/Ana-Lab[4]/SATL[5]	5 years	Electronic[6]
QAPP distribution documentation	GBRA	5 years	Electronic[6]
Field staff training records	GBRA[2]/UGRA[1]/MCWE[3]/WVWA[3]	1 month/ 5 years	Paper/ Electronic
Field equipment calibration/maintenance logs	GBRA[2]/UGRA[1]/WVWA[3]/MCWE[3]	1 month/ 5 years	Paper/ Electronic
Field instrument printouts	GBRA[2]/UGRA[1]/WVWA[3]/MCWE[3]	5 years	Electronic[6]
Field notebooks or data sheets	GBRA[2]/UGRA[1]/WVWA[3]/MCWE[3]	1 month/ 5 years	Paper/ Electronic
Chain of custody records	GBRA[2]/UGRA[1]/ELS[4]/Ana-Lab[4]/SATL[5]	1 month/ 5 years	Paper/ Electronic
Laboratory calibration records	GBRA[2]/UGRA[1]/Ana-Lab[4]/SATL[5]	1 month/ 5 years	Paper/ Electronic
Laboratory instrument printouts	GBRA[2]/UGRA[1]/Ana-Lab[4]/SATL[5]	1 month/ 5 years	Paper/ Electronic
Laboratory data reports/results	GBRA/UGRA/WVWA/MCWE/Ana-Lab[4]/SATL[5]	5 years	Electronic[6]
Laboratory equipment maintenance logs	GBRA[2]/UGRA[1]/Ana-Lab[4]/SATL[5]	1 month/ 5 years	Paper/ Electronic
Corrective Action Documentation	GBRA[2]/UGRA[1]/WVWA/MCWE/Ana-Lab[4]/SATL[5]	1 month/ 5 years	Paper/ Electronic

[1] UGRA maintains all original paper documentation for 5 years from creation.
[2] GBRA retains copies of all produced paper documents for at least 1 month from creation, at which point a document is scanned and converted to an electronic copy, which is retained by the GBRA for at least 5 years.
[3] WVWA retains copies of all produced paper documents for at least one month. These documents are converted to electronic format and retained for at least five years. Electronically produced field sampling documents are emailed to, and retained by the GBRA for at least 5 years.
[4] Ana-lab retains all documentation in electronic format. Any generated paper data is converted to electronic format and retained for at least five years.
[5] San Antonio Testing Lab, LLC retains all documentation in electronic format. Any generated paper data is converted to electronic format and retained for at least five years.
[6]These documents are generated and retained electronically for at least 5 years. If printed-paper copies are generated, they are not considered controlled documents.

Laboratory Test Reports

Test/data reports from the laboratory must document the test results clearly and accurately. Routine data reports should be consistent with the TNI Standard (2016), Volume 1, Module 2, Section 5.10 and include the information necessary for the interpretation and validation of data. The requirements for reporting data and the procedures are provided.

The laboratory information system from each contributing laboratory generates a test report upon request. A laboratory test report will contain at least the following information:

Title of report and unique identifiers on each page
Name and address of the analytical laboratory
Name and customer number of the client
Identification of the sample(s) analyzed

Date and time of sample receipt
Clearly identified subcontracted laboratory results (as applicable)
Identification of analysis method
Identification of samples that did not meet QA requirements and why (e.g., holding times exceeded)
Name and title of person accepting responsibility for the report
Sample results
Units of measurement
Sample matrix
Dry weight or wet weight (as applicable) Station information
Date and time of collection
Sample depth
Holding time for E. coli
LOQ and limit of detection (LOD) (formerly referred to as the reporting limit and the method detection limit, respectively), and qualification of results outside the working range (if applicable)
Certification of NELAP compliance
Narrative information on QC failures or deviations from requirements that may affect the quality of results or is necessary for the review, verification and validation of data

The information in test reports should be consistent with the information that the Guadalupe-Blanco River Authority and Upper Guadalupe River Authority need to prepare data submittals to TCEQ.

Otherwise, reports should be consistent with the TNI Standard and should include any additional information critical to the review, verification, validation, and interpretation of data. Information included in reports is based on the process used by the GBRA or UGRA Data Manager and documented in Section D1 and D2 of this document.

The laboratory information system generates quality assured electronic data for the GBRA or UGRA Data Manager. The GBRA or UGRA Data Manager ensures that a review, verification, and validation of the electronic data has occurred prior to submitting it to the TCEQ in a format acceptable by SWQMIS.

Electronic Data

Data will be submitted electronically to the TCEQ in the Event/Result file format described in the most current version of the DMRG. A completed Data Review Checklist and Data Summary (see Appendix F) will be submitted with each data submittal.

B1 Sampling Process Design

See Appendix B for sampling process design information and monitoring tables associated with data collected under this QAPP.

B2 Sampling Methods

Field Sampling Procedures

Field sampling will be conducted in accordance with the latest versions of the TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2012 (RG-415) and Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416), collectively referred to as "SWQM Procedures." Updates to SWQM Procedures are posted to the Surface Water Quality Monitoring Procedures website (https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html), and shall be incorporated into the GBRA, UGRA, WVWA, and MCWE's procedures, QAPP, SOPs, etc., within 60 days of any final published update. Additional aspects outlined in Section B below reflect specific requirements for sampling under CRP and/or provide additional clarification. All GBRA, WVWA, and MCWE sample collection bottles are purchased and distributed by GBRA. All UGRA sample collection bottles are purchased by UGRA, with exception of 500 mL bottles preserved with sulfuric acid, which are purchased by GBRA and distributed to UGRA. If Ana-lab or SATL laboratory is utilized for analysis, the sample bottles are purchased by GBRA or UGRA.

Table B2.1 GBRA, WVWA, & MCWE Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation	Sample Volume	Holding Time
Turbidity	Surface Water	Plastic	Cool, < 6°C but >0°C	3L	48 Hours
Hardness***	Surface Water	Plastic	Cool, < 6°C but >0°C, H_2SO_4 to pH < 2**	1L	6 Months
Total Suspended Solids (TSS)	Surface Water	Plastic	Cool, < 6°C but >0°C	3L	7 Days
Nitrate-nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C	3L	48 Hours
Nitrite – nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C	3L	48 Hours
Ammonia-nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C, H_2SO_4 to pH < 2**	1L	28 Days
Total phosphorus	Surface Water	Plastic	Cool, < 6°C but >0°C, H_2SO_4 to pH < 2**	1L	28 Days
Total Kjeldahl Nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C, H_2SO_4 to pH < 2**	1L	28 Days
Sulfate***	Surface Water	Plastic	Cool, < 6°C but >0°C	3L	28 Days
Chloride***	Surface Water	Plastic	Cool, < 6°C but >0°C	3L	28 Days
Chlorophyll a***/ Pheophytin***	Surface Water	Amber Plastic	Dark, Cool, < 6°C but >0°C before Filtration; Dark, 0°C after	3L	Filter within 48 hours/24 or 28 days at 0°C ****.

			Filtration		
E. coli	Surface Water	Plastic (Sterile)	Cool, < 6°C but >0°C (with $Na_2S_2O_3$ downstream of chlorinated discharges)**	120 mL	8 Hours*
Biological*** Fish	Surface Water	Plastic	10% Formalin (field) **/ 70%-75% Ethyl Alcohol (Voucher)	500 mL	1 week (field); 5 years (voucher)
Biological**** Benthic Macro-invertebrates	Surface Water	Plastic	70% or 95% Ethyl Alcohol (field) **/ 70%-75% Ethyl Alcohol (voucher)	500 mL (field) /5 mL (voucher)	1 week (field); 5 years (voucher)

* E.coli samples should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
** Preservation occurs within 15 minutes of collection in a pre-preserved bottle.
*** WVWA and MCWE do not collect this parameter
**** Maximum holding time is 28 days for EPA method SM10200-H4 and 24 days if using EPA method 445.0

Table B2.2 UGRA Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation	Sample Volume	Holding Time
Turbidity	Surface Water	Plastic	Cool, < 6°C but >0°C	1L	48 Hours
Total Suspended Solids (TSS)	Surface Water	Plastic	Cool, < 6°C but >0°C	1L	7 Days
Nitrate-nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C	1L	48 Hours
Ammonia-nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C H2SO4 to pH < 2****	250 mL	28 Days
Total phosphorus	Surface Water	Plastic	Freeze without chemical preservation	250 mL	28 Days
Total Kjeldahl Nitrogen	Surface Water	Plastic	Cool, < 6°C but >0°C H2SO4 to pH < 2**	500 mL	28 Days
Sulfate	Surface Water	Plastic	Cool, < 6°C but >0°C	1L	28 Days
Chloride	Surface Water	Plastic	Cool, < 6°C but >0°C	1L	28 Days
Chlorophyll a /Pheophytin	Surface Water	Amber Plastic	Dark, Cool, < 6°C but >0°C before Filtration; Dark, 0°C after Filtration	1L	Filter within 48 hours/24 or 28 days at 0°C*****.
E. coli	Surface Water	Plastic (Sterile)	Cool, < 6°C but >0°C, $Na_2S_2O_3$**	120 mL***	8 Hours*

* E. coli samples should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the

holding time may be extended and samples must be processed as soon as possible and within 30 hours.
** Preservation occurs within 15 minutes of collection in a pre-preserved bottle.
*** UGRA collects E. coli duplicates in 250 mL sterile bottles.
**** Preservation occurs upon arrival at UGRA lab.
***** Maximum holding time is 28 days for EPA method SM10200-H4 and 24 days if using EPA method 445.0

Sample Containers

GBRA
GBRA either purchases new bottles or uses bottles that are cleaned and reused for all samples collected for the Clean Rivers Program. GBRA maintains certificates from sample container manufacturers for purchased bottles in a notebook located in the GBRA laboratory.

- For unpreserved conventional parameters such as TSS, NO_3-N, Turbidity, Chloride, Sulfate, Chlorophyll a and Pheophytin, GBRA uses three-liter amber bottles that are either purchased new or cleaned and reused. The unpreserved reused bottles are cleaned by the GBRA staff with the following procedure: 1) wash containers with tap water and laboratory grade detergent, 2) triple rinse with hot tap water, and 3) triple rinse with deionized water. The GBRA will dispose of reused bottles for conventional analysis if the reused bottles visibly appear discolored or are no longer water tight following the cleaning procedure. GBRA maintains certificates from sample container manufacturers for purchased bottles in a notebook located in the GBRA laboratory.
- Sample containers for parameters preserved with H_2SO_4 such as TKN, NH_3-N, Total Phosphorus and Total Hardness are one-liter plastic bottles pre-preserved with 2 mL of sulfuric acid that the GBRA either purchases new or cleans, preserves, and reuses. The reused preserved bottles are cleaned by GBRA staff with the following procedure: 1) wash containers with tap water and laboratory grade detergent, 2) triple rinse with hot tap water, and 3) triple rinse with deionized water. After cleaning, 2 mL of sulfuric acid are added to bottles for sample preservation. The GBRA will dispose of reused bottles for conventional analysis if the reused bottles visibly appear discolored or are no longer water tight following the cleaning procedure. GBRA maintains certificates from sample container manufacturers for purchased bottles in a notebook located in the GBRA laboratory.
- Sample containers for bacteria parameters such as *E. coli* are 120 mL sterile bottles. GBRA collects bacteriological samples in bottles without sodium thiosulfate for most monitoring locations. Samples collected immediately downstream of chlorinated discharges are collected in bottles preserved with sodium thiosulfate.
- GBRA takes 2 photo vouchers per species of fish while in the field. If the fish is unable to be identified in the field, GBRA collects sample containers with 10% formalin for biological fish vouchers in the field. These samples are stored for at least 1 week and then washed and soaked in tap water for three successive days. Following this washing procedure, GBRA transfers the fish to bottles containing 70-75% Ethyl Alcohol to serve as vouchers for each fish species collected.
- GBRA collects sample containers with 70-75 Ethyl Alcohol for biological benthic macroinvertebrates assemblages in the field. These samples are stored at room temperature until the sample is processed. Following identification procedures, GBRA transfers the benthic macroinvertebrates to 5 mL bottles containing 70-75% Ethyl Alcohol to serve as vouchers for each genus collected.

WVWA & MCWE

- GBRA provides WVWA & MCWE with the bottles used for their monitoring program, which GBRA purchases new as described in the GBRA sample container section. GBRA maintains the bottle certificates from sample container manufacturers for bottles provided to the WVWA & MCWE. Sample containers for bacteria parameters such as *E. coli* are 120 mL sterile bottles. WVWA & MCWE collects bacteriological samples in bottles without sodium thiosulfate for most monitoring locations. Samples collected immediately downstream of chlorinated discharges are collected in bottles preserved with sodium thiosulfate.

UGRA
UGRA purchases new or cleans and reuses bottles for unpreserved and preserved conventional parameters, with

the exception of bottles for TKN and bacteria analysis, which they do not reuse. UGRA staff cleans one-liter unpreserved conventional bottles and one-liter amber bottles for chlorophyll a analysis before sample collection with the following procedure: 1) wash containers with tap water laboratory detergent, 2) triple rinse with hot tap water, and 3) triple rinse with deionized water. UGRA collects bacteriological samples in bottles with sodium thiosulfate. UGRA purchases new bottles for all bacteriological samples and purchases replacement plastic bottles for conventional analysis as needed. Certificates for new bacteriological sample bottles and plastic conventional bottles are maintained in a notebook in the UGRA laboratory. GBRA provides UGRA with new, pre-cleaned, pre-preserved 500 mL bottles for TKN analysis. The GBRA laboratory maintains the manufacturer certificate for these bottles.

- UGRA collects *E. coli* samples in new 120 mL sterile sample bottles. UGRA collects laboratory duplicate samples in 250 mL sterile sample bottles. All *E. coli* sample bottles have been manufacturer certified and pre-preserved with Sodium Thiosulfate.
- Chlorophyll-a and pheophytin samples are collected in 1L brown polyethylene bottles that are either purchased new or are washed and reused using the cleaning procedure described above.
- Unpreserved conventional parameters such as TSS, Turbidity, NO_3-N, Chloride and Sulfate are collected in one-liter plastic bottles that have been purchased new or clean and reused using the cleaning procedure described above.
- UGRA collects TKN samples in new 500 mL plastic bottles that have been manufacturer certified and pre-preserved with one mL of Sulfuric Acid.
- UGRA collects Total Phosphorus samples in 250 mL plastic bottles that purchased new or washed and reused using the cleaning procedure described above. Prior to use, bottles are acid washed with a solution of equal parts hydrochloric acid and deionized water. Total Phosphorus samples are frozen upon arrival at UGRA laboratory and thawed prior to analysis.
- UGRA collects Ammonia Nitrogen samples in 250 mL plastic bottles that are purchased new. These samples are either analyzed within 24 hours of collection or preserved by the UGRA laboratory with sulfuric acid to a pH of less than 2. If necessary, preservation occurs upon arrival at UGRA laboratory.

Ana-Lab
Ana-Lab purchases new bottles for all samples distributed to GBRA, UGRA, WVWA, or MCWE for Clean Rivers Program laboratory analysis performed as a part of this QAPP. Ana-lab maintains manufacturer certificates for any bottles distributed to collecting entities in this QAPP.

SATL
SATL purchases new bottles for all samples distributed to GBRA, UGRA, WVWA, or MCWE for Clean Rivers Program laboratory analysis performed as a part of this QAPP. SATL maintains manufacturer certificates for any bottles distributed to collecting entities in this QAPP.

Processes to Prevent Contamination

SWQM Procedures outline the necessary steps to prevent contamination of samples, including: direct collection into sample containers, when possible; use of certified containers for organics; and clean sampling techniques for metals. Field QC samples (identified in Section B5) are collected to verify that contamination has not occurred.

Documentation of Field Sampling Activities

Field sampling activities are documented on paper or electronic field data sheets as presented in Appendix D. Data from paper field data sheets are transcribed into the laboratory information system or an Excel spreadsheet. GBRA transfers data from electronic field data sheets directly into the laboratory information system via a parsing program or transcribes data from paper field sheets into the laboratory information system. WVWA records data electronically or on paper data sheets, which are sent to GBRA. Any paper field sheets are the responsibility of the field technician and are retained by the field technician after the samples are transported and relinquished to the laboratory. GBRA transcribes the WVWA data into the laboratory information system. UGRA transcribes field data directly into an Excel spreadsheet. Flow worksheets, aquatic life use monitoring checklists, habitat assessment forms, field biological assessment forms, and records of bacteriological analyses (if applicable) are part of the field data record. The following will be recorded for all visits:

Station ID
Sampling Date
Location
Sampling Depth
Sampling Time
Sample Collector's name
Values for all field parameters collected

Notes containing detailed observational data not captured by field parameters, including;
Water appearance
Weather
Biological activity
Recreational activity
Unusual odors
Pertinent observations related to water quality or stream uses
Watershed or instream activities
Specific sample information
Missing parameters

Field data is kept in a waterproof field notebook and includes:

Date and Time of sample collection
Name of water body
Date and time of sample collection
Name of water body
Location of sample site (Station ID)
Time spent electrofishing
Number of seine hauls

In the electronic field sheet (Appendix G) the following are recorded:

A description of habitats sampled
Unusual site characteristics
Field measurements (flow, DO, pH, temperature, specific conductance)

Recording Data

For the purposes of this section and subsequent sections, all field and laboratory personnel follow the basic rules for recording information as documented below:

- Write legibly, in indelible ink
- Make changes to paper pages by crossing out original entries with a single line strike-out, entering the changes, and initialing and dating the corrections.
- Close-out incomplete paper pages with an initialed and dated diagonal line.
- GBRA saves electronic field data sheets as pdf files for posterity.
- GBRA saves electronic laboratory instrumentation calibration and analysis files for posterity.

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

Examples of sampling method requirements or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately,

contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP, SWQM Procedures, or appropriate sampling procedures may invalidate data, and require documented corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the GBRA or UGRA Project Manager, in consultation with the GBRA QOA, UGRA QAO, WVWA QAO, or MCWE QAO to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

B3 Sample Handling and Custody

Sample Tracking

Proper sample handling and custody procedures ensure the custody and integrity of samples beginning at the time of sampling and continuing through transport, sample receipt, preparation, and analysis.

A sample is in custody if it is in actual physical possession or in a secured area that is restricted to authorized personnel. The Chain of Custody (COC) form is a record that documents the possession of the samples from the time of collection to receipt in the laboratory. The following information concerning the sample is recorded on the COC form (See Appendix E). The following list of items matches the COC form in Appendix E. *All COC forms to be used in the project should be included in Appendix E for the TCEQ's review.*

Date and time of collection
Site identification
Sample matrix
Number of containers
Preservative used
Was the sample filtered
Analyses required
Name of collector
Custody transfer signatures and dates and time of transfer
Bill of lading, if applicable

Sample Labeling

Samples from the field are labeled on the container, or on a label, with an indelible marker. Label information includes:

Site identification
Date and time of collection
Preservative added, if applicable
Indication of field-filtration for metals, as applicable
Sample type (i.e., analyses) to be performed

Sample Handling

Following a GBRA, UGRA, WVWA, or MCWE sample collection event, the field technician transfers the samples to an ice chest with ice. The ice chest is stored in a vehicle until it reaches the destination laboratory. Ice chests will remain in the possession of the field technician or in the locked vehicle until delivered to the respective lab. The field technician completes a chain of custody form describing the transported samples and analyses requested prior to relinquishing custody of the samples with a signature, date and time on the form. The analysis laboratory examines the samples and confirms the description and disposition of the samples listed on the chain of custody prior to receiving the samples. The analysis laboratory documents any discrepancies between the sample bottles received and the description on the accompanying chain of custody form prior to receiving the samples with a signature, date and time. UGRA collects samples that the GBRA laboratory analyzes for chlorophyll a, pheophytin and TKN analysis. UGRA may ship these samples to the GBRA by

common carrier, on ice and accompanied by the chain of custody form. The chain of custody that accompanies these samples includes the relinquishing employee's signature, and date and time of the sample transfer to the common carrier. The receiving laboratory checks in the samples as though they were received by an individual, but notes the common carrier on the second relinquishing signature line and the date and time that the samples were received. In order to meet holding times in the event of equipment failure samples GBRA will deliver samples on ice to Ana-Lab Laboratory in Kilgore, Texas or San Antonio Testing Lab, LLC in San Antonio, Texas by GBRA personnel or common carrier and accompanied by chain of custody forms. Following receipt by the analysis laboratory, the samples are stored in a refrigeration unit or transferred to an analyst for immediate analysis. Only authorized laboratory personnel will handle samples received by the laboratory.

For biological sampling, GBRA takes 2 photo vouchers per species of fish while in the field. If the fish is unable to be identified in the field, GBRA collects sample containers with 10% formalin for biological fish vouchers in the field. These samples are stored for at least 1 week and then washed and soaked in tap water for three successive days. Following this washing procedure, GBRA transfers the fish to bottles containing 70-75% Ethyl Alcohol to serve as vouchers for each fish species collected. GBRA collects sample containers with 70-75 Ethyl Alcohol for biological benthic macroinvertebrates assemblages in the field. These samples are stored at room temperature until the sample is processed. Following identification procedures, GBRA transfers the benthic macroinvertebrates to 5 mL bottles containing 70-75% Ethyl Alcohol to serve as vouchers for each genus collected.

Sample Tracking Procedure Deficiencies and Corrective Action

All deficiencies associated with COC procedures, as described in this QAPP, are immediately reported to the GBRA Project Manager. These include such items as delays in transfer resulting in holding time violations; violations of sample preservation requirements; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc. The GBRA Project Manager in consultation with the GBRA Laboratory QAO will determine if the procedural violation may have compromised the validity of the resulting data. Any failures that have reasonable potential to compromise data validity will invalidate data and the sampling event should be repeated. The resolution of the situation will be reported to the TCEQ CRP Project Manager in the project progress report. CAPs will be prepared by the Lead Organization QAO and submitted to TCEQ CRP Project Manager along with project progress report. UGRA maintains a similar procedure for tracking procedure deficiencies and corrective actions.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

B4 Analytical Methods

The analytical methods, associated matrices, and performing laboratories are listed in Appendix A. The authority for analysis methodologies under CRP is derived from the 30 Tex. Admin. Code Ch. 307, in that data generally are generated for comparison to those standards and/or criteria. The Texas Surface Water Quality Standards state "Procedures for laboratory analysis must be in accordance with the most recently published edition of the book entitled Standard Methods for the Examination of Water and Wastewater, the TCEQ Surface Water Quality Monitoring Procedures as amended, 40 CFR 136, or other reliable procedures acceptable to the TCEQ, and in accordance with chapter 25 of this title."

Laboratories collecting data under this QAPP must be NELAP accredited in accordance with 30 TAC Chapter 25. Copies of laboratory QMs and SOPs shall be made available for review by the TCEQ.

Standards Traceability

All standards used in the field and laboratory are traceable to certified reference materials. Standards preparation is fully documented and maintained. Each documentation includes information concerning the standard identification, starting materials, including concentration, amount used and lot number; date prepared, expiration date and preparer's initials/signature. The reagent bottle is labeled in a way that will trace the reagent back to preparation.

Analytical Method Deficiencies and Corrective Actions

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP-defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the applicable Laboratory Supervisor, who will make the determination and notify the GBRA Laboratory QAO if the problem compromises sample results. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the GBRA Project Manager. The GBRA Project Manager will include this information in a CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager. UGRA maintains a similar procedure for tracking procedure deficiencies and corrective actions.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

The TCEQ has determined that analyses associated with qualifier codes (e.g., "holding time exceedance," "sample received unpreserved," "estimated value") may have unacceptable measurement uncertainty associated with them. This will immediately disqualify analyses from submittal to SWQMIS. Therefore, data with these types of problems should not be reported to the TCEQ. Additionally, any data collected or analyzed by means other than those stated in the QAPP, or data suspect for any reason should not be submitted for loading and storage in SWQMIS. However, when data is lost, its absence will be described in the data summary report submitted with the corresponding data set, and a CAP (as described in section C1) may be necessary.

B5 Quality Control

Sampling Quality Control Requirements and Acceptability Criteria

The minimum field QC requirements, and program-specific laboratory QC requirements, are outlined in SWQM Procedures. Specific requirements are outlined below. Field QC sample results are submitted with the laboratory data report (see Section A9). No field QC samples (field blanks, field duplicates, or trip blanks) will be collected for the Clean Rivers Program.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Batch

A batch is defined as environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAP-defined matrix, meeting the above-mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extract, digestates, or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

Method Specific QC requirements

QC samples, other than those specified later this section (e.g., sample duplicates, surrogates, internal standards, continuing calibration samples, interference check samples, positive control, negative control, and media blank), are run as specified in the methods and in SWQM Procedures. The requirements for these samples, their acceptance criteria or instructions for establishing criteria, and corrective actions are method-specific.

Detailed laboratory QC requirements and corrective action procedures are contained within the individual laboratory quality manuals (QMs). The minimum requirements that all participants abide by are stated below.

Comparison Counting

For routine bacteriological samples, repeat counts on one or more positive samples are required, at least monthly. If possible, the analyst will compare counts with another analyst who also performs the analysis. Replicate counts by the same analyst should agree within 5 percent, and those between analysts should agree within 10 percent. The analyst(s) will record the results.

Limit of Quantitation (LOQ)

The laboratory will analyze a calibration standard (if applicable) at the LOQ published in Appendix A of this QAPP on each day calibrations are performed. In addition, an LOQ check sample will be analyzed with each analytical batch. Calibrations including the standard at the LOQ listed in Appendix A will meet the calibration requirements of the analytical method, or corrective action will be implemented.

LOQ Check Sample

An LOQ check sample consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of the measurement system at the lower limits of analysis. The LOQ check sample is spiked into the sample matrix at a level less than or equal to the LOQ published in Appendix A of this QAPP, for each analyte for each analytical batch of CRP samples run. If it is determined that samples have exceeded the high range of the calibration curve, samples should be diluted or run on another curve. For diluted or high concentration samples run on batches with calibration curves that do not include the LOQ published in Appendix A of this QAPP, a check sample will be run at the low end of the calibration curve.

The LOQ check sample is carried through the complete preparation and analytical process and is performed at a rate of one per analytical batch.

The percent recovery of the LOQ check sample is calculated using the following equation in which %R is percent recovery, S_R is the sample result, and S_A is the reference concentration for the check sample:

$$\%R = {}^{S_R}/_{S_A} \times 100$$

Measurement performance specifications are used to determine the acceptability of LOQ Check Sample analyses as specified in Appendix A of this QAPP.

Laboratory Control Sample (LCS)

An LCS consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of the measurement system. The LCS is spiked into the sample matrix at a level less than or near the midpoint of the calibration for each analyte. In cases of test methods with very long lists of analytes, LCSs are prepared with all the target analytes and not just a representative number, except in cases of organic analytes with multipeak responses.

The LCS is carried through the complete preparation and analytical process and is performed at a rate of one per preparation batch.

Results of LCSs are calculated by percent recovery (%R), which is defined as 100 times the measured concentration, divided by the true concentration of the spiked sample.

The following formula is used to calculate percent recovery, where %R is percent recovery; S_R is the measured result; and S_A is the true result:

$$\%R = {}^{S_R}/_{S_A} \times 100$$

Measurement performance specifications are used to determine the acceptability of LCS analyses as specified in Appendix A.

Laboratory Duplicates

A laboratory duplicate is an aliquot taken from the same container as an original sample under laboratory conditions and processed and analyzed independently. A laboratory duplicate is achieved by preparing 2 separate aliquots of a sample, LCS, or matrix spike. Both samples are carried through the entire preparation and analytical process. Laboratory duplicates are used to assess precision and are performed at a rate of one per preparation batch.

For most parameters except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X_1 and X_2, the RPD is calculated from the following equation:

$$RPD = \frac{|X_1 - X_2|}{\left(\frac{X_1 + X_2}{2}\right)} \times 100$$

If the precision criterion is exceeded, the data are not acceptable for use under this project and are not reported to TCEQ. Results from all samples associated with that failed duplicate (usually a maximum of 10 samples) are considered to have excessive analytical variability and are qualified as not meeting project QC requirements.

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicates are analyzed at a 10% frequency (or once per preparation batch, whichever is more frequent). Sufficient volume should be collected to analyze laboratory duplicates from the same sample container.

The base-10 logarithms of the results from the original sample and its duplicate are calculated. The absolute value of the difference between the two base-10 logarithms is calculated and compared to the precision criterion in Appendix A.

The precision criterion in Appendix A for bacteriological duplicates applies only to samples with concentrations > 10 MPN.

Matrix spike (MS) – Matrix spikes are prepared by adding a known quantity of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. Matrix-specific QC samples indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. The information from these controls is sample/matrix specific and would not normally be used to determine the validity of the entire batch. The frequency of matrix spikes is specified by the analytical method, or a minimum of one per preparation batch, whichever is greater. To the extent possible, matrix spikes prepared and analyzed over the course of the project should be performed on samples from different sites.

The components to be spiked shall be as specified by the mandated analytical method. The results from matrix spikes are primarily designed to assess the validity of analytical results in a given matrix and are expressed as percent recovery (%R).

The percent recovery of the matrix spike is calculated using the following equation, where %R is percent recovery, S_{SR} is the concentration measured in the matrix spike, S_R is the concentration in the parent sample, and S_A is the concentration of analyte that was added:

$$\%R = \frac{S_{SR} - S_R}{S_A} \times 100$$

Matrix spike recoveries are compared to the same acceptance criteria established for the associated LCS recoveries, rather than the matrix spike recoveries published in the mandated test method. The EPA 1993 methods (i.e. ammonia-nitrogen, ion chromatography, TKN) that establish matrix spike recovery acceptance

criteria are based on recoveries from drinking water that has very low interferences and variability and do not represent the matrices sampled in the CRP. If the matrix spike results are outside laboratory-established criteria, there will be a review of all other associated quality control data in that batch. If all of quality control data in the associated batch passes, it will be the decision of the laboratory QAO or GBRA Project Manager to report the data for the analyte that failed in the parent sample to TCEQ or to determine that the result from the parent sample associated with that failed matrix spike is considered to have excessive analytical variability and does not meet project QC requirements. Depending on the similarities in composition of the samples in the batch, GBRA may consider excluding all of the results in the batch related to the analyte that failed recovery.

Method blank

A method blank is a sample of matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as the samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. The method blank is used to document contamination from the analytical process. The analysis of method blanks should yield values less than the LOQ. For very high-level analyses, the blank value should be less than 5% of the lowest value of the batch, or corrective action will be implemented. Samples associated with a contaminated blank shall be evaluated as to the best corrective action for the samples (e.g. reprocessing, data qualifying codes). In all cases the corrective action must be documented.

The method blank shall be analyzed at a minimum of one per preparation batch. In those instances for which no separate preparation method is used (e.g., VOA) the batch shall be defined as environmental samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the GBRA or UGRA Project Manager, in consultation with GBRA or UGRA QAO. The GBRA Project Manager evaluates QC excursions for WVWA and MCWE as well. In that differences in sample results are used to assess the entire sampling process, including environmental variability, the arbitrary rejection of results based on pre-determined limits is not practical. Therefore, the professional judgment of the GBRA or UGRA Project Manager and QAO will be relied upon in evaluating results. Field blanks for trace elements and trace organics are scrutinized very closely.

Laboratory measurement quality control failures are evaluated by the laboratory staff. The disposition of such failures and the nature and disposition of the failure is reported to the Laboratory QAO. The Laboratory QAO will discuss the failure with the GBRA or UGRA Project Manager. If applicable, the GBRA or UGRA Project Manager or Laboratory QAO will include this information in a CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

Additionally, in accordance with CRP requirements and the TNI Standard (Volume 1, Module 2, Section 4.5, Subcontracting of Environmental Tests) when a laboratory that is a signatory of this QAPP finds it necessary and/or advantageous to subcontract analyses, the laboratory that is the signatory on this QAPP must ensure that the subcontracting laboratory is NELAP-accredited (when required) and understands and follows the QA/QC requirements included in this QAPP. This includes that the subcontracting laboratory utilize the same reporting limits as the signatory laboratory and performs all required quality control analysis outlined in this QAPP. The signatory laboratory is also responsible for quality assurance of the data prior to delivering it to GBRA or UGRA, including review of all applicable QC samples related to CRP data. As stated in section 4.5.5 of the 2016 TNI Standard, the laboratory performing the subcontracted work shall be indicated in the final report and the signatory laboratory shall make a copy of the subcontractor's report available to the client (GBRA or UGRA) when requested.

B6 Instrument/Equipment Testing, Inspection, and Maintenance

All sampling equipment testing and maintenance requirements are detailed in the SWQM Procedures. Sampling equipment is inspected and tested upon receipt and is assured appropriate for use. Equipment records are kept on all field equipment and a supply of critical spare parts is maintained.

All laboratory tools, gauges, instrument, and equipment testing and maintenance requirements are contained within laboratory QM(s).

B7 Instrument Calibration and Frequency

Field equipment calibration requirements are contained in the SWQM Procedures. Post-calibration check error limits and the disposition resulting from errors are adhered to. Data collected from field instruments that do not meet the post-calibration check error limits specified in the SWQM Procedures will not be submitted for inclusion into SWQMIS.

Detailed laboratory calibrations are contained within the QM(s).

B8 Inspection/Acceptance of Supplies and Consumables

No special requirements for acceptance are specified for field sampling supplies and consumables. Reference to the laboratory QM may be appropriate for laboratory-related supplies and consumables

B9 Acquired Data

This QAPP does not include the use of routine data acquired from external sources.
Only data collected directly under this QAPP is submitted to the SWQMIS database.

Non-directly measured data, secondary data, or acquired data involves the use of data collected under another project and collected with a different intended use than this project. The acquired data still meets the quality requirements of this project and is defined below. The following data source(s) will be used for this project:

USGS gage station data will be used throughout this project to aid in determining gage height and flow. Rigorous QA checks are completed on gage data by the USGS and the data are approved by the USGS and permanently stored at the USGS. This data will be submitted to the TCEQ under parameter code 00061 Flow, Instantaneous or parameter code 74069 Flow Estimate depending on the proximity of the monitoring station to the USGS gage station.

Reservoir stage data are collected every day from the USGS, International Boundary and Water Commission (IBWC), and the United States Army Corps of Engineers (USACE) websites. These data are preliminary and subject to revision. The Texas Water Development Board (TWDB) derives reservoir storage (in acre-feet) from these stage data (elevation in feet above mean sea level), by using the latest rating curve datasets available. These data are published at the TWDB website at http://waterdatafortexas.org/reservoirs/statewide. Information about measurement methodology can be found on the TWDB website. These data will be submitted to the TCEQ under parameter code 00052 Reservoir Stage and parameter code 00053 Reservoir Percent Full.

B10 Data Management

Data Management Process

GBRA field technicians and laboratory personnel follow protocols that ensure that the CRP database maintains

its integrity and usefulness. The field technician pre-logs the samples to be collected into the GBRA laboratory information system, which generates separate and distinct sample tracking numbers. Field data collected at the time of the sampling event is logged by the field technician, along with notes on sampling conditions on paper or electronic field data sheets. Any paper field sheets are the responsibility of the field technician and are retained by the field technician after the samples are transported and relinquished to the laboratory. The GBRA lab technician /sample custodian logs the sample in the laboratory information system database. The separate and distinct sample numbers that the field technician generated for each sample during pre-logging procedures are confirmed upon sample receipt and new numbers are assigned as needed. The sample is always accompanied by a chain of custody. The lab technician /sample custodian must review the chain of custody form to verify that it is filled out correctly and completely. Lab technicians take receipt of the sample and review the chain of custody form, begin sample prep or analysis and transfer samples into the refrigerator for storage. Field data that has been logged on paper field sheets is manually entered into the laboratory information system by the field technician, once the sample has been successfully received in the laboratory information system. Field data that has been logged on electronic field sheets is directly exported into the laboratory information system with a parsing program by the field technician, once the sample has been successfully received in the laboratory information system. An example of the field data sheet and chain of custody form used can be found in Appendices D and E. Twenty-four hour data recorded by a deployed water quality sensor is downloaded to a personal computer with applicable instrument manufacturer software and transferred to an excel spreadsheet to calculate reported minimum, maximum, and average values. The excel spreadsheet serves as the field data sheet for 24 hour data collections and any data entries into the GBRA LIMS are made from this sheet. Samples that are outsourced to other laboratories are accompanied by a copy of the chain of custody form. The GBRA CRP Data Manager or designee reviews lab bench sheets, outsourced lab data reports and field data sheets for representativeness, quality control, holding times and transcription errors.

Data generated by lab analysts and technicians are logged permanently on analysis bench sheets or generated by instruments in electronic data files. The raw data that is generated by the laboratory analyses are reviewed by the analyst/technician at the bench level, prior to entering or exporting the data into the Laboratory Information System. In the review, the analyst/technician verifies that the data includes date and time of analysis, that calculations are correct, that data includes documentation of dilutions and correction factors, that data meets data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. After this review the lab analyst/technician manually inputs or electronically exports the data and quality control information into the Laboratory Information System. A second review by another lab analyst/technician of the data entered into the LIMS and supporting documentation, validates that the data meets the data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. The GBRA field technician reviews field data prior to entering the data into the GBRA LIMS.

The GBRA Laboratory Lead Analyst supervises the GBRA laboratory. The Laboratory Lead Analyst or QAO reviews the report that is generated when all analyses are complete. If the GBRA Lab Lead Analyst or QAO feel there has been an error or finds that information is missing, the report is returned to the analyst for review and tracking to correct the error and generate a corrected copy. The GBRA Data Manager exports data from the GBRA LIMS, which converts the data to a pipe-delimited text file format acceptable for upload into SWQMIS as described in the latest DMRG. The GBRA Data Manager or designee reviews the respective laboratory and field data for reasonableness after a sample report is completed by the laboratory. If errors or anomalies are found, the GBRA Data Manager notifies the GBRA laboratory QAO and laboratory analyst/technician who created the data, so that the error can be reviewed, tracked and corrected. After the review for reasonableness, the GBRA Data Manager or designee ensures that at least 10% of the data generated by the GBRA has been reviewed at the bench level. If at any time the GBRA Data Manager or designee identifies errors, the laboratory data is corrected with and changes are tracked in the GBRA LIMS. The GBRA Data Manager is responsible for transmitting the data to TCEQ in the correct format. The GBRA LIMS creates electronic data deliverable pipe-delimited text files in the event and results file format specified in the DMRG for each sample collected in a given time period and assigns a specific sequenced tag number that pairs the event and results files. The GBRA Data Manager or designee reviews the event and results files, removes non-CRP data, confirms and corrects the submitting entity and collecting entity codes for sub-participants, checks data for correct significant figures and minimum and maximum data outliers. After the data is reviewed for completeness, minimum and maximum data outliers are accepted or rejected after being reviewed and confirmed for validity. The GBRA Data Manager uploads the text files to the SWQMIS test site to screen for data errors. If errors are found by SWQMIS test, the GBRA Data Manager corrects the errors in the events and results files and saves the list of errors as electronic pdf documents. The data files and Data Review Check List are sent to the CRP Project Manager for upload to

SWQMIS production environment. If errors are found during the TCEQ review, the GBRA Data Manager corrects those errors and the relevant files are resubmitted to the TCEQ CRP Project Manager.

Samples are taken to Ana-Lab or SATL for analyses that cannot be performed by the GBRA laboratory. Data for samples that are outsourced to the Ana-Lab or the SATL is received in paper format or electronic data deliverable imports into the GBRA LIMS. The data is reviewed by the GBRA Laboratory QAO to confirm that all quality control criteria have been met. After the report has been approved by the GBRA Laboratory QAO, the GBRA Data Manager exports the data from the GBRA LIMS for upload to SWQMIS. The GBRA Data Manager or designee reviews the data for reasonableness and if anomalies are found the Ana-Lab or the SATL is contacted to confirm data. If data is confirmed to be correct, then the data exported and transmitted to TCEQ in the same manner as other GBRA laboratory and field data.

UGRA Data Management Process

Field technicians and laboratory personnel follow protocols that ensure that the CRP database maintains its integrity and usefulness. Field data collected at the time of the sampling event is recorded by the field technician, along with notes on sampling conditions on field data sheets. The field data sheet is the responsibility of the field technician and stays in his possession when the samples are transferred to the laboratory. The sample receipt clerk logs the sample in the Lab Samples Database. Each sample is assigned a separate and distinct sample number. The sample is accompanied by a chain of custody form. The sample receipt clerk must review the chain of custody form to verify that it is filled out correctly and completely. Lab analysts take receipt of the sample, begin sample prep or analysis and transfer samples into the refrigerator for storage. The laboratory manager reviews the sample information entered into the Lab Samples Database generally within 24 hours of sample receipt. The field data is logged into the CRP database (excel database) by the field technician. Reference to this spreadsheet as the location of the field data is noted in the Lab Sample Database. Examples of the field data sheets and chains of custody used can be found in Appendices D and E. Twenty-four hour data collected by a deployed water quality sonde is downloaded to a personal computer with applicable instrument manufacturer software and transferred to an excel spreadsheet to calculate reported minimum, maximum, and average values. The UGRA field technician transfers the downloaded data to the GBRA field technician by email. The excel spreadsheet serves as the field data sheet for 24 hour data collections and associated data entries into the GBRA LIMS are made from this sheet. Samples that are outsourced to other laboratories are accompanied by a copy of the chain of custody form. The respective data managers review the lab bench sheets, outsourced lab data reports and field data sheets for representativeness, quality control, holding times and transcription errors.

Data generated by lab analysts are logged permanently on analysis bench sheets. The data are reviewed by the analyst prior to entering the data into the Lab Samples Database. In the review, the analyst verifies that the data includes date and time of analysis, that calculations are correct, that data includes documentation of dilutions and correction factors, that data meets data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. After the data is entered by the analyst, the laboratory manager validates that the data meets the data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards.

Samples are taken to the GBRA lab for analyses that cannot be performed by the UGRA laboratory. Data for samples that are outsourced to the GBRA laboratory are received by UGRA in electronic format. The data is reviewed by the UGRA Project Manager for completeness and the UGRA field technician enters the data into the CRP database (excel database). Reference to this spreadsheet as the location of the outsourced data is noted in the Lab Sample Database. Once all data has been entered into the Lab Sample Database and validated, the report is generated.

The UGRA field technician enters all lab, field, and outsourced data in to the CRP database (excel database). The UGRA Data Manager reviews the respective data for reasonableness and if errors or anomalies are found the laboratory or field staff is notified for review and tracking to correct the error. After review for reasonableness, the data is verified to the analysis bench sheets by the UGRA Data Manager. If at any time errors are identified, an amended laboratory report is created with the corrected data and the reason for the amended report is outlined in the case narrative. The Laboratory Samples Database also contains an audit trail function at the individual sample level that records before and after values, date change made, who made the change, and why

the change was made. An electronic version of all original and amended reports are retained by the lab. The UGRA Data Manager is responsible for transmitting the data to TCEQ. The UGRA Data Manager creates pipe-delimited text files for the event and results records from the CRP database for each sample and assigns a specific sequenced tag number that pairs the event and results files. After the data is reviewed for completeness, minimum and maximum data outliers are accepted or rejected after being reviewed and confirmed for validity. The UGRA Project Manager uploads the text files to the SWQMIS test site to screen for data errors. If errors are found, the errors are corrected by the UGRA Project Manager. The data files, data checklist, and SWQMIS validator report are sent to the CRP Project Manager in order to be uploaded to SWQMIS. If errors are found after the TCEQ review, those errors are corrected by the UGRA Project Manager.

WVWA and MCWE Data Management Process

WVWA and MCWE field technicians record the field data on field data sheets electronically or on paper at the time of the sampling event. The samples, along with the chain of custody form, are delivered to the GBRA Laboratory. The GBRA lab technician /sample custodian logs the sample in the GBRA LIMS. Each sample is assigned a separate and distinct sample number. The GBRA lab technician /sample custodian must review the chain of custody form to verify that it is filled out correctly and completely. GBRA lab technicians take receipt of the sample and review the chain of custody form, begin sample prep or analysis and transfer samples into the refrigerator for storage. The WVWA and MCWE Field Technician transfers a copy of the calibration/ post-calibration log and field data sheets to the GBRA Project Manager by email. Field data is logged into the GBRA LIMS by the GBRA field technician. Examples of the field data sheets and chains of custody used can be found in Appendices D and E. The GBRA Data Manager or designee reviews the lab bench sheets and field data sheets for WVWA and MCWE for representativeness, quality control, holding times and transcription errors. If errors or anomalies are found the WVWA or MCWE staff is contacted to investigate the error. Based on the information gathered, the data is invalidated, corrected or validated and if necessary, a corrective action form is initiated.

Data generated by lab analysts and technicians are logged permanently on analysis bench sheets or generated by instruments in electronic data files. The raw data that is generated by the laboratory analyses are reviewed by the analyst/technician at the bench level, prior to entering or exporting the data into the Laboratory Information System. In the review, the analyst/technician verifies that the data includes date and time of analysis, that calculations are correct, that data includes documentation of dilutions and correction factors, that data meets data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. After this review the lab analyst/technician manually inputs or electronically exports the data and quality control information into the Laboratory Information System. A second review by another lab analyst/technician of the data entered into the LIMS and supporting documentation, validates that the data meets the data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. The GBRA field technician reviews field data prior to entering the data into the GBRA LIMS.

The GBRA Laboratory Lead Analyst supervises the GBRA laboratory. The Laboratory Lead Analyst or QAO reviews the report that is generated when all analyses are complete. If the GBRA Lab Lead Analyst or QAO feel there has been an error or finds that information is missing, the report is returned to the analyst for review and tracking to correct the error and generate a corrected copy. The GBRA Data Manager exports data from the GBRA LIMS, which converts the data to a pipe-delimited text file format acceptable for upload into SWQMIS as described in the latest DMRG. The GBRA Data Manager or designee reviews the respective laboratory and field data for reasonableness after a sample report is completed by the laboratory. If errors or anomalies are found, the GBRA Data Manager notifies the GBRA laboratory QAO and laboratory analyst/technician who created the data, so that the error can be reviewed, tracked and corrected. After the review for reasonableness, the GBRA Data Manager or designee ensures that at least 10% of the data generated by the GBRA has been reviewed at the bench level. If at any time the GBRA Data Manager or designee identifies errors, the laboratory data is corrected with and changes are tracked in the GBRA LIMS. The GBRA Data Manager is responsible for transmitting the WVWA and MCWE data to TCEQ in the correct format. The GBRA LIMS creates electronic data deliverable pipe-delimited text files in the event and results file format specified in the DMRG for each sample collected in a given time period and assigns a specific sequenced tag number that pairs the event and results files. The GBRA Data Manager or designee reviews the event and results files, removes non-CRP data, confirms and corrects the submitting entity and collecting entity codes for sub-participants, checks data for correct significant figures and minimum and maximum data outliers. After the data is reviewed for completeness, minimum and maximum

data outliers are accepted or rejected after being reviewed and confirmed for validity. The GBRA Data Manager uploads the text files to the SWQMIS test site to screen for data errors. If errors are found by SWQMIS test, the GBRA Data Manager corrects the errors in the events and results files and saves the list of errors as electronic pdf documents. The data files and Data Review Check List are sent to the CRP Project Manager for upload to SWQMIS production environment. If errors are found during the TCEQ review, the GBRA Data Manager corrects those errors and the relevant files are resubmitted to the TCEQ CRP Project Manager.

Data Dictionary

Terminology and field descriptions are included in the 2019 DMRG, or most recent version.

Name of Entity	Tag Prefix	Submitting Entity	Collecting Entity
Guadalupe-Blanco River Authority	GB	GB	GB
Wimberley Valley Watershed Association	GB	GB	WV
Upper Guadalupe River Authority	UG	GB	UG
Meadows Center for Water and the Environment	GB	GB	TI

Data Errors and Loss

The GBRA Laboratory Lead Analyst supervises the GBRA laboratory and reviews the analytical report that is generated when all analyses are complete. The UGRA Laboratory Lead Analyst supervises the UGRA lab and reviews the analytical report when all data is complete. The report is reviewed to see that all necessary information is included and that the data quality objectives have been met. When the report is complete, the lab Lead Analyst signs the report. If the lab Lead Analyst or QAO feel there has been an error or finds that information is missing, the report is returned to the analyst for review and tracking to correct the error and generate a corrected copy. The GBRA/UGRA Data Manager reviews the laboratory and field data for reasonableness and if errors or anomalies are found the report is returned to the laboratory lead analyst for review and tracking to correct the error. After a review for reasonableness, the data is cross-checked by the GBRA/UGRA Data Manager to ensure that at least 10% of the data generated has been reviewed against project data quality objectives at the bench level. If at any time errors are identified, the laboratory information system databases are corrected. The GBRA/UGRA Data Manager is responsible for transmitting the data to TCEQ. If errors are found after the TCEQ review, those errors are corrected by the GBRA/UGRA Data Manager. If field or laboratory data are found to fail project QA criteria at any point during the data validation process, then the GBRA/UGRA Project Manager may choose to have the affected data resampled in order to avoid a data loss.

To minimize the potential for data loss, the databases, both lab and server files are backed up nightly and copies of the files are stored off-site weekly. If the laboratory database or network server fails, the back-up files can be accessed to restore operation or replace corrupted files.
The procedure to minimize data loss for UGRA is similar. All files are stored on the UGRA server and are backed up nightly onsite and to the cloud. If the primary server fails, the back-up files can be accessed to restore operation or replace corrupted files.

Record Keeping and Data Storage

Data is collected and recorded on field data sheets, and transferred into the GBRA laboratory information system, then the data sheets are filed for review and use later. GBRA uses electronic field sheets, but if there is an error or failure of the tablet and paper field data sheets are used, they are kept for a minimum of one month and then scanned and retained for a minimum of 5 years. Electronic field data sheets are saved as pdf files and retained for a minimum of 5 years. For UGRA, paper field data sheets are used to enter data into the CRP database (excel database) and maintained in paper format for a minimum of 1 month and electronic format for a minimum of 5 years.

The data produced during each analysis is recorded on analysis bench sheets or entered directly into the GBRA laboratory information system. The information contained in the bench sheets or LIMS electronic file includes all quality control data associated with each day's or batch's analysis. The data on paper logs are transferred to the laboratory database for report generation. If paper bench sheets are used, then they are retained in paper form for a minimum of one month and then scanned for permanent record. For UGRA, the data produced during each analysis is recorded on analysis bench sheets and then entered into the Laboratory Samples Database. The bench sheet includes all quality control data associated with each analysis. The paper bench sheets are retained in paper form for at least one month and electronic format for at least 5 years.

The data reports are generated from data that has been reviewed by the Laboratory QAO or designee and signed by the Laboratory Lead Analyst. The GBRA/UGRA Data Manager or designee reviews the CRP data generated for verification. If an anomaly or error is found, the Data Manager notifies the Laboratory QAO for review, verification and correction, if necessary. If a correction is made, a tracking log is created in the LIMS. Laboratory reports can be regenerated from the lab database at any time as needed. UGRA maintains permanent pdf files of the lab report.

The laboratory information system database is housed on the laboratory computer and is backed up on the network server nightly. The GBRA back-up copy of the network server files is made every Friday and that copy is stored off-site at a protected location. All files are stored on the UGRA server and are backed up nightly onsite and to the cloud. The network administrator is responsible for the servers and back up generation.

After data is sent to the TCEQ CRP Data Manager for review, the file that has been created is kept on the network server permanently. The network server is backed up nightly. Paper copies of the data and field duplicate sample reports are kept for a minimum of one year and then microfilmed for permanent record.

The database containing the scanned images of all lab records is contained on a network server and backed up nightly. A back-up copy of the network server files is made every Friday and that copy for GBRA is stored off-site at a protected location. The GBRA records manager is the custodian of these files. All files are stored on the UGRA server and are backed up nightly onsite and to the cloud.

Data Handling, Hardware, and Software Requirements

The laboratory database is housed on a GBRA server and backed up each evening. The laboratory database uses SQL 2012 database software. The systems are operating in Windows 10 and any additional software needed for word processing, spreadsheet or presentations uses Microsoft Office 2016.

Information Resource Management Requirements

Data will be managed in accordance with the TCEQ DMRG (most recent revision), and applicable GBRA information resource management policies.

GPS equipment may be used as a component of the information required by the Station Location (SLOC) request process for creating the certified positional data that will ultimately be entered into SWQMIS database. Positional data obtained by CRP grantees using a GPS will follow the TCEQ's OPP 8.11 policy regarding the collection and management of positional data. Positional data may be acquired with a GPS and verified with photo interpolation using a certified source, such as Google Earth or Google Maps. The verified coordinates and map interface can then be used to develop a new SLOC.

C1 Assessments and Response Actions

The following table presents the types of assessments and response actions for data collection activities applicable to the QAPP.

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements

Status Monitoring Oversight, etc.	Continuous	GBRA	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TCEQ in Quarterly Report
Monitoring Systems Audit of Basin Planning Agency	Dates to be determined by TCEQ CRP	TCEQ	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to provide corrective actions response to the TCEQ
Monitoring Systems Audit of Program Subparticipants (UGRA, WVWA, & MCWE)	Dates to be determined by GBRA (at least once per biennium)	GBRA	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the Basin GBRA. GBRA will report problems to TCEQ in Progress Report.
Laboratory Assessment	Dates to be determined by TCEQ	TCEQ Laboratory Assessor	Analytical and quality control procedures employed at the laboratory and the contract laboratory	30 days to provide corrective actions response to the TCEQ

Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, SWQM Procedures, or other applicable guidance. Deficiencies may invalidate resulting data and require corrective action. Repeated deficiencies should initiate a CAP. Corrective action for deficiencies may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff, are communicated to the GBRA Project Manager (or other appropriate staff) and should be subject to periodic review so their responses can be uniform, and their frequency tracked. It is the responsibility of the GBRA Project Manager, in consultation with the GBRA QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in quarterly progress reports and by completion of a CAP. The GBRA QAO maintains CAP's for WVWA and MCWE. UGRA maintains a similar corrective actions process for deficiencies.

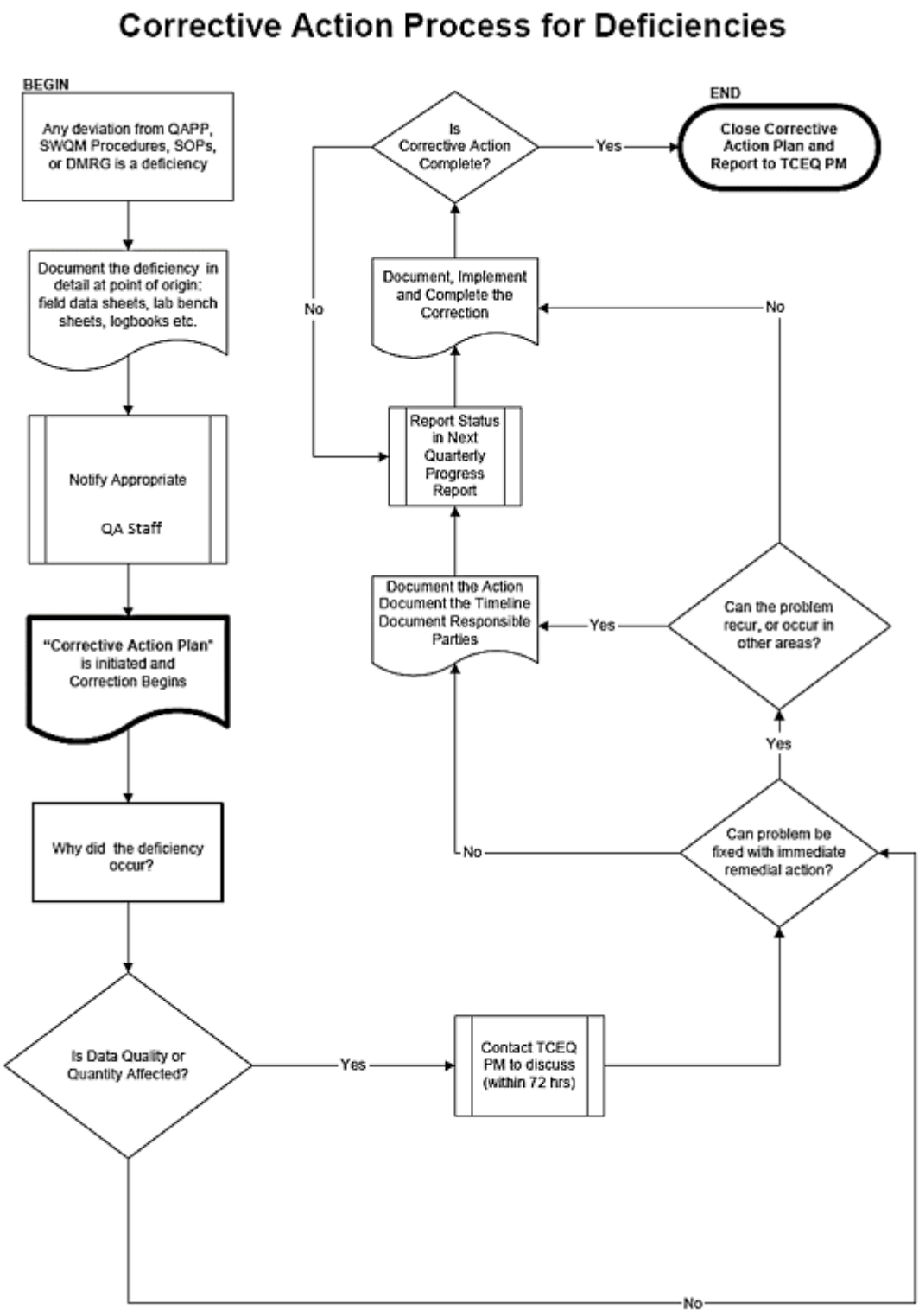
Corrective Action

CAPs should:

- Identify the problem, nonconformity, or undesirable situation
- Identify immediate remedial actions if possible
- Identify the underlying cause(s) of the problem
- Identify whether the problem is likely to recur, or occur in other areas
- Assist in determining the need for corrective action
- Employ problem-solving techniques to verify causes, determine solution, and develop an action plan
- Identify personnel responsible for action
- Establish timelines and provide a schedule
- Document the corrective action

A flow chart has been developed to facilitate the process (see figure C1.1: Corrective Action Process for Deficiencies).

Figure C1.1 Corrective Action Process for Deficiencies



The status of CAPs will be included with quarterly progress reports. In addition, significant conditions which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data will be reported to the TCEQ immediately.

The GBRA/UGRA Project Manager is responsible for ensuring that corrective actions have been implemented and tracks deficiencies and corrective actions. Records of audit findings and corrective actions are maintained by the GBRA/UGRA Project Manager. Audit reports and associated corrective action documentation will be submitted to the TCEQ with the quarterly progress reports.

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

C2 Reports to Management

Table C2.1 QA Management Reports

Type of Report	Frequency (daily, weekly, monthly, quarterly, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipients
Non-Conformance Report	**As Needed**	**As Needed**	**Field Staff Laboratory Staff**	**GBRA/UGRA QA Staff or Laboratory Management as appropriate**
GBRA/UGRA CRP Progress Reports	**Quarterly**	**December 15, 2021 March 15, 2022 June 15, 2022 September 15, 2022 December 15, 2022 March 15, 2023 June 15, 2023 August 31, 2023**	**GBRA Project Manager**	**TCEQ CRP Project Management**
Corrective Action Plans (CAPs)	**Status Updates and at time of CAP Completion**	**With Quarterly Report and as Needed**	**GBRA & UGRA QAOs**	**GBRA/UGRA Project Manager & TCEQ Project Manager**
Data Review Checklist	**Prior to Submission of Data to TCEQ**	**As Needed**	**GBRA & UGRA Data Managers**	**TCEQ Project Manager**
Monitoring Systems Audit Report and Response	**After Audit Report Received by GBRA**	**With Quarterly Report**	**GBRA/UGRA Agency QAO**	**TCEQ CRP Project Management**
WVWA Monitoring Systems Audit Response	**After Audit Report Received by WVWA**	**With Quarterly Report**	**WVWA Quality Assurance Officer**	**GBRA Project Management**
MCWE Monitoring Systems Audit Response	**After Audit Report Received by MCWE**	**With Quarterly Report**	**MCWE Quality Assurance Officer**	**GBRA Project Management**
UGRA	**After Audit**	**With Quarterly**	**UGRA CRP**	**GBRA Project**

Monitoring Systems Audit Response	**Report Received by UGRA**	**Report**	**Project Manager**	**Management**
Data Summary	**Prior to Submission of Data to TCEQ**	**As Needed**	**GBRA/UGRA Data Manager**	**TCEQ CRP Project Management**

Reports to GBRA Project Management

The GBRA Laboratory QAO will report any sample or data issue to the GBRA Project Manager. The GBRA Field Technician will report any sample or data issue associated with the field data to the GBRA Project Manager. The WVWA field technician will report any data issues to the GBRA Project Manager. The UGRA project manager submits quarterly reports of progress with known data issues and requests for expense reimbursements to the GBRA project manager. The Issues can include but are not limited to, loss of data, data anomalies or outliers, equipment failures or delays in meeting holding times. Based on the discussions, appropriate action will be taken (report data as is, resample, qualify the data, or report a loss of data). A corrective action report will be generated if any action is taken due to a failure in the quality system.

Reports to TCEQ Project Management

All reports detailed in this section are contract deliverables and are transferred to the TCEQ in accordance with contract requirements.

Progress Report

Summarizes the GBRA/UGRA's activities for each task; reports monitoring status, problems, delays, deficiencies, status of open CAPs, and documentation for completed CAPs; and outlines the status of each task's deliverables.

Monitoring Systems Audit Report and Response

Following any audit performed by the GBRA, a report of findings, recommendations and response is sent to the TCEQ in the quarterly progress report.

Data Summary

Contains basic identifying information about the data set and comments regarding inconsistencies and errors identified during data verification and validation steps or problems with data collection efforts (e.g. deficiencies).

Reports by TCEQ Project Management

Contractor Evaluation

The GBRA participates 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, Procurement and Contracts Section.

D1 Data Review, Verification, and Validation

All field and laboratory data will be reviewed and verified for integrity and continuity, reasonableness, and conformance to project requirements, and then validated against the project objectives and measurement performance specifications which are listed in Section A7 of this QAPP. Only those data which are supported by appropriate quality control data and meet the measurement performance specifications defined for this project will be considered acceptable and will be reported to the TCEQ for entry into SWQMIS.

D2 Verification and Validation Methods

All field and laboratory data will be reviewed, verified and validated to ensure they conform to project specifications.

Data review, verification, and validation will be performed using self-assessments as well as peer and management review as appropriate to the project task. The data review tasks to be performed by field and laboratory staff are listed in the first two columns of Tables D2.1-D2.4, respectively. Potential errors are identified by examination of documentation and by manual examination of corollary or unreasonable data; this analysis may be computer-assisted. If a question arises or an error is identified, the manager of the task responsible for generating the data is contacted to resolve the issue. Issues which can be corrected are corrected and documented. If an issue cannot be corrected, the task manager consults with the higher-level project management to establish the appropriate course of action, or the data associated with the issue are rejected and not reported to the TCEQ for storage in SWQMIS. Field and laboratory reviews, verifications, and validations are documented.

After the field and laboratory data are reviewed, another level of review is performed once the data are combined into a data set. This review step as specified in Tables D2.1-D2.4 is performed by the GBRA or UGRA Data Manager. Data review, verification, and validation tasks to be performed on the data set include, but are not limited to, the confirmation of laboratory and field data review, evaluation of field QC results, additional evaluation of anomalies and outliers, analysis of sampling and analytical gaps, and confirmation that all parameters and sampling sites are included in the QAPP.

The Data Review Checklist (see Appendix F) covers three main types of review: data format and structure, data quality review, and documentation review. The Data Review Checklist is transferred with the water quality data submitted to the TCEQ to ensure that the review process is being performed.

Another element of the data validation process is consideration of any findings identified during the monitoring systems audit conducted by the TCEQ CRP Lead Quality Assurance Specialist. Any issues requiring corrective action must be addressed, and the potential impact of these issues on previously collected data will be assessed. After the data are reviewed and documented, the GBRA/UGRA Project Manager validates that the data meet the data quality objectives of the project and are suitable for reporting to TCEQ.

If any requirements or specifications of the CRP are not met, based on any part of the data review, the responsible party should document the nonconforming activities and submit the information to the GBRA/UGRA Data Manager with the data in the Data Summary (See Appendix F). All failed QC checks, missing samples, missing analytes, missing parameters, and suspect results should be discussed in the Data Summary.

Table D2.1: Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	QA Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/QAO	GBRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures	GBRA Field Technician		GBRA Project Manager/QAO	GBRA Data Manager
Standards and reagents traceable	GBRA Field Technician	GBRA Laboratory Lead Analyst/ Lab QAO	GBRA Project Manager/QAO	
Chain of custody complete/acceptable	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/QAO	
NELAP Accreditation is current		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Sample preservation and handling acceptable	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Holding times not exceeded	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Collection, preparation, and analysis consistent with SOPs and QAPP	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Field documentation (e.g., biological, stream habitat) complete	GBRA Field Technician		GBRA Project Manager/QAO	GBRA Data Manager
Instrument calibration data complete	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
QC samples analyzed at required frequency	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/QAO	GBRA Data Manager
QC results meet performance and program specifications	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/QAO/Lab Lead Analyst / Lab QAO	GBRA Data Manager
Analytical sensitivity (LOQ/AWRL) consistent with QAPP	GBRA Field	GBRA Laboratory	GBRA Project	GBRA Data Manager

	Technician	Analyst/ Technician	Manager/QAO/Lab Lead Analyst / Lab QAO	
Results, calculations, transcriptions checked	GBRA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Laboratory bench-level review performed		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
All laboratory samples analyzed for all scheduled parameters		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Corollary data agree			GBRA Project Manager/QAO	GBRA Data Manager
Nonconforming activities documented	GBRA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Outliers confirmed and documented; reasonableness check performed	GBRA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Dates formatted correctly	GBRA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Depth reported correctly and in correct units	GBRA Field Technician		GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
TAG IDs correct				GBRA Data Manager
TCEQ Station ID number assigned				GBRA Data Manager
Valid parameter codes				GBRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly				GBRA Data Manager
Time based on 24-hour clock	GBRA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Check for transcription errors	GBRA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	GBRA Field Technician			GBRA Data Manager

Field instrument pre- and post-calibration check results within limits	GBRA Field Technician		GBRA Project Manager/QAO	GBRA Data Manager
10% of data manually reviewed				GBRA Data Manager

Table D2.2: UGRA Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	QA Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Project Manager/ QAO	UGRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures	UGRA Field Technician		UGRA Project Manager/ QAO	UGRA Data Manager
Standards and reagents traceable	UGRA Field Technician	UGRA Laboratory Lead Analyst/ Lab QAO	UGRA Project Manager/ QAO	
Chain of custody complete/acceptable	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Project Manager/ QAO	
NELAP Accreditation is current		UGRA Laboratory Analyst/ Technician	UGRA Lab Manager/ QAO	
Sample preservation and handling acceptable	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Lab Lead Analyst / QAO	
Holding times not exceeded	UGRA Field Technician	GBRA Laboratory Analyst/ Technician	UGRA Lab Manager/ QAO	
Collection, preparation, and analysis consistent with SOPs and QAPP	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Lab Manager/ QAO	UGRA Data Manager
Field documentation (e.g., biological, stream habitat) complete	UGRA Field Technician		UGRA Project Manager/ QAO	UGRA Data Manager
Instrument calibration data complete	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	Lab Lead Analyst / QAO	UGRA Data Manager

QC samples analyzed at required frequency	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Project Manager/ QAO	UGRA Data Manager
QC results meet performance and program specifications	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Project Manager/ QAO/Lab Lead Analyst / Lab QAO	UGRA Data Manager
Analytical sensitivity (LOQ/AWRL) consistent with QAPP	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	GBRA Project Manager/ QAO/Lab Lead Analyst / QAO	UGRA Data Manager
Results, calculations, transcriptions checked	UGRA Field Technician	UGRA Laboratory Analyst/ Technician	UGRA Lab Manager/ QAO	UGRA Data Manager
Laboratory bench-level review performed		UGRA Laboratory Analyst/ Technician	UGRA Lab Manager/ QAO	UGRA Data Manager
All laboratory samples analyzed for all scheduled parameters		UGRA Laboratory Analyst/ Technician	UGRA Lab Director/ QAO	UGRA Data Manager
Corollary data agree			UGRA Project Manager/ QAO	UGRA Data Manager
Nonconforming activities documented	UGRA Field Technician	UGRA Laboratory Analyst/ Technician		UGRA Data Manager
Outliers confirmed and documented; reasonableness check performed	UGRA Field Technician	UGRA Laboratory Analyst/ Technician		UGRA Data Manager
Dates formatted correctly	UGRA Field Technician	UGRA Laboratory Analyst/ Technician		UGRA Data Manager
Depth reported correctly and in correct units	UGRA Field Technician		UGRA Lab Manager/ QAO	UGRA Data Manager
TAG IDs correct				UGRA Data Manager
TCEQ Station ID number assigned				UGRA Data Manager
Valid parameter codes				UGRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and				UGRA Data

monitoring type(s) used correctly				Manager
Time based on 24-hour clock	UGRA Field Technician	UGRA Laboratory Analyst/ Technician		UGRA Data Manager
Check for transcription errors	UGRA Field Technician	UGRA Laboratory Analyst/ Technician		UGRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	UGRA Field Technician			UGRA Data Manager
Field instrument pre- and post-calibration check results within limits	UGRA Field Technician		UGRA Project Manager/ QAO	UGRA Data Manager
10% of data manually reviewed				UGRA Data Manager

Table D2.3: WVWA Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	QA Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ WVWA QAO	GBRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures	WVWA Field Technician		GBRA Project Manager/ WVWA QAO	GBRA Data Manager
Standards and reagents traceable	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ WVWA QAO	
Chain of custody complete/acceptable	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst /Lab QAO	
NELAP Accreditation is current		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Sample preservation and handling acceptable	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Holding times not exceeded	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	UGRA Lab Director/ Lab QAO	
Collection, preparation, and analysis consistent with SOPs and QAPP	WVWA Field	GBRA Laboratory	GBRA Lab Lead	GBRA Data Manager

	Technician	Analyst/ Technician	Analyst / Lab QAO	
Field documentation (e.g., biological, stream habitat) complete	WVWA Field Technician		GBRA Project Manager/ WVWA QAO	GBRA Data Manager
Instrument calibration data complete	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
QC samples analyzed at required frequency	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ WVWA QAO	GBRA Data Manager
QC results meet performance and program specifications	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ WVWA QAO/Lab Lead Analyst/ Lab QAO	GBRA Data Manager
Analytical sensitivity (LOQ/AWRL) consistent with QAPP	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ WVWA QAO/Lab Lead Analyst / QAO	GBRA Data Manager
Results, calculations, transcriptions checked	WVWA Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Laboratory bench-level review performed		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
All laboratory samples analyzed for all scheduled parameters		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Corollary data agree			GBRA Project Manager/ WVWA QAO	GBRA Data Manager
Nonconforming activities documented	WVWA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Outliers confirmed and documented; reasonableness check performed	WVWA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager

Dates formatted correctly	WVWA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Depth reported correctly and in correct units	WVWA Field Technician		GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
TAG IDs correct				GBRA Data Manager
TCEQ Station ID number assigned				GBRA Data Manager
Valid parameter codes				GBRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly				GBRA Data Manager
Time based on 24-hour clock	WVWA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Check for transcription errors	WVWA Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	WVWA Field Technician			GBRA Data Manager
Field instrument pre- and post-calibration check results within limits	WVWA Field Technician		GBRA Project Manager/ WVWA QAO	GBRA Data Manager
10% of data manually reviewed				GBRA Data Manager

Table D2.4: MCWE Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	QA Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ MCWE QAO	GBRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures	MCWE Field Technician		GBRA Project Manager/ MCWE QAO	GBRA Data Manager
Standards and reagents traceable	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ MCWE QAO	
Chain of custody complete/acceptable	MCWE Field	GBRA Laboratory	GBRA Lab Lead	

	Technician	Analyst/ Technician	Analyst /Lab QAO	
NELAP Accreditation is current		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Sample preservation and handling acceptable	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	
Holding times not exceeded	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	UGRA Lab Director/ Lab QAO	
Collection, preparation, and analysis consistent with SOPs and QAPP	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Field documentation (e.g., biological, stream habitat) complete	MCWE Field Technician		GBRA Project Manager/ MCWE QAO	GBRA Data Manager
Instrument calibration data complete	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
QC samples analyzed at required frequency	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ MCWE QAO	GBRA Data Manager
QC results meet performance and program specifications	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ MCWE QAO/Lab Lead Analyst / Lab QAO	GBRA Data Manager
Analytical sensitivity (LOQ/AWRL) consistent with QAPP	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Project Manager/ MCWE QAO/Lab Lead Analyst / QAO	GBRA Data Manager
Results, calculations, transcriptions checked	MCWE Field Technician	GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
Laboratory bench-level review performed		GBRA Laboratory Analyst/ Technician	GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
All laboratory samples analyzed for all scheduled		GBRA	GBRA	GBRA Data

parameters		Laboratory Analyst/ Technician	Lab Lead Analyst / Lab QAO	Manager
Corollary data agree			GBRA Project Manager/ MCWE QAO	GBRA Data Manager
Nonconforming activities documented	MCWE Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Outliers confirmed and documented; reasonableness check performed	MCWE Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Dates formatted correctly	MCWE Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Depth reported correctly and in correct units	MCWE Field Technician		GBRA Lab Lead Analyst / Lab QAO	GBRA Data Manager
TAG IDs correct				GBRA Data Manager
TCEQ Station ID number assigned				GBRA Data Manager
Valid parameter codes				GBRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly				GBRA Data Manager
Time based on 24-hour clock	MCWE Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Check for transcription errors	MCWE Field Technician	GBRA Laboratory Analyst/ Technician		GBRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	MCWE Field Technician			GBRA Data Manager
Field instrument pre- and post-calibration check results within limits	MCWE Field Technician		GBRA Project Manager/ MCWE QAO	GBRA Data Manager
10% of data manually reviewed				GBRA Data Manager

D3 Reconciliation with User Requirements

Data produced in this project, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data which do not meet requirements will not be submitted to SWQMIS nor will be considered appropriate for any of the uses noted in Section A5.

Appendix A: Measurement Performance Specifications (Table A7.1-3)

TABLE A7.1a Measurement Performance Specifications for GBRA					
Field Parameters					
Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	10	GBRA Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	78	GBRA Field
SPECIFIC CONDUCTANCE, FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	94	GBRA Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	300	GBRA Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	400	GBRA Field
SALINITY - PARTS PER THOUSAND	PPT	water	SM 2520 and TCEQ SOP V1	480	GBRA Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	GBRA Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	GBRA Field
RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL)***	FT ABOVE MSL	water	TWDB	52	GBRA Field
RESERVOIR PERCENT FULL***	% RESERVOIR CAPACITY	water	TWDB	53	GBRA Field
RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW ENTER 1 IF REPORTING	NS	other	TCEQ Drought Guidance	51	GBRA Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)**	meters	other	TCEQ SOP V2	89864	GBRA Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)**	meters	other	TCEQ SOP V2	89865	GBRA Field
POOL LENGTH, METERS**	meters	other	TCEQ SOP V2	89869	GBRA Field
% POOL COVERAGE IN 500 METER REACH**	%	other	TCEQ SOP V2	89870	GBRA Field

* Reporting to be consistent with SWQM guidance and based on measurement capability.
** To be routinely reported when collecting data from perennial pools.
*** As published by the Texas Water Development Board on their website
https://www.waterdatafortexas.org/reservoirs/statewide
****Salinity only collected at tidally influenced stations
References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1b Measurement Performance Specifications for GBRA

Flow Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	61	GBRA Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	1351	GBRA Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP V1	74069	GBRA Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	GBRA Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1c Measurement Performance Specifications for GBRA

Conventional Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD)	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	530	5	1**	NA	NA	NA	GBRA, Ana-Lab, SATL***
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	610	0.1	0.1	70-130	20	80-120	GBRA and Ana-Lab^
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	620	0.05	0.05	70-130	20	80-120	GBRA, Ana-Lab, SATL***
NITRITE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	615	0.05	0.05	70-130	20	80-120	GBRA^
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2 (1993)	625	0.2	0.2	70-130	20	80-120	GBRA and Ana-Lab^
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	665	0.06	0.02	70-130	20	80-120	GBRA and Ana-Lab***
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	665	0.06	0.05	70-130	20	80-120	SATL***
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	SM4500-PE	665	0.06	0.05	70-130	20	80-120	SATL***

HARDNESS, TOTAL (MG/L AS CACO3)*	mg/L	water	SM 2340 C	900	5	5	NA	20	80-120	GBRA, Ana-Lab^
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00940	5	1	70-130	20	80-120	GBRA, Ana-Lab, SATL***
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	945	5	1	70-130	20	80-120	GBRA, Ana-Lab, SATL***
CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	ug/L	water	SM 10200-H4	32211	3	1	NA	20	80-120	GBRA^
CHLOROPHYLL-A, FLUOROMETRIC METHOD, UG/L	µg/L	water	EPA 445.0	70953	3	1	NA	20	80-120	Ana-Lab^
PHEOPHYTIN-A UG/L SPECTROPHOTOMETRIC ACID. METH.	µg/L	water	SM 10200-H4	32218	3	1	NA	NA	NA	GBRA^
PHEOPHYTIN-A UG/L FLUOROMETRIC METHOD	µg/L	water	EPA 445	32213	3	1	NA	NA	NA	Ana-Lab^
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	NTU	water	SM 2130B	82079	0.5	0.5	NA	NA	NA	GBRA and Ana-Lab^

*Hardness is not used for regulatory purposes but is used to assess metals in water at inland sites (estuarine sites do not require hardness analysis).
**TSS LOQ is based on the volume of sample used.
***Ana-Lab or SATL will be used in the event of an equipment failure and the need to meet holding times.
^Ana-Lab will be used in the event of an equipment failure and the need to meet holding times.
References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1d Measurement Performance Specifications for GBRA

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Log Difference of Duplicates	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	MPN/100 mL	water	SM 9223-IDEXX**	31699	1	1	NA	0.50*	GBRA, Ana-Lab^
E.COLI, COLILERT, IDEXX, HOLDING TIME	hours	hours	water	NA	31704	NA	NA	NA	NA	GBRA, Ana-Lab^

* This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.
** E. coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
***Ana-Lab or SATL Laboratories will be used in the event of an equipment failure and the need to meet holding times.
^Ana-Lab will be used in the event of an equipment failure and the need to meet holding times.
References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1e Measurement Performance Specifications for GBRA

24 Hour Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE), 24HR AVG	DEG C	Water	TCEQ SOP V1	00209	GBRA field
WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	DEG C	Water	TCEQ SOP V1	00210	GBRA field
TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	DEG C	Water	TCEQ SOP V1	00211	GBRA field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR AVG	uS/cm	Water	TCEQ SOP V1	00212	GBRA field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MAX	uS/cm	Water	TCEQ SOP V1	00213	GBRA field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MIN	uS/cm	Water	TCEQ SOP V1	00214	GBRA field
PH, S.U., 24HR MAXIMUM VALUE	std. units	Water	TCEQ SOP V1	00215	GBRA field
PH, S.U., 24HR, MINIMUM VALUE	std. units	Water	TCEQ SOP V1	00216	GBRA field
SALINITY, 24-HR, MAXIMUM, PPT	ppt	Water	TCEQ SOP V1	00217	GBRA field
SALINITY, 24-HR, AVERAGE, PPT	ppt	Water	TCEQ SOP V1	00218	GBRA field
SALINITY, 24-HR, MINIMUM, PPT	ppt	Water	TCEQ SOP V1	00219	GBRA field
SALINITY, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00220	GBRA field
WATER TEMPERATURE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00221	GBRA field

SPECIFIC CONDUCTANCE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00222	GBRA field
pH, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00223	GBRA field
DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89855	GBRA field
DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89856	GBRA field
DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89857	GBRA field
DISSOLVED OXYGEN, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	89858	GBRA field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1f Measurement Performance Specifications for GBRA

Biological - Habitat

Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	Water	TCEQ SOP V2	00061	GBRA
BIOLOGICAL DATA	NS	Other	NA/Calculation	89888	GBRA
STREAM TYPE; 1=PERENNIAL 2=INTERMITTENT S/PERENNIAL POOLS 3=INTERMITTENT 4=UNKNOWN	NU	Water	NA/Calculation	89821	GBRA
STREAMBED SLOPE (M/KM)	M/KM	Other	NA/Calculation	72051	GBRA
AVERAGE PERCENTAGE INSTREAM COVER	%	Other	TCEQ SOP V2	84159	GBRA
STREAM ORDER	NU	Water	TCEQ SOP V2	84161	GBRA
NUMBER OF LATERAL TRANSECTS MADE	NU	Other	TCEQ SOP V2	89832	GBRA
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	Other	TCEQ SOP V2	89835	GBRA
TOTAL NUMBER OF STREAM BENDS	NU	Other	TCEQ SOP V2	89839	GBRA

NUMBER OF WELL DEFINED STREAM BENDS	NU	Other	TCEQ SOP V2	89840	GBRA
NUMBER OF MODERATELY DEFINED STREAM BENDS	NU	Other	TCEQ SOP V2	89841	GBRA
NUMBER OF POORLY DEFINED STREAM BENDS	NU	Other	TCEQ SOP V2	89842	GBRA
TOTAL NUMBER OF RIFFLES	NU	Other	TCEQ SOP V2	89843	GBRA
DOMINANT SUBSTRATE TYPE(1=CLAY,2=SILT,3=SAND,4=GRAVEL,5=COBBLE,6=BOULDER,7=BEDROCK,8=OTHER)	NU	Sediment	TCEQ SOP V2	89844	GBRA
AVERAGE PERCENT OF SUBSTRATE GRAVEL SIZE OR LARGER	%	Other	TCEQ SOP V2	89845	GBRA
AVERAGE STREAM BANK EROSION (%)	%	Other	TCEQ SOP V2	89846	GBRA
AVERAGE STREAM BANK SLOPE (DEGREES)	deg	Other	TCEQ SOP V2	89847	GBRA
HABITAT FLOW STATUS, 1=NO FLOW, 2=LOW,3=MOD,4=HIGH	NU	Other	TCEQ SOP V2	89848	GBRA
AVERAGE PERCENT TREES AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89849	GBRA
AVERAGE PERCENT SHRUBS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89850	GBRA
AVERAGE PERCENT GRASS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89851	GBRA
AVERAGE PERCENT CULTIVATED FIELDS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89852	GBRA
AVERAGE PERCENT OTHER AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89853	GBRA
AVERAGE PERCENTAGE OF TREE CANOPY COVERAGE	%	Other	TCEQ SOP V2	89854	GBRA
DRAINAGE AREA ABOVE MOST DOWNSTREAM TRANSECT*	km2	Other	TCEQ SOP V2	89859	GBRA
REACH LENGTH OF STREAM EVALUATED (M)	m	Other	NA/Calculation	89884	GBRA
AVERAGE STREAM WIDTH (METERS)	M	Other	TCEQ SOP V2	89861	GBRA
AVERAGE STREAM DEPTH (METERS)	M	Other	TCEQ SOP V2	89862	GBRA
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)	M	Other	TCEQ SOP V2	89864	GBRA
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)	M	Other	TCEQ SOP V2	89865	GBRA
AVERAGE WIDTH OF NATURAL RIPARIAN VEGETATION (M)	M	Other	TCEQ SOP V2	89866	GBRA
AVERAGE WIDTH OF NATURAL RIPARIAN BUFFER ON LEFT BANK (M)	M	Other	NA/Calculation	89872	GBRA
AVERAGE WIDTH OF NATURAL RIPARIAN BUFFER ON RIGHT BANK (M)	m	Other	NA/Calculation	89873	GBRA

AESTHETICS OF REACH(1=WILD 2=NAT. 3=COMM. 4=OFF.)	NU	Other	TCEQ SOP V2	89867	GBRA
NUMBER OF STREAM COVER TYPES	NU	Other	TCEQ SOP V2	89929	GBRA
LAND DEVELOP IMPACT (1=UNIMP,2=LOW,3=MOD,4=HIGH)	NU	Other	TCEQ SOP V2	89962	GBRA
RIPARIAN VEGETATION %; LEFT BANK - TREES	%	Other	NA/Calculation	89822	GBRA
RIPARIAN VEGETATION %; RIGHT BANK - TREES	%	Other	NA/Calculation	89823	GBRA
RIPARIAN VEGETATION %; LEFT BANK SHRUBS	%	Other	NA/Calculation	89824	GBRA
RIPARIAN VEGETATION %; RIGHT BANK - SHRUBS	%	Other	NA/Calculation	89825	GBRA
RIPARIAN VEGETATION %: LEFT BANK - GRASSES OR FORBS	%	Other	NA/Calculation	89826	GBRA
RIPARIAN VEGETATION %; RIGHT BANK - GRASSES OR FORBS	%	Other	NA/Calculation	89827	GBRA
RIPARIAN VEGETATION %: LEFT BANK - CULTIVATED FIELDS	%	Other	NA/Calculation	89828	GBRA
RIPARIAN VEGETATION %: RIGHT BANK - CULTIVATED FIELDS	%	Other	NA/Calculation	89829	GBRA
RIPARIAN VEGETATION %: LEFT BANK - OTHER	%	Other	NA/Calculation	89830	GBRA
RIPARIAN VEGETATION %: RIGHT BANK - OTHER	%	Other	NA/Calculation	89871	GBRA
AVAILABLE INSTREAM COVER HQI SCORE: 4=ABUNDANT 3=COMMON 2=RARE 1=ABSENT	NU	Other	NA/Calculation	89874	GBRA
BOTTOM SUBSTRATE STABILITY HQI SCORE: 4=STABLE 3=MODERATELY STABLE 2=MODERATELY UNSTABLE 1=UNSTABLE	NU	Other	NA/Calculation	89875	GBRA
NUMBER OF RIFFLES HQI SCORE: 4=ABUNDANT 3=COMMON 2=RARE 1=ABSENT	NS	Other	NA/Calculation	89876	GBRA
DIMENSIONS OF LARGEST POOL HQI SCORE: 4=LARGE 3=MODERATE 2=SMALL 1=ABSENT	NU	Other	NA/Calculation	89877	GBRA
CHANNEL FLOW STATUS HQI SCORE: 3=HIGH 2=MODERATE 1=LOW 0=NO FLOW	NU	Other	NA/Calculation	89878	GBRA
BANK STABILITY HQI SCORE: 3=STABLE 2=MODERATELY STABLE 1=MODERATELY UNSTABLE 0=UNSTABLE	NU	Other	NA/Calculation	89879	GBRA
CHANNEL SINUOSITY HQI SCORE: 3=HIGH 2=MODERATE 1=LOW 0=NONE	NU	Other	NA/Calculation	89880	GBRA
RIPARIAN BUFFER VEGETATION HQI SCORE: 3=EXTENSIVE 2=WIDE 1=MODERATE 0=NARROW	NU	Other	NA/Calculation	89881	GBRA

AESTHETICS OF REACH HQI SCORE: 3=WILDERNESS 2=NATURAL AREA 1=COMMON SETTING 0=OFFENSIVE	NU	Other	NA/Calculation	89882	GBRA
HQI TOTAL SCORE	NU	Other	NA/Calculation	89883	GBRA
LENGTH OF STREAM EVALUATED (KM)	KM	Other	NA/Calculation	89860	GBRA
STREAMBED SLOPE (FT/FT)	FT/FT	Other	NA/Calculation	72052	GBRA
NO FLOW ISOLATED POOL: LARGEST POOL MAX WIDTH (M	M	Other	NA/Calculation	89908	GBRA
NO FLOW ISOLATED POOL: LARGEST POOL MAX LENGTH (	M	Other	NA/Calculation	89909	GBRA
NO FLOW ISOLATED POOL: LARGEST POOL MAX DEPTH (M	M	Other	NA/Calculation	89910	GBRA
NO FLOW ISOLATED POOL: SMALLEST POOL MAX DEPTH (	M	Other	NA/Calculation	89911	GBRA
NO FLOW ISOLATED POOL: SMALLEST POOL MAX WIDTH (	M	Other	NA/Calculation	89912	GBRA
NO FLOW ISOLATED POOL: SMALLEST POOL MAX LENGTH	M	Other	NA/Calculation	89913	GBRA
NO FLOW ISOLATED POOLS: NUMBER OF POOLS EVALUATED	NU	Other	NA/Calculation	89914	GBRA

* From USGS map.References:United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1g Measurement Performance Specifications for GBRA

Biological - Benthics (Qualitative)

Parameter	Units	Matrix	Method	Parameter Code	Lab
STREAM ORDER	NU	Water	TCEQ SOP, V1	84161	GBRA
BIOLOGICAL DATA	NS	Other	NA/Calculation	89888	GBRA
RAPID BIOASSESSMENT PROTOCOLS BENTHIC MACROINVERTEBRATE IBI SCORE	NS	Other	NA/Calculation	90081	GBRA
BENTHIC DATA REPORTING UNITS (1=NUMBER OF INDIVIDUALS IN SUB-SAMPLE, 2=NUMBER OF INDIVIDUALS/FT2, 3=NUMBER OF INDIVIDUALS/M2, 4=TOTAL NUMBER OF INDIVIDUALS IN SAMPLE)	NU	Other	TCEQ SOP V2	89899	GBRA
DIP NET EFFORT,AREA SWEPT (SQ.METER)	m2	Other	TCEQ SOP V2	89902	GBRA

KICKNET EFFORT,AREA KICKED (SQ.METER)	m2	Other	TCEQ SOP V2	89903	GBRA
KICKNET EFFORT,MINUTES KICKED (MIN.)	min.	Other	TCEQ SOP V2	89904	GBRA
DEBRIS/SHORELINE SAMPLING EFFORT, MINUTES	min.	Other	TCEQ SOP V2	89905	GBRA
NUMBER OF INDIVIDUALS IN BENTHIC SAMPLE	NU	Other	TCEQ SOP V2	89906	GBRA
UNDERCUT BANK AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89921	GBRA
OVERHANGING BRUSH AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89922	GBRA
GRAVEL BOTTOM AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89923	GBRA
SAND BOTTOM AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89924	GBRA
SOFT BOTTOM AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89925	GBRA
MACROPHYTE BED AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89926	GBRA
SNAGS AND BRUSH AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89927	GBRA
BEDROCK STREAMBED AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89928	GBRA
PETERSEN SAMPLER EFFORT, AREA SAMPLED (SQ. MTR.)	m2	Other	TCEQ SOP V2	89934	GBRA
EKMAN SAMPLER EFFORT, AREA SAMPLED (SQ.METER)	m2	Other	TCEQ SOP V2	89935	GBRA
MESH SIZE, ANY NET OR SIEVE, AVERAGE BAR (CM)	cm	Other	TCEQ SOP V2	89946	GBRA
BENTHIC SAMPLE COLLECTION METHOD (1=SURBER, 2=EKMAN, 3=KICKNET, 4=PETERSON, 5=HESTER DENDY, 6=SNAG, 7=HESS)	NU	Other	TCEQ SOP V2	89950	GBRA
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP V1	89961	GBRA
BENTHOS ORGANISMS -NONE PRESENT (0=NONE PRESENT)	NS	Other	TCEQ SOP V2	90005	GBRA
HILSENHOFF BIOTIC INDEX (HBI)	NU	Other	TCEQ SOP V2	90007	GBRA
NUMBER OF EPT INDEX	NU	Other	TCEQ SOP V2	90008	GBRA
DOMINANT BENTHIC FUNCTIONAL FEEDING GRP, % OF INDIVIDUALS	%	Other	TCEQ SOP V2	90010	GBRA
BENTHIC GATHERERS, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90025	GBRA
BENTHIC PREDATORS, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90036	GBRA
DOMINANT TAXON, BENTHOS PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90042	GBRA

RATIO OF INTOLERANT TO TOLERANT TAXA, BENTHOS	NU	Other	TCEQ SOP V2	90050	GBRA
NUMBER OF NON-INSECT TAXA	NU	Other	TCEQ SOP V2	90052	GBRA
ELMIDAE, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90054	GBRA
TOTAL TAXA RICHNESS, BENTHOS	NU	Other	TCEQ SOP V2	90055	GBRA
CHIRONOMIDAE, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90062	GBRA
PERCENT OF TOTAL TRICHOPTERA INDIVIDUALS AS HYDROPSYCHIDAE	%	Other	TCEQ SOP V2	90069	GBRA
TOTAL # OF BENTHIC GENERA IN SAMPLE	NU	Other	TCEQ SOP V3	90011	GBRA
BENTHIC SHREDDERS (% OF COMMUNITY)	%	Other	TCEQ SOP V2	90035	GBRA
TOTAL # OF FAMILIES IN BENTHIC SAMPLE	NU	Other	TCEQ SOP V2	90012	GBRA
HESS SAMPLER EFFORT, AREA SAMPLED (SQ. METER)	m2	Other	TCEQ SOP V2	89956	GBRA

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.1h Measurement Performance Specifications for GBRA

Biological - Nekton

Parameter	Units	Matrix	Method	Parameter Code	Lab
STREAM ORDER	NU	Water	TCEQ SOP V1	84161	GBRA
NEKTON TEXAS REGIONAL IBI SCORE	NS	Other	NA/Calculation	98123	GBRA
BIOLOGICAL DATA	NS	Other	NA/Calculation	89888	GBRA
SEINE, MINIMUM MESH SIZE, AVERAGE BAR, NEKTON,IN	IN	Other	TCEQ SOP V2	89930	GBRA

SEINE, MAXIMUM MESH SIZE, AVG BAR, NEKTON,INCH	IN	Other	TCEQ SOP V2	89931	GBRA
NET LENGTH (METERS)	M	Other	TCEQ SOP V2	89941	GBRA
ELECTROFISHING METHOD 1=BOAT 2=BACKPACK 3=TOTEBARGE	NU	Other	TCEQ SOP V2	89943	GBRA
ELECTROFISH EFFORT, DURATION OF SHOCKING (SEC)	SEC	Other	TCEQ SOP V2	89944	GBRA
SEINING EFFORT (# OF SEINE HAULS)	NU	Other	TCEQ SOP V2	89947	GBRA
COMBINED LENGTH OF SEINE HAULS (METERS)	M	Other	TCEQ SOP V2	89948	GBRA
SEINING EFFORT, DURATION (MINUTES)	MIN	Other	TCEQ SOP V2	89949	GBRA
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP V1	89961	GBRA
AREA SEINED (SQ METERS)	M2	Other	TCEQ SOP V2	89976	GBRA
NUMBER OF SPECIES, FISH	NU	Other	TCEQ SOP V2	98003	GBRA
NEKTON ORGANISMS-NONE PRESENT (0=NONE PRESENT)	NS	Other	TCEQ SOP V2	98005	GBRA
TOTAL NUMBER OF SUNFISH SPECIES	NU	Other	TCEQ SOP V2	98008	GBRA
TOTAL NUMBER OF INTOLERANT SPECIES, FISH	NU	Other	TCEQ SOP V2	98010	GBRA
PERCENT OF INDIVIDUALS AS OMNIVORES, FISH	%	Other	TCEQ SOP V2	98017	GBRA
PERCENT OF INDIVIDUALS AS INVERTIVORES, FISH	%	Other	TCEQ SOP V2	98021	GBRA
PERCENT OF INDIVIDUALS AS PISCIVORES, FISH	%	Other	TCEQ SOP V2	98022	GBRA
PERCENT OF INDIVIDUALS WITH DISEASE OR ANOMALY	%	Other	TCEQ SOP V2	98030	GBRA
TOTAL NUMBER OF NATIVE CYPRINID SPECIES	NU	Other	TCEQ SOP V2	98032	GBRA
PERCENT INDIVIDUALS AS NON-NATIVE FISH SPECIES (% OF COMMUNITY)	%	Other	TCEQ SOP V2	98033	GBRA
TOTAL NUMBER OF INDIVIDUALS SEINING	NU	Other	TCEQ SOP V2	98039	GBRA
TOTAL NUMBER OF INDIVIDUALS ELECTROFISHING	NU	Other	TCEQ SOP V2	98040	GBRA
TOTAL NUMBER OF BENTHIC INVERTIVORE SPECIES	NU	Other	TCEQ SOP V2	98052	GBRA
TOTAL NUMBER OF BENTHIC FISH SPECIES	NU	Other	TCEQ SOP V2	98053	GBRA
NUMBER OF INDIVIDUALS PER SEINE HAUL	NU	Other	TCEQ SOP V2	98062	GBRA
NUMBER OF INDIVIDUALS PER MINUTE ELECTROFISHING	NU	Other	TCEQ SOP V2	98069	GBRA

PERCENT INDIVIDUALS AS TOLERANT FISH SPECIES (EXCLUDING WESTERN MOSQUITOFISH)	%	Other	TCEQ SOP V2	98070	GBRA
TOTAL NUMBER OF SUCKER SPECIES	NU	Other	TCEQ SOP V2	98009	GBRA
PERCENT OF INDIVIDUALS AS HYBRIDS	%	Other	TCEQ SOP V2	98024	GBRA
TOTAL NUMBER OF INDIVIDUALS IN SAMPLE, FISH	NU	Other	TCEQ SOP V2	98023	GBRA
PERCENT OF INDIVIDUALS AS TOLERANTS, FISH	%	Other	TCEQ SOP V2	98016	GBRA
TOTAL NUMBER OF DARTER SPECIES	NU	Other	TCEQ SOP V2	98004	GBRA

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.2a Measurement Performance Specifications for UGRA

Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	UGRA Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	UGRA Field
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	UGRA Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	UGRA Field
PH (STANDARD UNITS)	s.u.	water	EPA 150.1 and TCEQ SOP V1	00400	UGRA Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	UGRA Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	UGRA Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)**	meters	other	TCEQ SOP V2	89864	UGRA Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)**	meters	other	TCEQ SOP V2	89865	UGRA Field

POOL LENGTH, METERS**	meters	other	TCEQ SOP V2	89869	UGRA Field
% POOL COVERAGE IN 500 METER REACH**	%	other	TCEQ SOP V2	89870	UGRA Field

* Reporting to be consistent with SWQM guidance and based on measurement capability.
** To be routinely reported when collecting data from perennial pools.
*** As published by the Texas Water Development Board on their website https://www.waterdatafortexas.org/reservoirs/statewide
**** Chlorine residual to be collected downstream of chlorinated outfalls

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.2b Measurement Performance Specifications for UGRA

Flow Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	UGRA Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	UGRA Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP V1	74069	UGRA Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	UGRA Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
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TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.2c Measurement Performance Specifications for UGRA

Conventional Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD)	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	530	5	1**	NA	NA	NA	UGRA, GBRA, and Ana-Lab, and SATL***
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	Mg/L	Water	SM 4500-NH3 D	610	0.1	0.1	70-130	20	80-120	UGRA***
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	610	0.1	0.1	70-130	20	80-120	GBRA and Ana-Lab^
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	620	0.05	0.04	70-130	20	80-120	UGRA***
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	620	0.05	0.05	70-130	20	80-120	GBRA, Ana-Lab, SATL***
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2 (1993)	625	0.2	0.2	70-130	20	80-120	GBRA and Ana-Lab^
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	SM 4500-P E.	665	0.06	0.05	70-130	20	80-120	UGRA***
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	665	0.06	0.02	70-130	20	80-120	GBRA, Ana-Lab, SATL***
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	SM4500-PE	00665	0.06	0.05	70-130	20	80-120	SATL***
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	940	5	0.2	70-130	20	80-120	UGRA***
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	940	5	1	70-130	20	80-120	GBRA, Ana-Lab, SATL***
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	945	5	0.2	70-130	20	80-120	UGRA***
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	945	5	1	70-130	20	80-120	GBRA, Ana-Lab, SATL***
CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	ug/L	water	SM 10200-H4	32211	3	1	NA	20	80-120	GBRA^
CHLOROPHYLL-A, FLUOROMETRIC METHOD, UG/L	µg/L	water	EPA 445.0	70953	3	1	NA	20	80-120	Ana-Lab^

PHEOPHYTIN-A UG/L SPECTROPHOTOMETRIC ACID. METH.	µg/L	water	SM 10200-H4	32218	3	1	NA	NA	NA	GBRA^
PHEOPHYTIN-A UG/L FLUOROMETRIC METHOD	µg/L	Water	EPA 445	32213	3	1	NA	NA	NA	Ana-Lab^
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	NTU	water	SM 2130B	82079	0.5	0.5	NA	NA	NA	UGRA, GBRA, Ana-Lab^

**TSS LOQ is based on the volume of sample used.
***GBRA, Ana-Lab, or SATL will be used in the event of an equipment failure and the need to meet holding times.^GBRA or Ana-Lab will be used in the event of an equipment failure and the need to meet holding times. References:United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.2d Measurement Performance Specifications for UGRA

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Log Difference of Duplicates	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	SM 9223-B**	31699	1	1	NA	0.50*	NA	UGRA, GBRA, Ana-Lab***
E.COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	UGRA, GBRA, Ana-Lab***

* This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.
** E.coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
***GBRA Laboratory or Ana-Lab will be used in the event of an equipment failure and the need to meet holding times.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.2e Measurement Performance Specifications for UGRA					
24 Hour Parameters in Water					
Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE), 24HR AVG	DEG C	Water	TCEQ SOP V1	00209	UGRA field
WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	DEG C	Water	TCEQ SOP V1	00210	UGRA field
TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	DEG C	Water	TCEQ SOP V1	00211	UGRA field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR AVG	uS/cm	Water	TCEQ SOP V1	00212	UGRA field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MAX	uS/cm	Water	TCEQ SOP V1	00213	UGRA field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MIN	uS/cm	Water	TCEQ SOP V1	00214	UGRA field
PH, S.U., 24HR MAXIMUM VALUE	std. units	Water	TCEQ SOP V1	00215	UGRA field
PH, S.U., 24HR, MINIMUM VALUE	std. units	Water	TCEQ SOP V1	00216	UGRA field
WATER TEMPERATURE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00221	UGRA field
SPECIFIC CONDUCTANCE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00222	UGRA field
pH, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00223	UGRA field
DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89855	UGRA field
DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89856	UGRA field
DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89857	UGRA field
DISSOLVED OXYGEN, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	89858	UGRA field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3a Measurement Performance Specifications for MCWE

Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	WVWA/MCWE Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	WVWA/MCWE Field
SPECIFIC CONDUCTANCE, FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	WVWA/MCWE Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	WVWA/MCWE Field
PH (STANDARD UNITS)	s.u.	water	EPA 150.1 and TCEQ SOP V1	00400	WVWA/MCWE Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	WVWA/MCWE Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	WVWA/MCWE Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)**	meters	other	TCEQ SOP V2	89864	WVWA/MCWE Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)**	meters	other	TCEQ SOP V2	89865	WVWA/MCWE Field
POOL LENGTH, METERS**	meters	other	TCEQ SOP V2	89869	WVWA/MCWE Field
% POOL COVERAGE IN 500 METER REACH**	%	other	TCEQ SOP V2	89870	WVWA/MCWE Field

* Reporting to be consistent with SWQM guidance and based on measurement capability.
** To be routinely reported when collecting data from perennial pools.
*** As published by the Texas Water Development Board on their website https://www.waterdatafortexas.org/reservoirs/statewide

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3b Measurement Performance Specifications for MCWE					
Flow Parameters					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	WVWA/MCWE Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	WVWA/MCWE Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP V1	74069	WVWA/MCWE Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	WVWA/MCWE Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard
Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3c Measurement Performance Specifications for MCWE										
Conventional Parameters in Water										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**TCEQ AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Precision (RPD)**	**Bias %Rec. of LCS**	**Lab**
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	530	5	1**	NA	NA	NA	GBRA, Ana-Lab, SATL***
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	610	0.1	0.1	70-130	20	80-120	GBRA and Ana-Lab***
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	620	0.05	0.05	70-130	20	80-120	GBRA, Ana-Lab^
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	665	0.06	0.02	70-130	20	80-120	GBRA, Ana-Lab, SATL***

**TSS LOQ is based on the volume of sample used.
***Ana-Lab or SATL will be used in the event of an equipment failure and the need to meet holding times.
References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3d Measurement Performance Specifications for MCWE

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Log Difference of Duplicates	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	SM 9223-B**	31699	1	1	NA	0.50*	NA	GBRA, Ana-Lab***
E.COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	GBRA, Ana-Lab***

* This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.
** E.coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
***Ana-Lab will be used in the event of an equipment failure and the need to meet holding times.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3e Measurement Performance Specifications for MCWE

24 Hour Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE), 24HR AVG	DEG C	Water	TCEQ SOP V1	00209	MCWE field
WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	DEG C	Water	TCEQ SOP V1	00210	MCWE field
TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	DEG C	Water	TCEQ SOP V1	00211	MCWE field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR AVG	uS/cm	Water	TCEQ SOP V1	00212	MCWE field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MAX	uS/cm	Water	TCEQ SOP V1	00213	MCWE field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MIN	uS/cm	Water	TCEQ SOP V1	00214	MCWE field
PH, S.U., 24HR MAXIMUM VALUE	std. units	Water	TCEQ SOP V1	00215	MCWE field
PH, S.U., 24HR, MINIMUM VALUE	std. units	Water	TCEQ SOP V1	00216	MCWE field
WATER TEMPERATURE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00221	MCWE field
SPECIFIC CONDUCTANCE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00222	MCWE field
pH, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00223	MCWE field
DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89855	MCWE field
DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89856	MCWE field
DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89857	MCWE field
DISSOLVED OXYGEN, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	89858	MCWE field

References:

United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).

TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3a Measurement Performance Specifications for WVWA
Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	WVWA/MCWE Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	WVWA/MCWE Field
SPECIFIC CONDUCTANCE, FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	WVWA/MCWE Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	WVWA/MCWE Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	00400	WVWA/MCWE Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	WVWA/MCWE Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	WVWA/MCWE Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)**	meters	other	TCEQ SOP V2	89864	WVWA/MCWE Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)**	meters	other	TCEQ SOP V2	89865	WVWA/MCWE Field
POOL LENGTH, METERS**	meters	other	TCEQ SOP V2	89869	WVWA/MCWE Field
% POOL COVERAGE IN 500 METER REACH**	%	other	TCEQ SOP V2	89870	WVWA/MCWE Field

* Reporting to be consistent with SWQM guidance and based on measurement capability.
** To be routinely reported when collecting data from perennial pools.
*** As published by the Texas Water Development Board on their website https://www.waterdatafortexas.org/reservoirs/statewide

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3b Measurement Performance Specifications for WVWA

Flow Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	WVWA/MCWE Field

FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	WVWA/MCWE Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP V1	74069	WVWA/MCWE Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	WVWA/MCWE Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard
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TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3c Measurement Performance Specifications for WVWA

Conventional Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD)	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	530	5	1**	NA	NA	NA	GBRA, Ana-Lab, SATL***
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	610	0.1	0.1	70-130	20	80-120	GBRA and Ana-Lab***
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	620	0.1	0.05	70-130	20	80-120	GBRA, Ana-Lab^
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2 (1993)	625	0.2	0.2	70-130	20	80-120	GBRA and Ana-Lab^
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	665	0.1	0.02	70-130	20	80-120	GBRA, Ana-Lab, SATL***

^Ana-Lab will be used in the event of an equipment failure and the need to meet holding times.
**TSS LOQ is based on the volume of sample used.
***Ana-Lab or SATL will be used in the event of an equipment failure and the need to meet holding times.
References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

TABLE A7.3d Measurement Performance Specifications for WVWA

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Log Difference of Duplicates	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	SM 9223-B**	31699	1	1	NA	0.50*	NA	GBRA, Ana-Lab***
E. COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	GBRA, Ana-Lab***

* This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.
** E.coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
***Ana-Lab will be used in the event of an equipment failure and the need to meet holding times.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

Measurement performance specifications define the data quality needed to satisfy project objectives. To this end, measurement performance specifications are qualitative and quantitative statements that:

- clarify the intended use of the data
- define the type of data needed to support the end use
- identify the conditions under which the data should be collected

Appendix A of the QAPP addresses measurement performance specifications, including:

- analytical methodologies
- AWRLs
- limits of quantitation
- bias limits for LCSs
- precision limits for LCSDs
- completeness goals

- qualitative statements regarding representativeness and comparability

Procedures for laboratory analysis must be in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, 40 CFR 136, or otherwise approved independently. Only data collected that have a valid TCEQ parameter code assigned in Tables A7 are stored in SWQMIS. Any parameters listed in Tables A7 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Table A7.1-3 reflects actual parameters, methods, etc. employed by the GBRA and its participants. Procedures for laboratory analysis are in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, 40 CFR 136, or otherwise approved independently. Only data collected that have a valid TCEQ parameter code assigned in Table A7.1-3 are stored in SWQMIS. Any parameters listed in Table A7.1-3 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Table A7.1 – A7.3 - Measurement Performance Specifications

Appendix B: Task 3 Work Plan & Sampling Process Design and Monitoring Schedule (Plan)

TASK 3: WATER QUALITY MONITORING

Objectives: Water quality monitoring will focus on the characterization of a variety of locations and conditions. This will include a combination of the following:

- planning and coordinating basin-wide monitoring;
- routine, regularly-scheduled monitoring to collect long-term information and support statewide assessment of water quality; and
- systematic, regularly-scheduled short-term monitoring to screen water bodies for issues.

Task Description: The Performing Party will conduct water quality monitoring and provide details in the Progress Report as prescribed in the FY2022-2023 Guidance. The actual number of sites, location, frequency, and parameters collected will be based on priorities identified at the basin Steering Committee and Coordinated Monitoring meetings and included in the amended Appendix B schedule of the QAPP.

The Performing Party will complete the following subtasks:

Monitoring Description — In FY 2022, the Performing Party will conduct routine monitoring at a minimum of nineteen sites monthly and a minimum of fourteen sites quarterly for field, conventional, flow (at stream sites), and bacteria parameter groups. Biological and habitat monitoring events will be conducted at a minimum of two sites in the Performing Party's basin. In addition, the Performing Party will coordinate with the Upper Guadalupe River Authority (UGRA) for the monitoring of a minimum of ten sites quarterly in Kerr County and one site quarterly in Kendall County for field, conventional, flow (at stream sites), and bacteria parameter groups. In FY 2023, the Performing Party will monitor at a similar level of effort as in FY 2021. The actual number of sites, location, frequency, and parameters collected in FY 2023 will be included in the Performing Party QAPP Appendix B update.

All monitoring will be completed in accordance with the Performing Party QAPP, the TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods (RG-415) and the TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG-416).

Coordinated Monitoring Meeting — The Performing Party will hold an annual coordinated monitoring meeting as described in the FY2022-2023 CRP Guidance. Qualified monitoring organizations will be invited to attend the working meeting in which monitoring needs and purposes will be discussed segment by segment and station by station. Information from participants and stakeholders will be used to select stations and parameters that will enhance overall water quality monitoring coverage, eliminate duplication of effort, and address basin priorities. A summary of the changes to the monitoring schedule will be provided to the participants within two weeks of the meeting. Changes to the monitoring schedule will be entered into the statewide Coordinated Monitoring Schedule (http://cms.lcra.org) and communicated to meeting attendees. Changes to monitoring schedules that occur during the year will be entered into the Coordinated Monitoring Schedule and communicated to meeting attendees.

Progress Report — Each Progress Report will include all types of monitoring and indicate the number of sampling events and the types of monitoring conducted in the quarter.

Deliverables and Dues Dates:

September 1, 2021 through August 31, 2022

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report — December 15, 2021; March 15 and June 15, 2022
B. Coordinated Monitoring Meeting — between March 15 and April 30, 2022
C. Coordinated Monitoring Meeting Summary of Changes — within 2 weeks of the meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete — May 31, 2022

September 1, 2022 through August 31, 2023

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report — September 15 and December 15, 2022; March 15 and June 15 and August 31, 2023
B. Coordinated Monitoring Meeting — between March 15 and April 30, 2023
C. Coordinated Monitoring Meeting Summary of Changes — within 2 weeks of the meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete — May 31, 2023

Appendix B Sampling Process Design and Monitoring Schedule (plan)

Sample Design Rationale FY 2023

The sample design is based on the legislative intent of CRP. Under the legislation, the Basin Planning Agencies have been tasked with providing data to characterize water quality conditions in support of the Texas Water Quality Integrated Report, and to identify significant long-term water quality trends. Based on Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues are used to develop work plans which are in accord with available resources. As part of the Steering Committee process, the GBRA coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the watershed.

The following changes have been proposed to the FY2023 monitoring schedule. These changes have come about because of concerns or requests of steering committee members or monitoring entities at the annual Guadalupe River Basin Coordinated Monitoring Meeting.

1. GBRA conducted an aquatic life monitoring event at station 12684 (South Fork Guadalupe River Adjacent to Hunt Lion's Park) on segment 1818 in FY22. GBRA was able to conduct the first event during the index period, however due extreme drought they will need to postpone the critical period event into the FY23 critical period. Because of this, the ALM will remain on the monitoring schedule. This event will consist of 24-Hour DO, Aquatic Habitat, Benthic, Nekton, conventionals, bacteria, and flow monitoring.
2. GRBA will remove aquatic life monitoring event from the Coordinated Monitoring Schedule at station 22082 (Guadalupe River 20 meters upstream of FM 1376 and 2.5 KM South of Sisterdale) on segment 1806 in FY23.
3. GBRA conducted an aquatic life monitoring event at station 18595 (Perdido Creek at FM 622 near Fannin Texas) on segment 1807A in FY22. GBRA was able to conduct the first event during the index period, however due extreme drought they will need to postpone the critical period event into the FY23 critical period. Because of this, the ALM will remain on the monitoring schedule. This event will consist of 24-Hour DO, Aquatic Habitat, Benthic, Nekton, conventionals, bacteria, and flow monitoring.
4. GBRA will add nitrites to conventional sampling for all routine sites beginning in FY23.
5. TCEQ Region 11 and WVWA, unknowingly, have both been sampling at station 12668 on segment 1813. Going forward, TCEQ will monitor standard field measurements and conventional chemical analyses

including chlorophyll-a, bacteria, and flow on a quarterly basis during the months of November, February, May, and August. WVWA will monitor monthly, excluding the months that TCEQ Region 11 samples, for a total of 8 times per year. WVWA will collect the same parameters described above but will not collect chlorophyll-a.

6. Beginning in FY23 at station 12669, TCEQ will monitor standard field measurements and conventional chemical analyses including chlorophyll-a on a quarterly basis during the months of November, February, May, and August. WVWA will monitor monthly, excluding the months that TCEQ Region 11 samples, for a total of 8 times per year. WVWA will not collect chlorophyll-a.
7. GBRA will add an aquatic life monitoring event at station 15399 (Honey Creek Approximately 1.2 KM Upstream of Confluence with Guadalupe River at Unimproved Road Crossing) on an unclassified segment of 1806 for FY23 at Guadalupe River State Park. This event will consist of 24-Hour DO, Aquatic Habitat, Benthic, Nekton, Field and Flow monitoring at a frequency of two times per year in FY2023.
8. GBRA will add an aquatic life monitoring event at station 12685 (South Fork Guadalupe River adjacent to camp arrowhead) in segment 1818 in FY23. This event will consist of 24-Hour DO, Aquatic Habitat, Benthic, Nekton, conventionals, bacteria, and flow monitoring at a frequency of two times per year.
9. WVWA will add a new monthly monitoring site, station 17528, Blanco River immediately upstream of River Run and Pany Drive 0.3 mi East of RR 1623 at Hines Branch in Blanco. Monitoring will include conventionals, bacteria, field parameters, and flow.

Site Selection Criteria

This data collection effort involves monitoring routine water quality using procedures that are consistent with the TCEQ SWQM program. Some general guidelines are followed when selecting sampling sites, as outlined below, and discussed thoroughly in SWQM Procedures, Volumes I and II. Overall consideration is given to accessibility and safety. All monitoring activities have been developed in coordination with the CRP Steering Committee and with the TCEQ. The site selection criteria specified are those the TCEQ would like considered to produce data which is complementary to that collected by the state and which may be used in assessments, etc.

1. Locate stream sites so that samples can be safely collected from the centroid of flow. Centroid is defined as the midpoint of that portion of stream width which contains 50 percent of the total flow. If multiple potential sites on a stream segment are appropriate for monitoring, choose one that would best represent the water body, and not a site that displays unusual conditions or contaminant source(s). Avoid backwater areas or eddies when selecting a stream site.
2. At a minimum for reservoirs, locate sites near the dam (reservoirs) and in the major arms. Larger reservoirs might also include stations in the middle and upper (riverine) areas. Select sites that best represent the water body by avoiding coves and back water areas. A single monitoring site is considered representative of 25 percent of the total reservoir acres, but not more than 5,120 acres.
3. Monitoring sites are selected to maximize stream coverage or basin coverage. Very long segments may require more stations. As a rule of thumb, stream segments between 25 and 50 miles long require two stations, and longer than 50 miles require three or more depending on the existence of areas with significantly different sources of contamination or potential water quality concerns. Major hydrological features, such as the confluence of a major tributary or an instream dam, may also limit the spatial extent of an assessment based on one station.
4. Because historical water quality data can be very useful in assessing use attainment or impairment, it may be best to use sites that are on current or past monitoring schedules.
5. All classified segments (including reservoirs) should have at least one Monitoring site that adequately characterizes the water body, and monitoring should be coordinated with the TCEQ or other qualified monitoring entities reporting routine data to TCEQ.
6. Monitoring sites may be selected to bracket sources of pollution, influence of tributaries, changes in land uses, and hydrological modifications.
7. Sites should be accessible. When possible, stream sites should have a USGS or IBWC stream flow gauge. If not, it should be possible to conduct flow measurement during routine visits.

Monitoring Sites for FY 2023

The sample design for SWQM is shown in Table B1.1 below

Table B1.1 Sample Design and Schedule, FY 2023

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
GUADALUPE RIVER AT LOWER GUADALUPE DIVERSION DAM AND SALT WATER BARRIER	12578	1802	14	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
GUADALUPE RIVER AT FM 447 WEST OF NURSERY AND UPSTREAM OF SOUTH TEXAS ELECTRIC	12590	1803	14	GB	GB	RT									4			4	4		4	
GUADALUPE RIVER AT OLD SAN ANTONIO ROAD/FM766 WEST OF CUERO	12592	1803	14	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
GUADALUPE RIVER AT US 183 IN HOCHHEIM IN DEWITT COUNTY	20470	1803	14	GB	GB	RT									4			4	4		4	
ELM CREEK ON LAZY F RANCH 515 METERS UPSTREAM OF OLD US 87 BRIDGE	17894	1803A	14	GB	GB	RT									4			4	4		4	Routine Monitoring Added in FY20 to Confirm DO Impairment
SANDIES CREEK 100 FT DOWNSTREAM OF COUNTY HIGHWAY 1.9 MI UPSTREAM FROM BIRDS CREEK 2.0 MI NE OF WESTHOFF	13657	1803B	14	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon;
PEACH CREEK AT GONZALES CR 353 14.0KM EAST OF GONZALES	14937	1803C	14	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
GUADALUPE RIVER 200 METERS DOWNSTREAM OF H-4 DAM AT LAKE GONZALES	21736	1804	14	GB	GB	RT									4			4	4		4	Station added in FY16

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
GUADALUPE RIVER AT FM 1117 RIVER CROSSING 2.1 MILES SOUTH OF SH 90A 5.2 MILES EAST OF SEGUIN	17134	1804	13	GB	GB	RT									4			4	4		4	Dropped by TCEQ R in FY16
GUADALUPE RIVER IMMEDIATELY DOWNSTREAM OF H-5 DAM AT WOOD LAKE SW OF GONZALES TX	15110	1804	14	GB	GB	RT									4			4	4		4	
LAKE DUNLAP-GUADALUPE RIVER NORTH BANK AT ACS PLACE AT MID POINT OF LONE STAR DRIVE	12596	1804	13	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
WEST BANK OF LAKE MCQUEENEY AT LAKE BREEZE SKI LODGE BOAT RAMP 1.20 KILOMETERS UPSTREAM OF FM 78	22189	1804	13	GB	GB	RT									12			12	12		12	Replaced Station 15149 in FY20 - NH3 and TKN will be done bimon
GERONIMO CREEK AT HABERLE ROAD/CR 1103 MILES SOUTH OF GERONIMO	12576	1804A	13	GB	GB	RT									12			12	12		12	ecoregion reference site NH3 and TKN will be done bimonthly
CANYON LAKE SOUTH OF JACOBS CREEK PARK 500 YARDS EAST OF PENINSULA	12598	1805	13	GB	GB	RT									12			12			12	NH3 and TKN will be done bimon
GUADALUPE RIVER 20 METERS UPSTREAM OF FM 1376 AND 2.5 KILOMETERS SOUTH OF SISTERDALE	22082	1806	13	GB	GB	RT									4			4	4		4	Quarterly Routine Station Added in FY19 Due to Elevated E. coli Concentrations Downstream at Station 17404.
GUADALUPE RIVER AT FM 474 AT AMMANS CROSSING NE OF BOERNE	17404	1806	13	GB	GB	RT									4			4	4		4	

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
GUADALUPE RIVER AT FOOTBRIDGE IN LOUISE HAYS PARK APPROX 100M UPSTREAM OF SH16	16244	1806	13	GB	UG	RT												12			12	
GUADALUPE RIVER AT G STREET/FORMERLY OLD MEDINA RD IN KERRVILLE SEGMENT KM 177.9	12616	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
GUADALUPE RIVER AT HERMANN SONS RD ADJACENT TO HERMANN SONS HOME WEST OF COMFORT	12605	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
GUADALUPE RIVER AT KERRVILLE STATE PARK SEGMENT KM 174.4	12615	1806	13	GB	UG	RT									4			12	12		12	VSS removed from conventional in FY22
GUADALUPE RIVER AT LOUISE HAYS PARK DAM APPROX 50M DOWNSTREAM OF SH16	16243	1806	13	GB	UG	RT												12			12	
GUADALUPE RIVER AT RIVERVIEW RD IN INGRAM TX	15111	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
GUADALUPE RIVER AT RR 311 1.9 MI SE OF SPRING BRANCH 7.5 MI DOWNSTREAM FROM CURRY CREEK	13700	1806	13	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
GUADALUPE RIVER AT SAN ANTONIO RD/FM1621 IN WARING	12602	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
GUADALUPE RIVER AT SH 16 IN KERRVILLE	12617	1806	13	GB	UG	RT												12			12	

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
GUADALUPE RIVER AT SPLIT ROCK RD OFF SH 27 2.6 KM DOWNSTREAM OF FLATROCK DAM	15113	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22. NH3 added in FY22
GUADALUPE RIVER AT UGRA LAKE DAM	12618	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
GUADALUPE RIVER CENTER POINT LAKE	12608	1806	13	GB	UG	RT									4			4	4		4	VSS removed from conventionals in FY22
HONEY CREEK APPROXIMATELY 1.2 KM UPSTREAM OF CONFLUENCE WITH GUADALUPE RIVER AT UNIMPROVED ROAD CROSSING	15399	1806	13	GB	GB	BS	2	2	2	2									2		2	ALM Added for FY23
HONEY CREEK APPROXIMATELY 1.2 KM UPSTREAM OF CONFLUENCE WITH GUADALUPE RIVER AT UNIMPROVED ROAD CROSSING	15399	1806	13	GB	GB	RT									4			4	4		4	Routine Quarterly Monitoring Added for FY21
CAMP MEETING CREEK 0.1 KM UPSTREAM CONFLUENCE WITH GUADALUPE IN KERRVILLE	12546	1806A	13	GB	UG	RT									4			12	12		12	Monthly bacteria, flow, field added in FY22 VSS removed from conventional in FY22
QUINLAN CREEK AT TRAVIS STREET IN KERRVILLE	12541	1806D	13	GB	UG	RT												12	12		12	
TOWN CREEK AT HAMILTON STREET IN KERRVILLE	12549	1806E	13	GB	UG	RT												12	12		12	

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
COLETO CREEK RESERVOIR AT MID POINT OF DAM ON COLETO CREEK PARK ROAD	20827	1807	14	GB	GB	RT									12			12			12	depth profiles will be completed quarterly; nh3 and tkn bimonthly
PERDIDO CREEK AT FM 622 NEAR FANNIN TEXAS	18595	1807A	14	GB	GB	BS	1	1	1	1					1			1	1		1	ALM originally scheduled for FY22, critical period event will be conducted in Sept 2022 or the FY23 critical period due to extreme drought.
LOWER SAN MARCOS RIVER AT SH 80 SOUTH OF LULING	12626	1808	11	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
SAN MARCOS RIVER AT US90A 3.3KM WEST OF INTERSECTION OF US90A AND US183 IN GONZALES 7KM UPSTREAM OF CONFL. WITH GUADALUPE RIVER	16578	1808	14	GB	GB	RT									4			4	4		4	
PLUM CREEK AT CR 202 SE OF LOCKHART	12647	1810	11	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
PLUM CREEK AT OLD WOODEN BRIDGE ON CALDWELL CR 135 SE OF LULING	12640	1810	11	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
PLUM CREEK AT PLUM CREEK ROAD NORTH OF UHLAND	17406	1810	11	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
COMAL RIVER AT LANDA PARK AREA 16 2.45 MI UPSTREAM FROM CONFLUENCE WITH GUADALUPE RIVER IN NEW BRAUNFELS	15082	1811	13	GB	GB	RT									12			12	12		12	TKN and NH3 done bimonthly
COMAL RIVER DOWNSTREAM CLEMONS DAM IN NEW BRAUNFELS	12653	1811	13	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
DRY COMAL CREEK AT MISSOURI-KANSAS-TEXAS RAILROAD CROSSING IN NEW BRAUNFELS	12570	1811A	13	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
GUADALUPE RIVER AT RIVER RD 2ND CROSSING UPSTREAM OF NEW BRAUNFELS	12658	1812	13	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimon
GUADALUPE RIVER AT THE BEGINNING OF CYPRESS BEND PARK IN NEW BRAUNFELS	12656	1812	13	GB	GB	RT									4			4	4		4	
BLANCO RIVER AT BLANCO STATE PARK PR 23	12669	1813	11	GB	WV	RT									8			8	8		8	conventionals-Total P, NO3-N, NH3-N, TSS &; TKN
BLANCO RIVER IMMEDIATELY UPSTREAM OF RIVER RUN AND PANY DR 0.3 MI EAST OF RR 1623 AT HINES BRANCH IN BLANCO	17528	1813	11	GB	WV	RT									12			12	12		12	conventionals-Total P, NO3-N, NH3-N, TSS &; TKN
BLANCO RIVER AT BRIDGE ON SH 12 AT WIMBERLEY	12661	1813	11	GB	WV	RT									4			4	4		4	conventionals-Total P, NO3-N, NH3-N, TSS &; TKN
BLANCO RIVER AT FM 165 1/2 MILE EAST OF BLANCO	12668	1813	11	GB	WV	RT									8			8	8		8	conventionals-Total P, NO3-N, NH3-N, TSS &; TKN. Will not collect chlorophyll-a.

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
BLANCO RIVER AT LOW WATER CROSSING AT CR 174/FULTON RANCH RD	12660	1813	11	GB	WV	RT									4			4	4		4	conventionals-Total P, NO3-N, NH3-N, TSS, & TKN
BLANCO RIVER AT LOW WATER CROSSING CR1492 AT PIONEER TOWN	12663	1813	11	GB	WV	RT									4			4	4		4	conventionals-Total P, NO3-N, NH3-N, TSS
BLANCO RIVER AT PLEASANT VALLEY CROSSING ON FISHER STORE RD	12665	1813	11	GB	WV	RT									4			4	4		4	conventionals-Total P, NO3-N, NH3-N, TSS
UPPER SAN MARCOS RIVER IMMEDIATELY UPSTREAM OF IH 35 BRIDGE AT SAN MARCOS	12672	1814	11	GB	GB	RT									4			4	4		4	
CYPRESS CREEK AT CAMP YOUNG JUDAEA 830 METERS DOWNSTREAM OF JACOBS WELLS ROAD IN THE CITY OF WOODCREEK IN HAYS COUNTY	22109	1815	11	GB	TI	RT									4			4	4		4	Conventionals-Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT CONFLUENCE WITH THE BLANCO RIVER	12673	1815	11	GB	TI	BS	2												2			24 Hour DO & Streamflow CRP Monitoring
CYPRESS CREEK AT CONFLUENCE WITH THE BLANCO RIVER	12673	1815	11	GB	TI	RT									4			4	4		4	Conventionals-Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT DOWNSTREAM END IN BLUE HOLE CAMPGROUND	12675	1815	11	GB	TI	BS	2												2			24 Hour DO & Streamflow CRP Monitoring

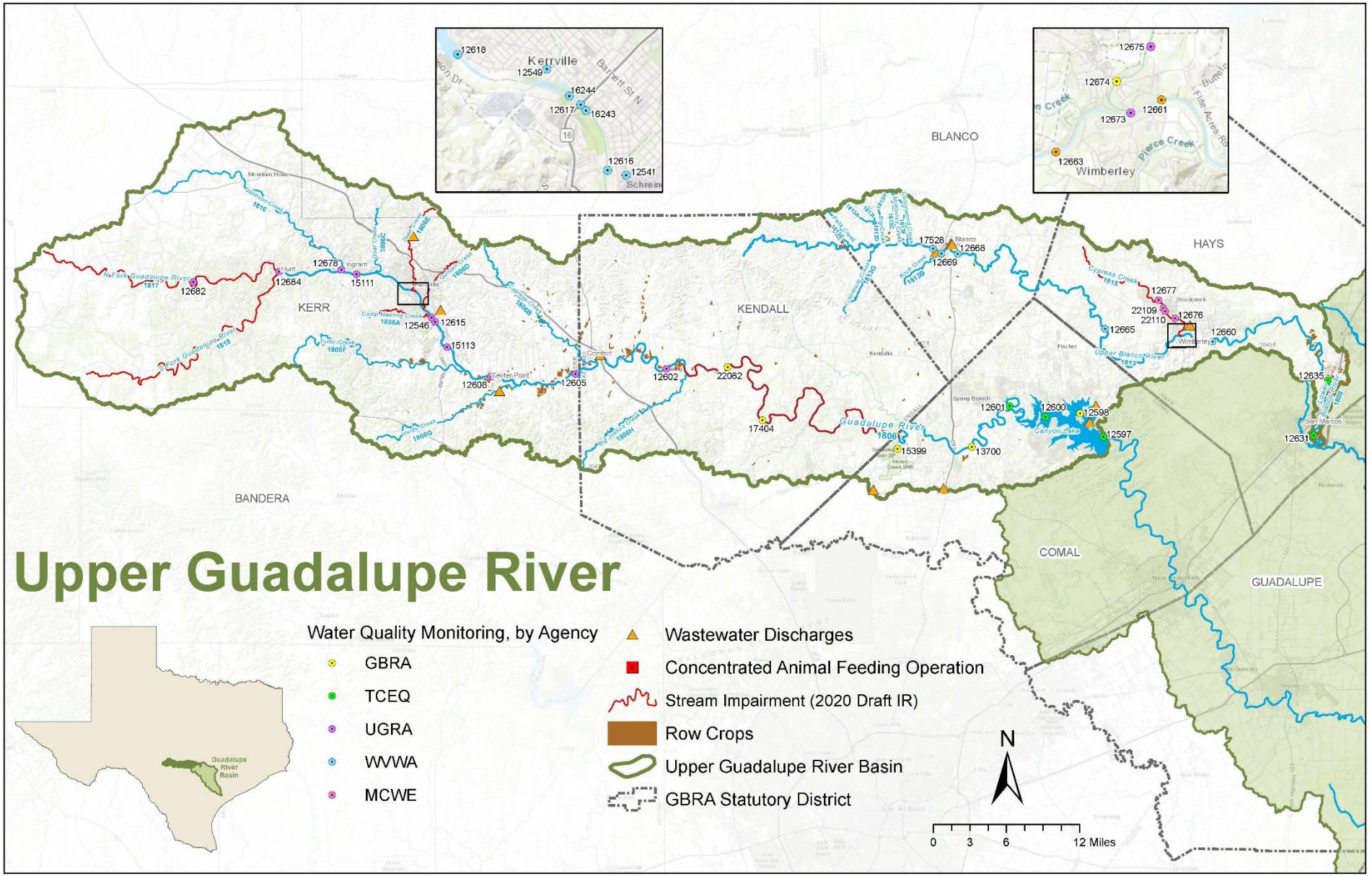
Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
CYPRESS CREEK AT DOWNSTREAM END IN BLUE HOLE CAMPGROUND	12675	1815	11	GB	TI	RT									4			4	4		4	Conventionals-Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT FM 12 AT WIMBERLEY	12674	1815	11	GB	GB	RT									4			4	4		4	
CYPRESS CREEK AT JACOBS WELL SPRING APPROXIMATELY 670 METERS UPSTREAM OF HAYS CR 220/JACOBS WELL ROAD NORTH OF WIMBERLEY CAMS 0745	12677	1815	11	GB	TI	RT									4			4	4		4	Conventionals-Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT RR 12 1 MILE NORTH OF WIMBERLEY	12676	1815	11	GB	TI	RT									4			4	4		4	Conventionals-Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT WOODCREEK DRIVE DAM IN HAYS COUNTY	22110	1815	11	GB	TI	RT									4			4	4		4	Conventionals-Total P, NO3-N, NH3-N, TSS
JOHNSON CREEK AT SH 39 IN INGRAM	12678	1816	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
NORTH FORK GUADALUPE AT RIVER GAGING STATION NEAR CAMP WALDEMAR	12682	1817	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22. NH3 added for FY22/23

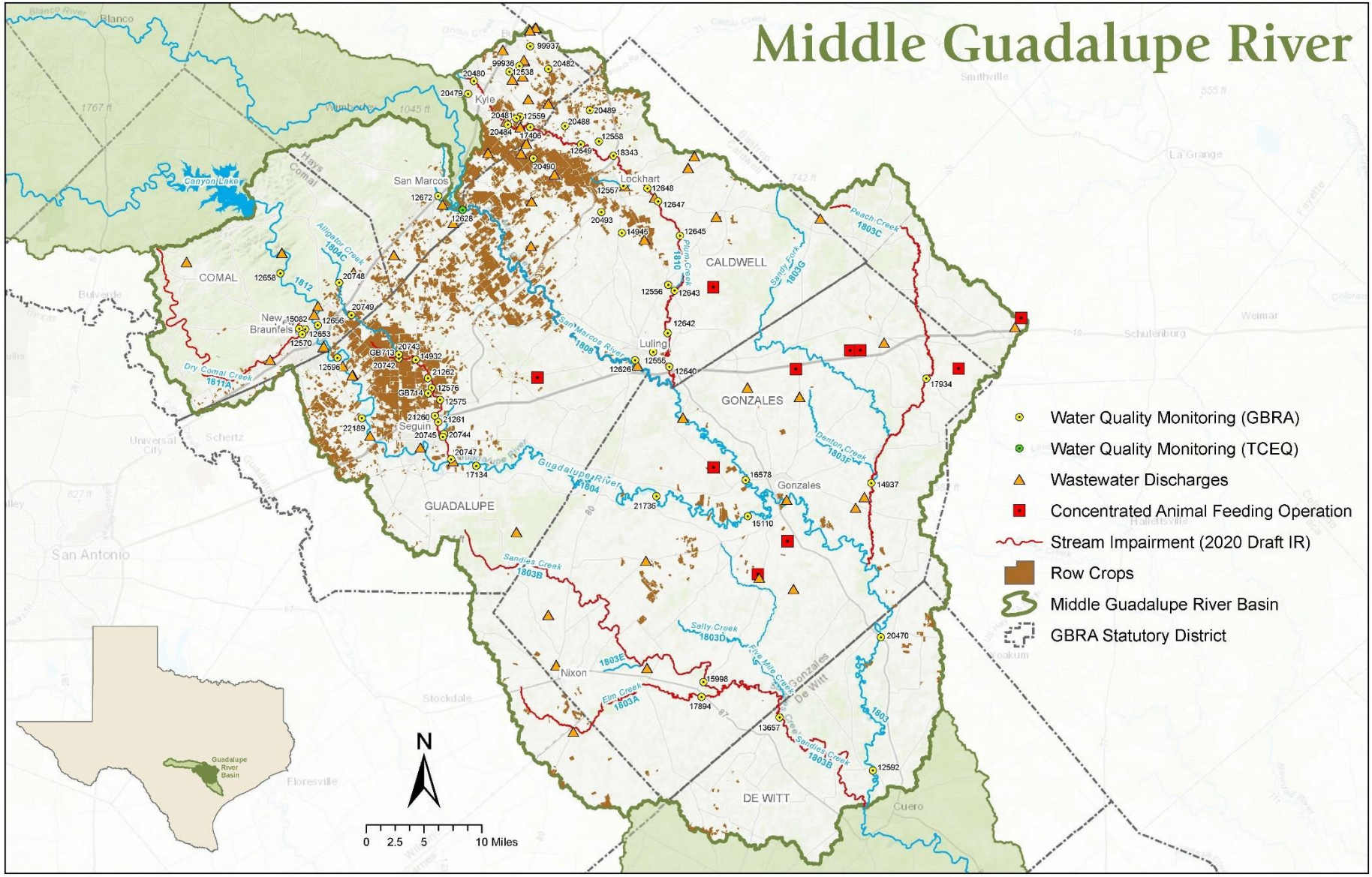
Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
SOUTH FORK GUADALUPE ADJACENT TO HUNT LIONS PARK	12684	1818	13	GB	GB	BS		1	1	1									1		1	ALM originally scheduled for FY22, critical period event will be conducted in Sept 2022 or the FY23 critical period due to extreme drought.
SOUTH FORK GUADALUPE ADJACENT TO HUNT LIONS PARK	12684	1818	13	GB	UG	BS	1															24 HR DO in support of GBRA Aquatic Life Monitoring Event
SOUTH FORK GUADALUPE ADJACENT TO HUNT LIONS PARK	12684	1818	13	GB	UG	RT									4			4	4		4	VSS removed from conventional in FY22
SOUTH FORK GUADALUPE ADJACENT TO CAMP ARROWHEAD	12685	1818	13	GB	GB	BS		2	2	2									2		2	ALM added for FY23
SOUTH FORK GUADALUPE ADJACENT TO CAMP ARROWHEAD	12685	1818	13	GB	UG	BS	2															
SAN ANTONIO RIVER FM 2506 EAST OF FANNIN	12790	1901	14	GB	GB	RT									12			12	12		12	NH3 and TKN will be done bimonthly

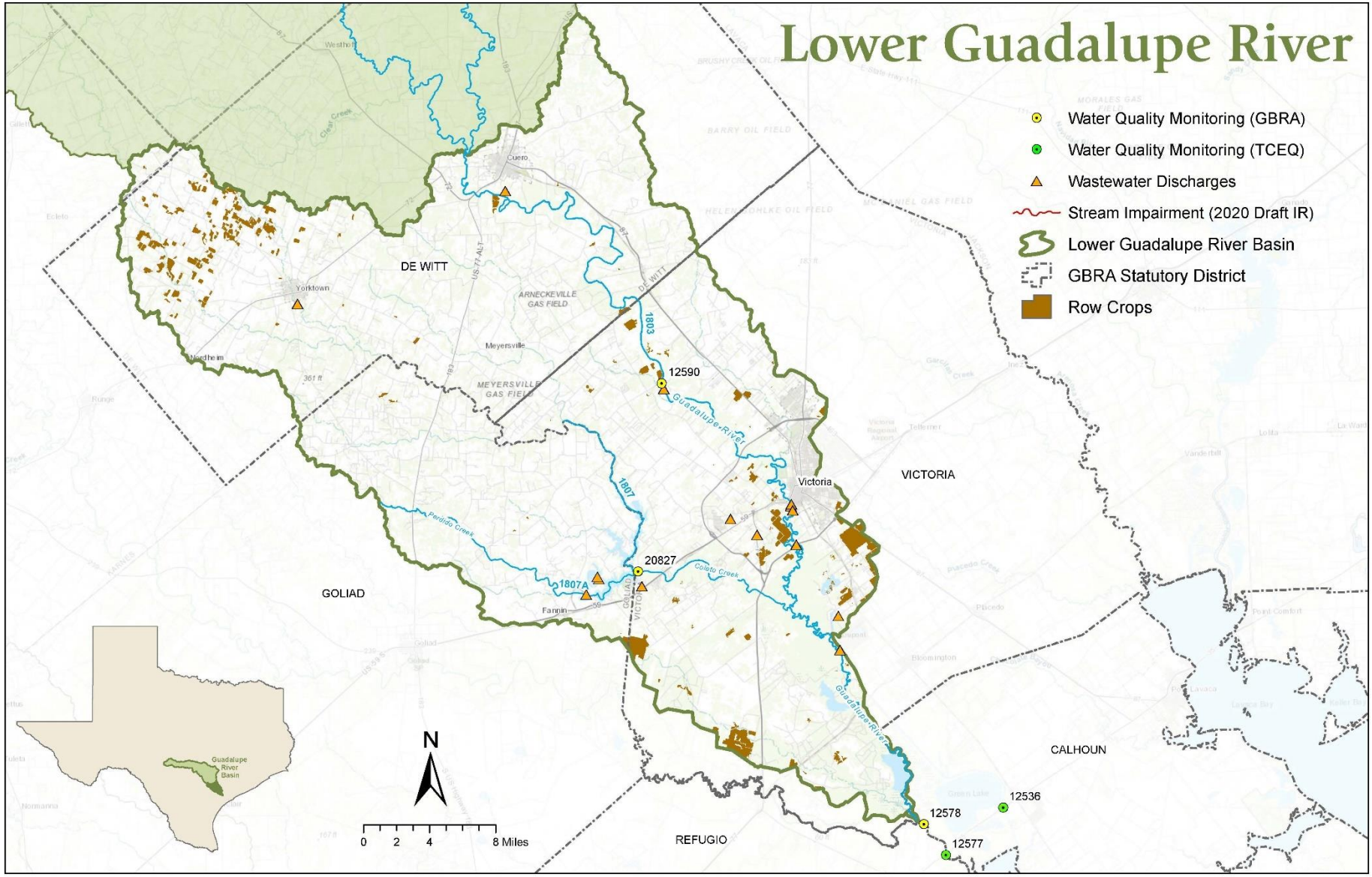
Appendix C: Station Location Maps

Station Location Maps

Maps of stations monitored by the GBRA are provided below. The maps were generated by the GBRA. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Project Manager at 830-379-5822.

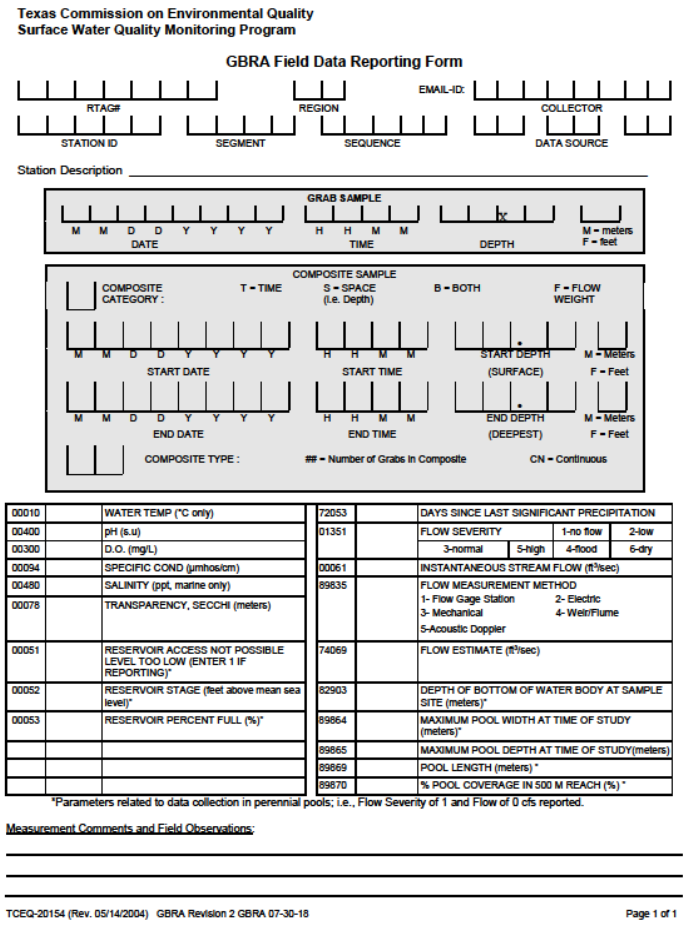

Upper Guadalupe River
Water Quality Monitoring, by Agency
GBRA
TCEQ
UGRA
WWWA
MCWE
Wastewater Discharges
Concentrated Animal Feeding Operation
Stream Impairment (2020 Draft IR)
Row Crops
Upper Guadalupe River Basin
GBRA Statutory District
Guadalupe River Basin
N
0 3 6 12 Miles
Kerrville
Wimberley
BANDERA
KERR
KENDALL
BLANCO
HAYS
COMAL
GUADALUPE


Middle Guadalupe River
Water Quality Monitoring (GBRA)
Water Quality Monitoring (TCEQ)
Wastewater Discharges
Concentrated Animal Feeding Operation
Stream Impairment (2020 Draft IR)
Row Crops
Middle Guadalupe River Basin
GBRA Statutory District
COMAL
GUADALUPE
CALDWELL
GONZALES
DE WITT
San Marcos
Kyle
Lockhart
Luling
Seguin
New Braunfels
Gonzales
Nixon
Cuero
Canyon Lake
Guadalupe River Basin
N
0 2.5 5 10 Miles


Lower Guadalupe River
Water Quality Monitoring (GBRA)
Water Quality Monitoring (TCEQ)
Wastewater Discharges
Stream Impairment (2020 Draft IR)
Lower Guadalupe River Basin
GBRA Statutory District
Row Crops
DE WITT
VICTORIA
GOLIAD
CALHOUN
REFUGIO
Victoria
Cuero
Yorktown
Meyersville
Nordheim
Fannin
ARNECKEVILLE GAS FIELD
MEYERSVILLE GAS FIELD
Guadalupe River
Perdido Creek
Coleto Creek
1803
1807
1807A
12590
20827
12578
12536
12577
N
0 2 4 8 Miles
Guadalupe River Basin

Appendix D: Field Data Sheets

GBRA Field Data Reporting Form in PDF and backup Hard copy Version



Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

GBRA Field Data Reporting Form

RTAG# | REGION | EMAIL-ID: | COLLECTOR

STATION ID | SEGMENT | SEQUENCE | DATA SOURCE

Station Description _____

GRAB SAMPLE

M M D D Y Y Y Y (DATE) | H H M M (TIME) | x (DEPTH) | M = meters F = feet

COMPOSITE SAMPLE

COMPOSITE CATEGORY : | T = TIME | S = SPACE (i.e. Depth) | B = BOTH | F = FLOW WEIGHT

START DATE (M M D D Y Y Y Y) | START TIME (H H M M) | START DEPTH (SURFACE) | M = Meters F = Feet

END DATE (M M D D Y Y Y Y) | END TIME (H H M M) | END DEPTH (DEEPEST) | M = Meters F = Feet

COMPOSITE TYPE : | ## = Number of Grabs in Composite | CN = Continuous

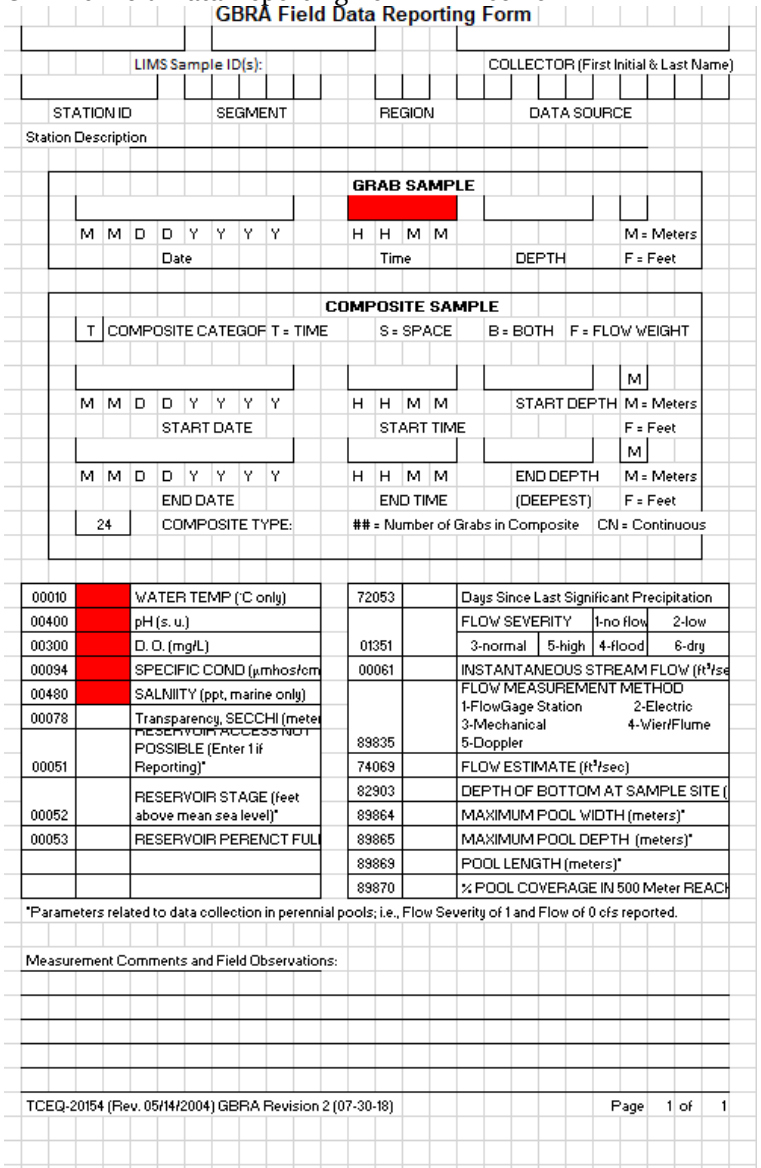
00010		WATER TEMP (°C only)	72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION		
00400		pH (s.u)	01351		FLOW SEVERITY	1-no flow	2-low
00300		D.O. (mg/L)			3-normal 5-high	4-flood	6-dry
00094		SPECIFIC COND (µmhos/cm)	00061		INSTANTANEOUS STREAM FLOW (ft³/sec)		
00480		SALINITY (ppt, marine only)	89835		FLOW MEASUREMENT METHOD 1- Flow Gage Station 2- Electric 3- Mechanical 4- Weir/Flume 5-Acoustic Doppler		
00078		TRANSPARENCY, SECCHI (meters)					
00051		RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW (ENTER 1 IF REPORTING)*	74069		FLOW ESTIMATE (ft³/sec)		
00052		RESERVOIR STAGE (feet above mean sea level)*	82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters)*		
00053		RESERVOIR PERCENT FULL (%)*	89864		MAXIMUM POOL WIDTH AT TIME OF STUDY (meters)*		
			89865		MAXIMUM POOL DEPTH AT TIME OF STUDY(meters)		
			89869		POOL LENGTH (meters) *		
			89870		% POOL COVERAGE IN 500 M REACH (%) *		

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

TCEQ-20154 (Rev. 05/14/2004) GBRA Revision 2 GBRA 07-30-18 Page 1 of 1

GBRA's Field Data Reporting Form in Excel form



GBRA Field Data Reporting Form

LIMS Sample ID(s):

COLLECTOR (First Initial & Last Name)

STATION ID | SEGMENT | REGION | DATA SOURCE

Station Description

GRAB SAMPLE

M M D D Y Y Y Y — Date

H H M M — Time

DEPTH — M = Meters, F = Feet

COMPOSITE SAMPLE

T COMPOSITE CATEGOF T = TIME | S = SPACE | B = BOTH | F = FLOW WEIGHT

M M D D Y Y Y Y — START DATE

H H M M — START TIME

START DEPTH — M = Meters, F = Feet

M M D D Y Y Y Y — END DATE

H H M M — END TIME

END DEPTH (DEEPEST) — M = Meters, F = Feet

24 — COMPOSITE TYPE: ## = Number of Grabs in Composite, CN = Continuous

00010		WATER TEMP (°C only)
00400		pH (s. u.)
00300		D. O. (mg/L)
00094		SPECIFIC COND (µmhos/cm
00480		SALNIITY (ppt, marine only)
00078		Transparency, SECCHI (meter
00051		RESERVOIR ACCESS NOT POSSIBLE (Enter 1 if Reporting)*
00052		RESERVOIR STAGE (feet above mean sea level)*
00053		RESERVOIR PERENCT FULI

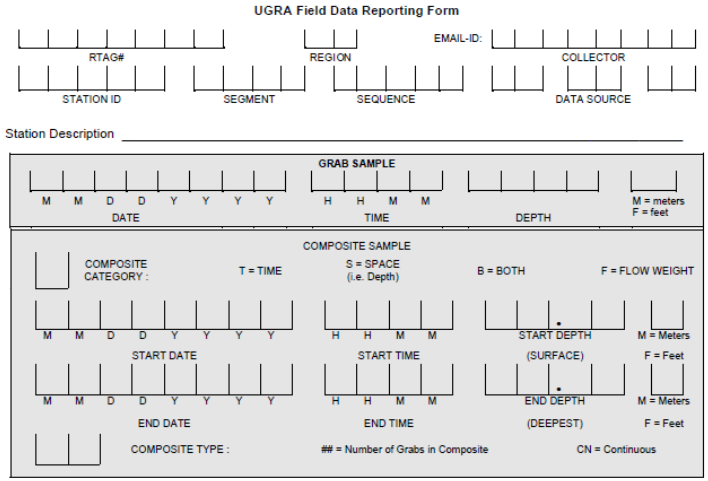
72053		Days Since Last Significant Precipitation
01351		FLOW SEVERITY: 1-no flow, 2-low, 3-normal, 5-high, 4-flood, 6-dry
00061		INSTANTANEOUS STREAM FLOW (ft³/se
89835		FLOW MEASUREMENT METHOD: 1-FlowGage Station, 2-Electric, 3-Mechanical, 4-Wier/Flume, 5-Doppler
74069		FLOW ESTIMATE (ft³/sec)
82903		DEPTH OF BOTTOM AT SAMPLE SITE (
89864		MAXIMUM POOL WIDTH (meters)*
89865		MAXIMUM POOL DEPTH (meters)*
89869		POOL LENGTH (meters)*
89870		% POOL COVERAGE IN 500 Meter REACH

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

TCEQ-20154 (Rev. 05/14/2004) GBRA Revision 2 (07-30-18) Page 1 of 1

UGRA Field Data Reporting Form



UGRA Field Data Reporting Form

RTAG# | REGION | EMAIL-ID: | COLLECTOR

STATION ID | SEGMENT | SEQUENCE | DATA SOURCE

Station Description _____

GRAB SAMPLE

M M D D Y Y Y Y — DATE
H H M M — TIME
DEPTH
M = meters F = feet

COMPOSITE SAMPLE

COMPOSITE CATEGORY : T = TIME S = SPACE (i.e. Depth) B = BOTH F = FLOW WEIGHT

M M D D Y Y Y Y — START DATE
H H M M — START TIME
START DEPTH (SURFACE)
M = Meters F = Feet

M M D D Y Y Y Y — END DATE
H H M M — END TIME
END DEPTH (DEEPEST)
M = Meters F = Feet

COMPOSITE TYPE : ## = Number of Grabs in Composite CN = Continuous

00010		WATER TEMP (°C only)	72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION
00300		D.O. (mg/L)	01351		FLOW SEVERITY: 1-no flow, 2-low, 3-normal, 5-high, 4-flood, 6-dry
00094		SPECIFIC COND (µmhos/cm)	00061		INSTANTANEOUS STREAM FLOW (ft³/sec)
00400		pH (s.u)	89835		FLOW MEASUREMENT METHOD: 1- Flow Gage Station, 2- Electric, 3- Mechanical, 4- Weir/Flume, 5-Doppler
			74069		FLOW ESTIMATE (ft³/sec)
00078		Transparency, Secchi (meters)	89864		MAXIMUM POOL WIDTH (meters) *
			89869		POOL LENGTH (meters) *
			89865		MAXIMUM POOL DEPTH (meters) *
			82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters) *
			89870		PERCENT POOL COVERAGE IN 500 METER REACH

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of zero reported.

Measurement Comments and Field Observations:

WVWA Field Data Reporting Form PDF and backup Hard Copy version

Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

WVWA Field Data Reporting Form

RTAG# | REGION | EMAIL-ID: | COLLECTOR

STATION ID | SEGMENT | SEQUENCE | DATA SOURCE

Station Description _____

GRAB SAMPLE

M M D D Y Y Y Y (DATE) | H H M M (TIME) | DEPTH | M = meters F = feet

COMPOSITE SAMPLE

COMPOSITE CATEGORY : T = TIME S = SPACE (i.e. Depth) B = BOTH F = FLOW WEIGHT

M M D D Y Y Y Y START DATE | H H M M START TIME | START DEPTH (SURFACE) | M = Meters F = Feet

M M D D Y Y Y Y END DATE | H H M M END TIME | END DEPTH (DEEPEST) | M = Meters F = Feet

COMPOSITE TYPE : ## = Number of Grabs in Composite CN = Continuous

00010		WATER TEMP (°C only)
00400		pH (s.u)
00300		D.O. (mg/L)
00094		SPECIFIC COND (µmhos/cm)
00078		TRANSPARENCY, SECCHI (meters)

72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION
01351		FLOW SEVERITY: 1-no flow, 2-low, 3-normal, 5-high, 4-flood, 6-dry
00061		INSTANTANEOUS STREAM FLOW (ft^3/sec)
89835		FLOW MEASUREMENT METHOD: 1- Flow Gage Station, 2- Electric, 3- Mechanical, 4- Weir/Flume, 5-Acoustic Doppler
74069		FLOW ESTIMATE (ft^3/sec)
82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters)*
89864		MAXIMUM POOL WIDTH AT TIME OF STUDY (meters)*
89865		MAXIMUM POOL DEPTH AT TIME OF STUDY(meters)
89869		POOL LENGTH (meters) *
89870		% POOL COVERAGE IN 500 M REACH (%) *

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

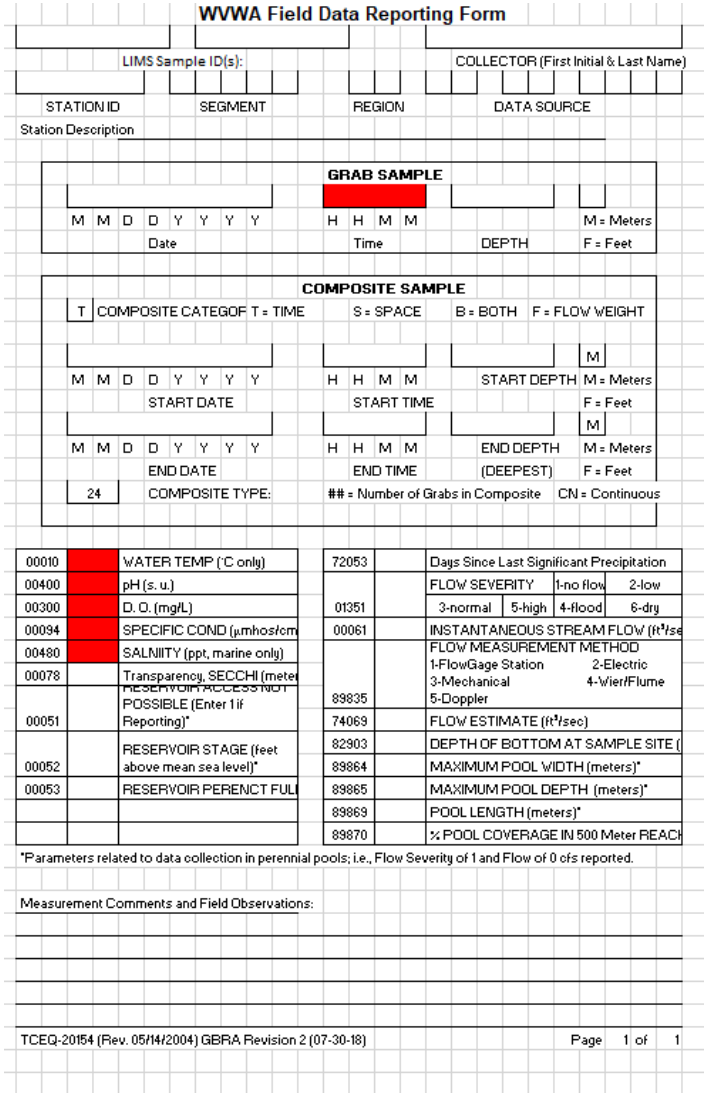
_____

_____

_____

TCEQ-20154 (Rev. 05/14/2004) GBRA Revision 2 WVWA 07-30-18 Page 1 of 1

WVWA Field Data Reporting Form Excel Version



WVWA Field Data Reporting Form

LIMS Sample ID(s): | COLLECTOR (First Initial & Last Name)

STATION ID | SEGMENT | REGION | DATA SOURCE

Station Description

GRAB SAMPLE

M M D D Y Y Y Y	H H M M		M = Meters
Date	Time	DEPTH	F = Feet

COMPOSITE SAMPLE

T | COMPOSITE CATEGOF T = TIME | S = SPACE | B = BOTH | F = FLOW WEIGHT

			M
M M D D Y Y Y Y	H H M M	START DEPTH	M = Meters
START DATE	START TIME		F = Feet
			M
M M D D Y Y Y Y	H H M M	END DEPTH	M = Meters
END DATE	END TIME	(DEEPEST)	F = Feet

24 | COMPOSITE TYPE: | ## = Number of Grabs in Composite | CN = Continuous

00010		WATER TEMP (°C only)	72053		Days Since Last Significant Precipitation
00400		pH (s. u.)	01351		FLOW SEVERITY 1-no flow 2-low 3-normal 5-high 4-flood 6-dry
00300		D. O. (mg/L)			
00094		SPECIFIC COND (µmhos/cm	00061		INSTANTANEOUS STREAM FLOW (ft³/se
00480		SALNIITY (ppt, marine only)	89835		FLOW MEASUREMENT METHOD 1-FlowGage Station 2-Electric 3-Mechanical 4-Wier/Flume 5-Doppler
00078		Transparency, SECCHI (mete			
00051		RESERVOIR ACCESS NOT POSSIBLE (Enter 1 if Reporting)*	74069		FLOW ESTIMATE (ft³/sec)
			82903		DEPTH OF BOTTOM AT SAMPLE SITE (
00052		RESERVOIR STAGE (feet above mean sea level)*	89864		MAXIMUM POOL WIDTH (meters)*
00053		RESERVOIR PERENCT FULI	89865		MAXIMUM POOL DEPTH (meters)*
			89869		POOL LENGTH (meters)*
			89870		% POOL COVERAGE IN 500 Meter REACH

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

TCEQ-20154 (Rev. 05/14/2004) GBRA Revision 2 (07-30-18) Page 1 of 1

MCWE Field Data Reporting Form in PDF and Back up Hard Copy Version

Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

MCWE Field Data Reporting Form

RTAG# _____ REGION _____ EMAIL-ID: LG | JB COLLECTOR _____

STATION ID _____ SEGMENT _____ SEQUENCE _____ DATA SOURCE _____

Station Description _____ _____

GRAB SAMPLE

M M D D Y Y Y Y DATE | H H M M TIME | 0 X 3 DEPTH | M (M = meters, F = feet)

COMPOSITE SAMPLE

COMPOSITE CATEGORY : T = TIME S = SPACE (i.e. Depth) B = BOTH F = FLOW WEIGHT

M M D D Y Y Y Y START DATE | H H M M START TIME | START DEPTH (SURFACE) | M = Meters F = Feet

M M D D Y Y Y Y END DATE | H H M M END TIME | END DEPTH (DEEPEST) | M = Meters F = Feet

COMPOSITE TYPE : ## = Number of Grabs in Composite CN = Continuous

00010		WATER TEMP (°C only)	72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION		
00400		pH (s.u)	01351		FLOW SEVERITY	1-no flow	2-low
00300		D.O. (mg/L)			3-normal / 5-high / 4-flood / 6-dry		
00094		SPECIFIC COND (µmhos/cm)	00061		INSTANTANEOUS STREAM FLOW (ft^3/sec)		
00480		SALINITY (ppt, marine only)	89835		FLOW MEASUREMENT METHOD 1- Flow Gage Station 2- Electric 3- Mechanical 4- Weir/Flume 5-Acoustic Doppler		
89978		PRIMARY CONTACT, OBSERVED ACTIVITY (# of people observed)					
89979		EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	74069		FLOW ESTIMATE (ft^3/sec)		
00051		RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW (ENTER 1 IF REPORTING)*	82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters)*		
00052		RESERVOIR STAGE (feet above mean sea level)*	89864		MAXIMUM POOL WIDTH AT TIME OF STUDY (meters)*		
00053		RESERVOIR PERCENT FULL (%)*	89865		MAXIMUM POOL DEPTH AT TIME OF STUDY(meters)		
			89869		POOL LENGTH (meters) *		
			89870		% POOL COVERAGE IN 500 M REACH (%) *		

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

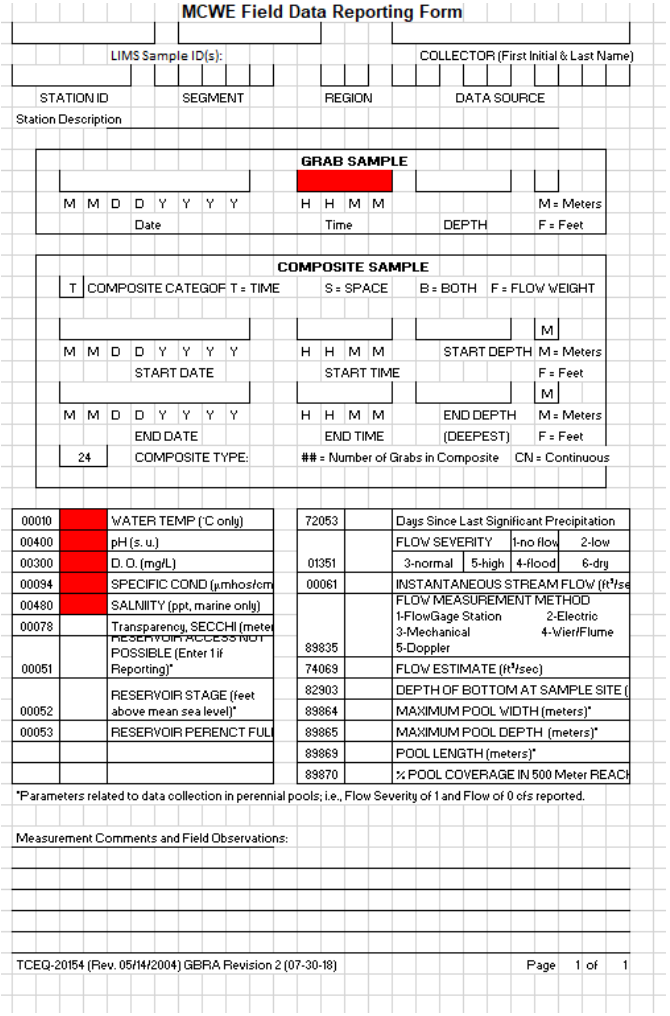
_____

_____

_____

TCEQ-20154 (Rev. 05/14/2004) Page 1 of 1

MCWE Field Data Reporting Form Excel Version



MCWE Field Data Reporting Form

LIMS Sample ID(s): | COLLECTOR (First Initial & Last Name)

STATION ID | SEGMENT | REGION | DATA SOURCE

Station Description

GRAB SAMPLE

M M D D Y Y Y Y — Date | H H M M — Time | DEPTH | M = Meters, F = Feet

COMPOSITE SAMPLE

T | COMPOSITE CATEGOF T = TIME | S = SPACE | B = BOTH | F = FLOW WEIGHT

M M D D Y Y Y Y — START DATE | H H M M — START TIME | START DEPTH | M = Meters, F = Feet

M M D D Y Y Y Y — END DATE | H H M M — END TIME | END DEPTH (DEEPEST) | M = Meters, F = Feet

24 — COMPOSITE TYPE: | ## = Number of Grabs in Composite | CN = Continuous

00010		WATER TEMP (°C only)		72053		Days Since Last Significant Precipitation	
00400		pH (s. u.)				FLOW SEVERITY	1-no flow 2-low
00300		D. O. (mg/L)		01351		3-normal 5-high 4-flood 6-dry	
00094		SPECIFIC COND (µmhos/cm		00061		INSTANTANEOUS STREAM FLOW (ft³/se	
00480		SALNIITY (ppt, marine only)		89835		FLOW MEASUREMENT METHOD 1-FlowGage Station 2-Electric 3-Mechanical 4-Wier/Flume 5-Doppler	
00078		Transparency, SECCHI (meter					
00051		RESERVOIR ACCESS NOT POSSIBLE (Enter 1 if Reporting)*		74069		FLOW ESTIMATE (ft³/sec)	
00052		RESERVOIR STAGE (feet above mean sea level)*		82903		DEPTH OF BOTTOM AT SAMPLE SITE (	
00053		RESERVOIR PERENCT FULI		89864		MAXIMUM POOL WIDTH (meters)*	
				89865		MAXIMUM POOL DEPTH (meters)*	
				89869		POOL LENGTH (meters)*	
				89870		% POOL COVERAGE IN 500 Meter REACH	

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

TCEQ-20154 (Rev. 05/14/2004) GBRA Revision 2 (07-30-18) Page 1 of 1

Appendix E: Chain of Custody Forms

GBRA LAB
933 E. Court Street, Seguin, TX 78155
Phone: (830) 379-5822 Fax: (830) 379-7478

GUADALUPE-BLANCO RIVER AUTHORITY LABORATORY
CHAIN OF CUSTODY

Customer Information

Customer Acct.#:						RUSH Analysis : _____ by EOB (Additional Fees Apply)					
Name:						Billing Address:					
Address:						Fax #:					
Phone #:						Email 1:					
Thermometer #:						Email 2:					
Receipt Temp (°C) Observed / Corrected: /						Chlorine Strip GBRA Reagent #			Chlorine : Absent/ Present		
Ice: Yes / No (Circle One)						pH Paper GBRA Reagent #:					
# of Containers:			Condition of Containers (Intact): Yes / No (Circle One)			Residual Chlorine (Total/Free) Results:					
Date Collected	Time Collected	Matrix: WW=Wastewater DW=Drinking Water SW=Surface Water SO=Soil/Sludge	8x Vol. P=Plastic G=Glass	Sample Name/Description	TCEQ ID Number	Grab / Comp.	Analysis Requested	GBRA Sample ID	Bottle I.D.#	pH	Type of Preservation	Rush sample (2x, 3x, 4x)
Collected By:					Date/Time:	Transferred To:				Date/Time:		
Released From:					Date/Time:	Received By:				Date/Time:		
Released From:					Date/Time:	Received By:				Date/Time:		
Released From:					Date/Time:	Received By:				Date/Time:		
Released From:					Date/Time:	Received By:				Date/Time:		
NOTES / COMMENTS / SHIP TO:												

RL-042/COC-0101/TWG-6000/2011 (QASM App. c) GBRA Doc. 3019-C Rev 18 Eff: 07/09/2018 MMR

Upper Guadalupe River Authority Environmental Laboratory

Chain of Custody Record

Report To:			Invoice To:	E-mail: PLEASE PRINT CLEARLY	Preservation Info:
Customer			Same? Y N		
Address			Info:		
City	State	Zip			
Attn:	Phone #				

Sample Information: Hardcopy Report? Y N

Requested Analysis:

Project Name:

Sampled By:

Comments:

System Name: and Public Water ID # (if applicable)	Sample Location	Collected Date	Collected Time	Sample Type	Source	Cl_2 residual	# of containers	Chemical Preservative	Work Order number (Lab use only)
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐ _____	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐ _____	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐ _____	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐ _____	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐ _____	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]
[ ]	[ ]	[ ]	[ ]	☐ Distribution ☐ Construction ☐ Raw ☐ Repeat ☐ Effluent ☐ _____	☐ Groundwater ☐ Surface water ☐ Wastewater				[ ]

Condition of Sample(s):	Temperature:	Send out:

Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

UGRA use only: $_____ ☐ Paid

Cash CC Check ref.#_____

Appendix F: Data Review Checklist and Summary Shells Data Review Checklist

This checklist is to be used by the Planning Agency and other entities handling the monitoring data in order to review data before submitting to the TCEQ. This table may not contain all of the data review tasks being conducted.

Data Format and Structure	Y, N, or N/A
Are there any duplicate Tag Id numbers in the Events file?	
Do the Tag prefixes correctly represent the entity providing the data?	
Have any Tag Id numbers been used in previous data submissions?	
Are Tag IDs associated with a valid SLOC?	
Are sampling Dates in the correct format, MM/DD/YYYY with leading zeros?	
Are sampling Times based on the 24 hr clock (e.g. 09:04) with leading zeros?	
Is the Comments field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?	
Are Submitting Entity, Collecting Entity, and Monitoring Type codes used correctly?	
Do sampling dates in the Results file match those in the Events file for each Tag Id?	
Are values represented by a valid parameter code with the correct units?	
Are there any duplicate parameter codes for the same Tag Id?	
Are there any invalid symbols in the Greater Than/Less Than (GT/LT) field?	
Are there any Tag Ids in the Results file that are not in the Events file or vice versa?	
Data Quality Review	Y, N, or N/A
Are “less-than” values reported at the LOQ? If no, explain in Data Summary.	
Have the outliers been verified and a "1" placed in the Verify_flg field?	
Have checks on correctness of analysis or data reasonableness been performed? e.g., Is ortho-phosphorus less than total phosphorus? Are dissolved metal concentrations less than or equal to total metals? Is the minimum 24 hour DO less than the maximum 24 hour DO? Do the values appear to be consistent with what is expected for site?	
Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?	
Are all parameter codes in the data set listed in the QAPP?	
Are all stations in the data set listed in the QAPP?	
Documentation Review	Y, N, or N/A
Are blank results acceptable as specified in the QAPP?	
Were control charts used to determine the acceptability of lab duplicates (if applicable)?	
Was documentation of any unusual occurrences that may affect water quality included in the Event file’s Comments field?	
Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain in Data Summary.	
Were there any failures in field and/or laboratory measurement systems that were not	

resolvable and resulted in unreportable data? If yes, explain in Data Summary.	
Was the laboratory's NELAP Accreditation current for analysis conducted?	
Did participants follow the requirements of this QAPP in the collection, analysis, and reporting of data?	

Data Summary

Data Set Information

Data Source: _____

Date Submitted: _____

Tag_id Range: _____

Date Range: _____

□ I certify that all data in this data set meets the requirements specified in Texas Water Code Chapter 5, Subchapter R (TWC §5.801 et seq) and Title 30 Texas Administrative Code Chapter 25, Subchapters A & B.
□ This data set has been reviewed using the criteria in the Data Review Checklist.

Planning Agency Data Manager: _____ Date: _____

Please explain in the table below any data discrepancies discovered during data review including:

- Inconsistencies with LOQs
- Failures in sampling methods and/or laboratory procedures that resulted in data that could not be reported to the TCEQ (indicate items for which the Corrective Action Process has been initiated and send *Corrective Action Status Report* with the applicable Progress Report).

Dataset ____ contains data from FY__ QAPP Submitting Entity code __ and collecting entity ___. This is field and lab data that was collected by the (collecting entity). Analyses were performed by the (lab name). The following tables explain discrepancies or missing data as well as calculated data loss.

Discrepancies or missing data for the listed tag ID:

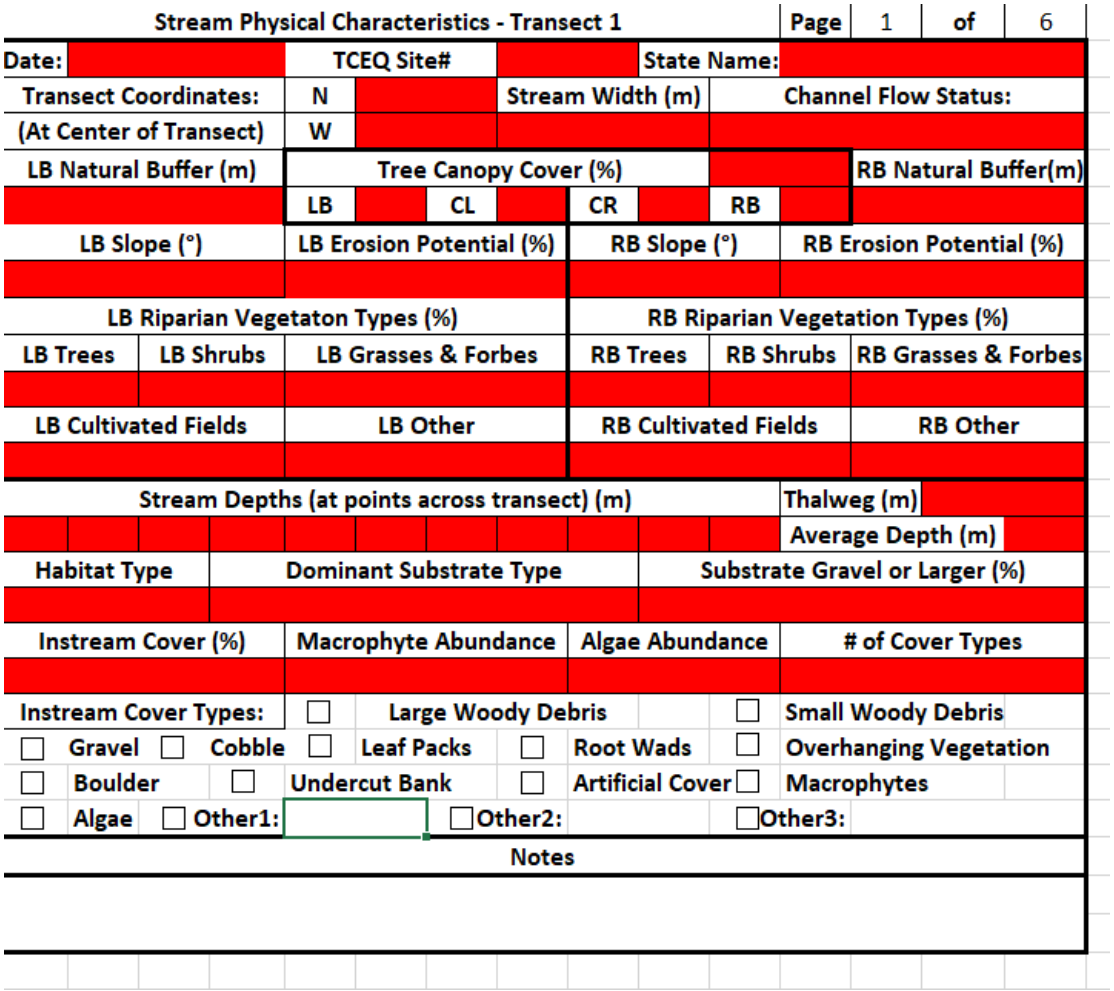
Tag ID	Station ID	Date	Parameters	Type of Problem	Comment/PreCAPs/CAPs

Data Loss

Parameter	Missing Data points out of Total	Percent Data Loss for this Dataset	Parameter	Missing Data points out of Total	Percent Data Loss for this Dataset

Appendix G: Biological Monitoring Electronic Field Sheet

Stream Physical Characteristics Sheet



Stream Physical Characteristics - Transect 1								Page	1	of	6
Date:		TCEQ Site#			State Name:						
Transect Coordinates:	N		Stream Width (m)		Channel Flow Status:						
(At Center of Transect)	W										
LB Natural Buffer (m)	Tree Canopy Cover (%)						RB Natural Buffer(m)				
	LB		CL		CR		RB				
LB Slope (°)	LB Erosion Potential (%)		RB Slope (°)		RB Erosion Potential (%)						
LB Riparian Vegetaton Types (%)			RB Riparian Vegetation Types (%)								
LB Trees	LB Shrubs	LB Grasses & Forbes	RB Trees		RB Shrubs		RB Grasses & Forbes				
LB Cultivated Fields	LB Other		RB Cultivated Fields		RB Other						
Stream Depths (at points across transect) (m)								Thalweg (m)			
								Average Depth (m)			
Habitat Type	Dominant Substrate Type		Substrate Gravel or Larger (%)								
Instream Cover (%)	Macrophyte Abundance		Algae Abundance		# of Cover Types						
Instream Cover Types:	☐	Large Woody Debris		☐	Small Woody Debris						
☐ Gravel ☐ Cobble	☐	Leaf Packs	☐	Root Wads	☐	Overhanging Vegetation					
☐ Boulder	☐	Undercut Bank	☐	Artificial Cover	☐	Macrophytes					
☐ Algae ☐ Other1:		☐ Other2:			☐ Other3:						
Notes											