Texas State Soil and Water Conservation Board
State Nonpoint Source Grant Program

Petronila and San Fernando Creek Watershed Protection Plan Implementation

TSSWCB Project # 23-52

Quality Assurance Project Plan

Texas State Soil and Water Conservation Board

Revision #0

prepared by

Texas A&M AgriLife Research
Texas Water Resources Institute

Effective Period: Upon final approval through Feb 28, 2025

Questions concerning this quality assurance project plan should be directed to:

Shaylynn Postma
TWRI Research Associate and Project Manager
shaylynn.postma@ag.tamu.edu
1001 Holleman Dr. East
23118 TAMU
College Station, Texas 77840

This Page Left Blank Intentionally

Section A1: Approval Sheet

Quality Assurance Project Plan (QAPP) for *Petronila and San Fernando Creek Watershed Protection Plan Implementation*

Texas State Soil and Water Conservation Board (TSSWCB)

Name: Jana Lloyd
Title: TSSWCB Project Manager (PM)

Signature: _____ Date: 9/8/23

Name: Mitch Conine
Title: TSSWCB Quality Assurance Officer (QAO)

Signature: _____ Date: 9/8/2023

Texas A&M AgriLife Research – Texas Water Resources Institute (TWRI)

Name: Lucas Gregory
Title: TWRI Associate Director and Project Leader

Signature: _____ Date: 9/6/2023

Name: Stephanie DeVilleneuve
Title: TWRI Research Specialist and QAO

Signature: _____ Date: 9/6/2023

Name: Shaylynn Postma
Title: TWRI Research Associate and Project Manager

Signature: _____ Date: 9/6/2023

Nueces River Authority (NRA)

Name: Marisa Juarez
Title: NRA Director of Utilities and Water Quality

Signature: _____ Date: 8/28/2023

Texas A&M University – Corpus Christi (TAMU-CC)

Name: Michael Wetz
Title: Professor & Chair for Coastal Ecosystem Processes

Signature: _____ Date: 8/29/23

City of Corpus Christi – Water Utilities Lab (WUL)

Name: Michael McGall
Title: Lab Manager

Signature: _____ Date: 9/6/2023

Name: LaDona Parr
Title: Lab QAO

Signature: _____ Date: 09/06/2023

Section A2: Table of Contents

Section: Title

List of Acronyms and Abbreviations

AWRL	Ambient Water Reporting Limits
BBSG	Baffin Bay Stakeholder Group
CAR	corrective action report
CBBEP	Coastal Bend Bays and Estuaries Program
COC	chain of custody
CRP	Clean Rivers Program
DM	Data Manager
DMRG	data management reference guide
DO	dissolved oxygen
DQO	data quality objectives
HRI	Harte Research Institute
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LM	Laboratory Manager
LOD	limit of detection
LOQ	limit of quantitation
NELAP	National Environmental Laboratory Accreditation Program
NRA	Nueces River Authority
NWS	National Weather Service
OSSF	onsite sewage facility
PM	Project Manager
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	quality assurance project plan
QC	quality control
QM	quality manual
QPR	quarterly progress report
RPD	relative percent difference
SOP	standard operating procedure
SWQM	surface water quality monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TAMU-CC	Texas A&M University – Corpus Christi
TCEQ SOP, V1	TCEQ's Surface Water Quality Monitoring Procedures, Volume 1
TCEQ	Texas Commission on Environmental Quality
TSSWCB	Texas State Soil and Water Conservation Board
TWRI	Texas AgriLife Research, Texas Water Resources Institute
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WUL	City of Corpus Christi Water Utilities Laboratory
%R	percent recovery

Section A3: Distribution List

Organizations, and individuals within, which will receive copies of the approved QAPP and any subsequent revisions include:

Texas State Soil and Water Conservation Board

1497 Country View Lane
Temple, TX 76504

Name: Jana Lloyd
Title: TSSWCB PM

Name: Mitch Conine
Title: TSSWCB QAO

Texas A&M AgriLife Research - Texas Water Resources Institute

1001 Holleman Dr East
2118 TAMU
College Station, TX 77840

Name: Lucas Gregory
Title: TWRI Associate Director and Project Leader

Name: Stephanie DeVilleneuve
Title: TWRI Research Specialist and QAO

Name: Shaylynn Postma
Title: TWRI Research Associate and PM

Nueces River Authority

602 N. Staples St, Suite 280
Corpus Christi, Texas 78401

Name: Marisa Juarez
Title: Director of Utilities and Water Quality

Texas A&M University – Corpus Christi

6300 Ocean Drive, Unit 5869

Corpus Christi, Texas 78412

Name: Michael Wetz
Title: Professor & Chair of Coastal Ecosystem Processes

City of Corpus Christi – Water Utilities Laboratory

1301 Leopard St.
Corpus Christi, Texas 78410

Name: Michael McCall
Title: Lab Manager

Name: LaDona Parr
Title: Lab QAO

Section A4: Project/Task Organization

The following is a list of individuals and organizations participating in the project with their specific roles and responsibilities:

TSSWCB – Texas State Soil and Water Conservation Board, Temple, Texas. Provide state oversight and management of all project activities and ensure coordination of activities with related projects and TCEQ.

Jana Lloyd, TSSWCB PM

Responsible for ensuring that the project delivers data of known quality, quantity, and type on schedule to achieve project objectives. Provides the primary point of contact between TSSWCB and TWRI. Tracks and reviews deliverables to ensure that tasks in the work plan are completed as specified. Reviews and approves QAPP and any amendments or revisions and ensures distribution of approved/revised QAPPs to TSSWCB participants. Notifies TSSWCB QAO of any project non-conformances or corrective actions reported or taken by TWRI.

Mitch Conine; TSSWCB QAO

Reviews and approves QAPP and any amendments or revisions. Responsible for verifying that the QAPP is followed by project participants. Monitors implementation of corrective actions. Coordinates or conducts audits of field and laboratory systems and procedures. Determines that the project meets the requirements for planning, quality assessment (QA), quality control (QC), and reporting under the TSSWCB Nonpoint Source Management Program.

TWRI – Texas Water Resources Institute, College Station, Texas. Responsible for general project oversight, coordination and administration, project reporting, collection of water quality data, updating data analysis and characterization, updating Load Duration Curves (LDC), and QAPP development.

Lucas Gregory, TWRI; Associate Director & Project Lead

Responsible for supporting the development and ensuring the timely delivery of project deliverables, ensuring cooperation between project partners, providing fiscal oversight and completing project reporting.

Stephanie DeVilleneuve, TWRI; Research Specialist and QAO

Responsible for determining that the QAPP meets the requirements for planning, QA and QC. Conducts audits of field and laboratory systems and procedures. Responsible for maintaining the official, approved QAPP, as well as conducting quality assurance audits in conjunction with TSSWCB personnel. Responsible for reviewing any deviations from the QAPP and developing corrective action plans in consultation with the project manager, lab manager and field sampling staff as appropriate.

Shaylynn Postma, TWRI; Research Associate and PM

The TWRI Project Manager is responsible for ensuring that tasks and other requirements in the contract are executed on time and with the QA/QC requirements in the system as defined by the contract and in the project QAPP; assessing the quality of subcontractor/participant work; and submitting accurate and timely deliverables to the TSSWCB PM.

WUL – City of Corpus Christi – Water Utilities Lab, Corpus Christi, Texas. Responsible for conducting laboratory analysis.

Michael McCall, WUL LM

Responsible for overall performance, administration, and reporting of analyses performed by WUL. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Enforces corrective action, as required. Facilitates monitoring systems audits. Reviews and verifies all laboratory data for integrity and continuity, reasonableness, and conformance to project requirements, and then validates the data against the measurement performance specifications listed in Table A7.1 of the QAPP.

LaDona Parr, WUL QAO

Monitors the implementation of the QAM and the QAPP within the laboratory to ensure complete compliance with QA objectives as defined by the contract and in the QAPP. Conducts internal audits to identify potential problems and ensure compliance with written SOPs. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Performs validation and verification of data before the report is sent to TWRI. Ensures that all QA reviews are conducted in a timely manner from real-time review at the bench during analysis to final submittal of data to TWRI QA officer.

NRA – Nueces River Authority, Corpus Christi, Texas. Responsible for field data collection, management and reporting to the Texas Commission on Environmental Quality.

Marisa Juarez, NRA Director of Utilities and Water Quality and Field Supervisor

Coordinates field sampling and data collection activities and supervises the field personnel in conducting sampling events. Ensures that all field personnel are properly trained and equipped to conduct the necessary monitoring and that all sampling procedures are followed according to the QAPP. Ensures that personnel, supplies, and equipment are available at all appropriate times. Responsible for overseeing the Aquatic Resource Specialist in completing sample documentation including labeling samples and ensuring the correct sites are identified. Supervises field and laboratory data entry

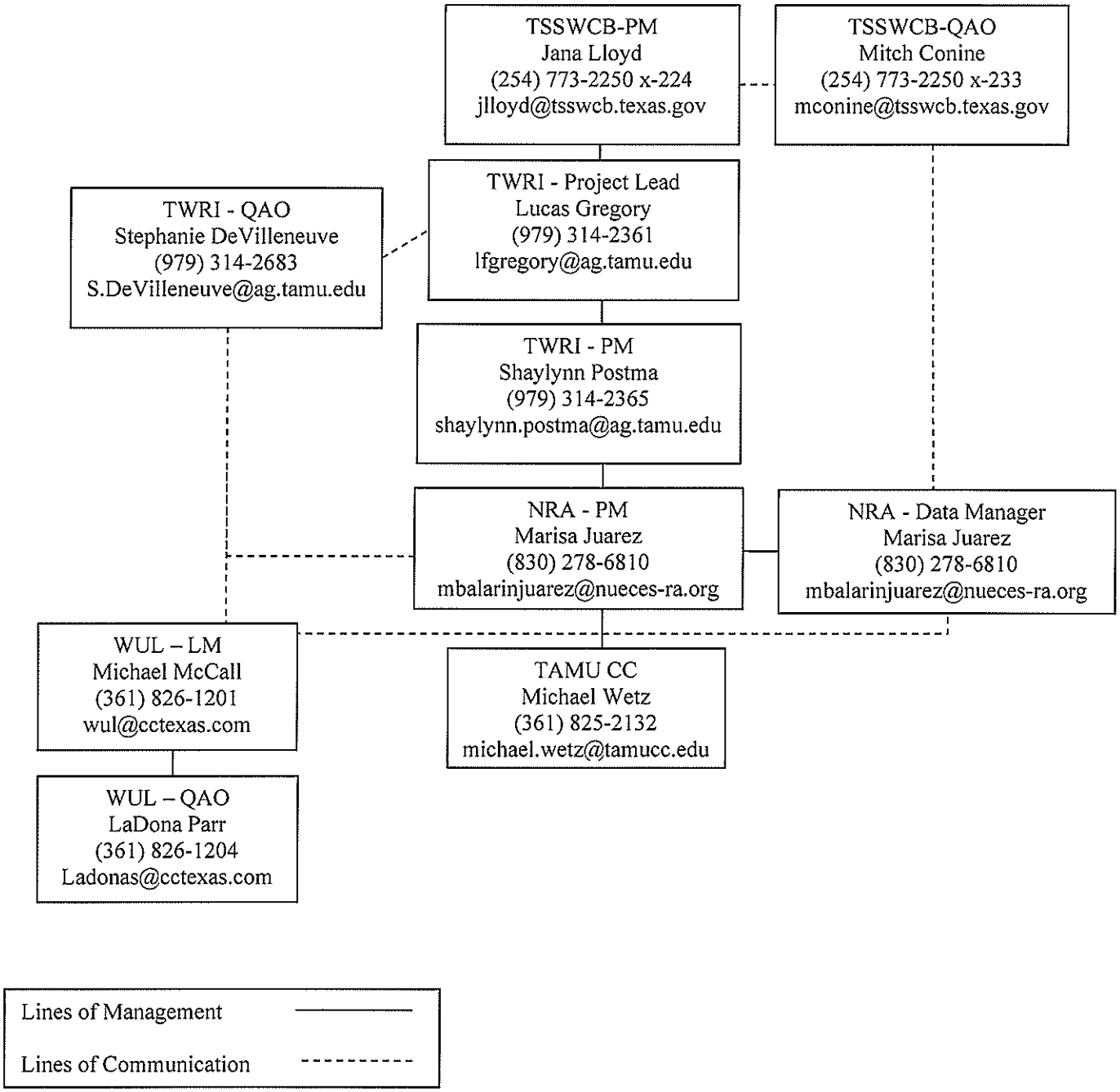
to the NRA database. Reviews data entered into NRA database and informs NRA Project Manager of any needed corrections.

TAMU-CC – Texas A&M University – Corpus Christi, Corpus Christi, Texas. Responsible for providing assistance with data assessment and review, stakeholder facilitation support, and watershed protection plan review.

Michael Wetz, Professor and Chair of Coastal Ecosystem Processes

Coordinates with the project team in the evaluation and assessment of watershed and water quality data. Reviews needed load reduction estimates and pollutant loading estimates. Supports and assists with stakeholder engagement, coordination, and facilitation efforts. Contributes to and reviews the watershed protection plan.

Figure A4.1. Project Organization Chart



Section A5: Problem Definition/Background

The Texas Integrated Report and 303(d) List has identified San Fernando Creek (SegID 2492A), Petronila Creek Tidal (SegID 2203), and Petronila Creek Above Tidal (SegID 2204) as impaired since 2006, 2010, and 2016, respectively, for not meeting the state's water quality standard for contact recreation. All three are impaired for elevated bacteria, while additional impairments for chloride, sulfate, and total dissolved solids were added for Petronila Creek Above Tidal in 2022. Petronila Creek Tidal has previously had an impairment for high pH that was listed in the 2018 Integrated Report and then was removed in 2022. Besides the impairments, San Fernando Creek has concerns for elevated nitrates, chlorophyll-a, and total phosphorus, Petronila Creek Tidal has a concern for chlorophyll-a, and Petronila Creek Above Tidal has concerns for chlorophyll-a, total phosphorous, and depressed dissolved oxygen.

The two watersheds encompass portions of Kleberg, Duval, Jim Wells, and Nueces counties and are predominantly rural, although San Fernando Creek includes the cities of Kingsville, Alice, Benavides and Bishop, and each municipality has one or more wastewater treatment plants that contribute flow to the stream network. These wastewater contributions dominate flows in San Fernando Creek, but not Petronila Creek except in drought conditions. Because of their neighboring locations and overlapping key stakeholders, the San Fernando/Petronila Creeks WPP was developed as a watershed-based plan (WBP) covering both watersheds.

San Fernando and Petronila Creeks flow into Baffin Bay and are two of the three major tributaries in this hypersaline estuary. Baffin Bay is also experiencing water quality concerns with high concentrations of chlorophyll-a, nitrate, total Kjeldahl nitrogen and very high concentrations of organic matter reported. The hydrology of this system undoubtedly impacts estuarine water quality; however, pollutant loadings from the watershed are known contributors to the ongoing water quality issues.

Watershed stakeholders have expressed a desire to improve water quality in Baffin Bay and formed an ad-hoc stakeholder group known as the Baffin Bay Stakeholder Group (BBSG) in 2018. The goal of this group is to improve water quality in the bay, and they fully understand the importance that watersheds play in the health and function of the bay. In 2020, efforts to develop a WPP began and resulted in the development of the Petronila and San Fernando Creeks WPP. The plan outlines an approach to improve water quality through voluntary implementation of management practices to address nonpoint source pollution across the watershed. These practices address bacteria from feral hogs, human sources (failing on-site sewage facilities and wastewater treatment facilities), livestock (grazing animals), pets and wildlife and focus on feasible management activities.

With the acceptance of the WPP, efforts to improve water quality in the bay and watershed have shifted toward securing funds to implement the WPP components and facilitating stakeholder engagement. A dedicated watershed coordinator will continue to engage watershed stakeholders through education and outreach activities and focused discussions with existing entities and groups. Discussion will be held regarding specific implementation projects that can

be done now and those that are desired in the future. The watershed coordinator will also facilitate future project ideas and proposal development to secure implementation funding.

Section A6: Project Goals and Task Description

This project will focus on transitioning BBSG activities from WPP development to implementation. The project team, with leadership from the watershed coordinator, will continue working with key stakeholders and partner agencies to facilitate implementation activities outlined in the WPP. The watershed coordinator, to be hired by TAMU-CC Harte Research Institute (HRI), will serve as the primary conduit for interaction with landowners, citizens, and entities to facilitate WPP implementation. HRI will coordinate with the BBSG and other stakeholders to seek input and recommendations on needed activities and educational programs in the watershed and continue to support WPP implementation efforts. HRI will assist stakeholders in securing resources to implement management measures to improve water quality and acquire resources to enable implementation and will work with state and federal agencies, as appropriate, to bring technical and financial assistance to the watershed.

Education and outreach were identified as key components of WPP success. The WPP implementation will focus strongly on continuing to provide educational opportunities to stakeholders regarding management strategies that can reduce NPS pollution. Outreach and education coordination efforts by the watershed coordinator and project partners will facilitate and support public participation by private individuals and local officials during implementation. Activities may include but are not limited to developing publications, factsheets, website content, and other materials to promote and communicate watershed pollution prevention efforts. Additionally, the watershed coordinator will plan and conduct water resources education and outreach efforts across the watershed in collaboration with existing groups. Delivery of existing educational programs such as the Riparian and Stream Ecosystem Training, Lone Star Healthy Streams, Texas Watershed Stewards and Texas Well Owner Network and others will also occur.

Additional water quality sampling will be conducted to continue building a robust data set that illustrates baseline water quality conditions and future changes in water quality as a result of WPP implementation activity. Data collected will support long-term trend analysis which is a common means for evaluating gradual changes in water quality that are expected from WPP implementation. Monitoring will not commence until an approved monitoring QAPP is secured. Eleven monitoring sites from areas of the watershed where data is lacking have been selected for additional monitoring. Planned quarterly Clean Rivers Program (CRP) monitoring will continue at currently monitored sites and supplemental monitoring will be coordinated such that selected sites will be monitored monthly. This approach will result in monthly data collection over 18 months at monitored sites and will fill data gaps at CRP sites resulting from the traditional quarterly CRP monitoring regime.

Support for the project will continue long-term through the coordinated efforts of the Coastal Bend Bays and Estuaries Program (CBBEP), NRA, TAMU-CC, and TWRI. NRA is charged with managing and protecting the surface water resources of this watershed and the larger Nueces-Rio Grande Coastal Basin and will continue to do so into the future. They maintain stakeholder connections and conduct the basin's CRP monitoring. TAMU-CC is located

adjacent to the watershed and continually works to protect and restore coastal and marine habitats and resources. CBBEP has a similar mission and routinely works with the public to raise awareness about coastal resource issues. TWRI will continue to support implementation efforts in the watershed through education program delivery, assistance in grant acquisition and implementation project administration and support. Additionally, widespread local support to improve the water quality in Baffin Bay exists and is ongoing through the efforts of the Baffin Bay Stakeholder Group that meets approximately quarterly to discuss ongoing efforts, data collection and planning needs, funding opportunities and educational resource availability.

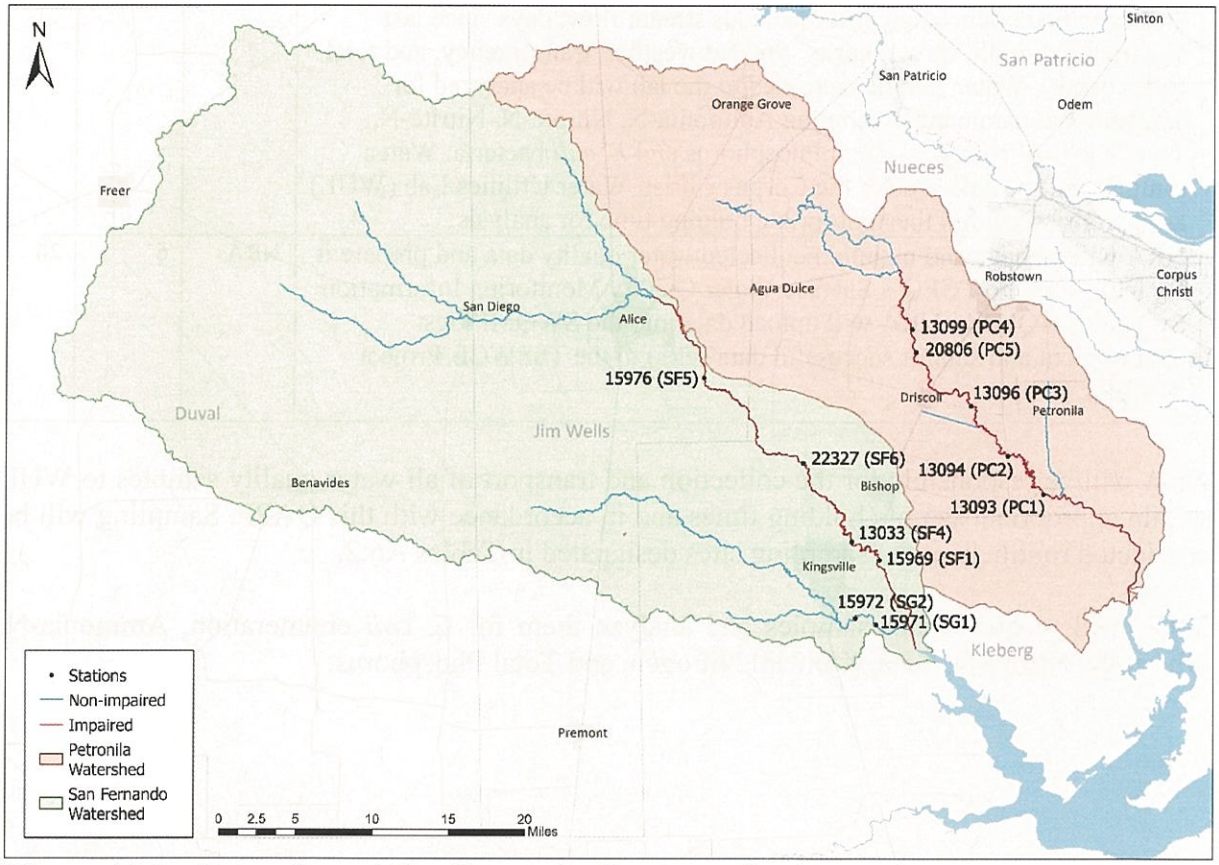


Figure A6.1. Petronila and San Fernando Creek monitoring stations

Table A6.1. Project Plan Milestones

Task	Project Milestones	Agency	Start Month	End Month
4.1	NRA will conduct routine, monthly, ambient water quality monitoring at 11 monitoring stations. Four of these are existing CRP sites that will continue to be monitored under the CRP program. During non-CRP sampling months, CRP sites will be sampled under this project. Flow will be measured where feasible. Sampling will include routine field parameters (water temperature, pH, DO, specific conductance, instantaneous stream flow, days since last significant rainfall, flow severity, present weather, transparency, and total water depth). Water samples returned to the lab will be analyzed for conventional parameters including Ammonia-N, Nitrate-N, Nitrite-N, Total Kjeldahl Nitrogen, Total Phosphorus and *E. coli* bacteria. Water samples will be delivered to the Corpus Christi Water Utilities Lab (WUL) as appropriate within the appropriate holding time for analysis.	NRA	6	24
4.2	NRA will manage and maintain collected water quality data and prepare it for inclusion into TCEQ's Surface Water Quality Monitoring Information System (SWQMIS). NRA will upload data into the SWQMIS test environment and submit successful data set(s) to the TSSWCB Project Manager.	NRA	6	24

NRA will be responsible for the collection and transport of all water quality samples to WUL within appropriate sample holding times and in accordance with this QAPP. Sampling will be conducted routinely at the sampling sites designated in Tables A6.2.

WUL will receive water samples and analyze them for *E. coli* enumeration, Ammonia-N, Nitrate-N, Nitrite-N, Total Kjeldahl Nitrogen, and Total Phosphorus.

Table A6.2. Petronila and San Fernando Creek water quality monitoring sites

TCEQ Station ID	Site Description	Latitude	Longitude	Start Date (Upon QAPP approval)	End Date	Mode of Sampling	Sample Matrix	Monitoring Freq.	Agency Responsible for Sampling	Monitor Type*
13093	Petronila Creek Immediately Upstream of FM 70 Bridge East of Bishop	27.579244	-97.627081	08/2023	02/2025	Grab	Water	Monthly	NRA	RT
13094	Petronila Creek at FM 892 SE of Driscoll	27.616771	-97.663710	08/2023	02/2025	Grab	Water	Monthly (Non-CRP Months Only)	NRA	RT
13096	Petronila Creek at FM 665	27.665202	-97.702324	08/2023	02/2025	Grab	Water	Monthly (Non-CRP Months Only)	NRA	RT
13099	Petronila Creek at FM 2826 N of Driscoll	27.739714	-97.763965	08/2023	02/2025	Grab	Water	Monthly	NRA	RT
20806	Petronila Creek 181 M West and 6 M South of Alice Rd. & Lost Creek Rd Intersection	27.717788	-97.759936	08/2023	02/2025	Grab	Water	Monthly (Non-CRP Months Only)	NRA	RT
13033	San Fernando Creek at US 77	27.537708	-97.832460	08/2023	02/2025	Grab	Water	Monthly (Non-CRP Months Only)	NRA	RT
15969	San Fernando Creek at FM 2045/E Santa Gertrudis Street 3.62 km E of Kingsville	27.519708	-97.803275	08/2023	02/2025	Grab	Water	Monthly	NRA	RT
15971	Santa Gertrudis Creek at N Kleberg CR 1070 644 Meters North of FM 1717 7.24 km SE of Kingsville	27.458015	-97.808099	08/2023	02/2025	Grab	Water	Monthly	NRA	RTWD
15972	Santa Gertrudis Creek at FM 1717 4.8 km SE of Kingsville	27.464418	-97.829825	08/2023	02/2025	Grab	Water	Monthly	NRA	RTWD
15975	San Fernando Creek at FM 1930 8.05 km SE of Alice in Jim Wells County	27.697073	-97.986757	08/2023	02/2025	Grab	Water	Monthly	NRA	RT
22327	San Fernando Creek upstream of FM 1355 Approx 0.5 miles South of FM 70	27.6139	-97.882552	08/2023	02/2025	Grab	Water	Monthly	NRA	RT

*Monitor type description can be found in table A9.1.

Section A7: Quality Objectives and Criteria for Data Quality

The purpose of this project is to collect additional water quality data to support implementation efforts, allow documentation of implementation effectiveness, and to continue to fill water quality data gaps across the watershed. Increasing spatial distribution and temporal resolution of sampling across the watershed will support this goal. Additionally, this approach will enable future refinements to implementation approaches and allow for long term assessment of implementation effectiveness. Personnel at NRA will conduct water quality monitoring.

Surface Water Quality Monitoring (SWQM) – The goal of this section is to ensure that data collected meets the data quality objectives (DQOs) of the project. The objective of this project is to gather water quality data for the San Fernando and Petronila watersheds to support implementation of the WPP.

Following are actions that will be undertaken by this project to assess bacterial pollution within these watersheds:

- Monitor water quality as related to bacteria

The measurement performance criteria to support the project objectives are specified in Table A7-1.

Consistent with the most recent version of the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (TCEQ SOP, V1) (TCEQ 2012), routine grab samples will be collected on a monthly basis during non-CRP monitoring months. During routine sampling, measurements of DO, conductivity, pH, stream flow, and water temperature will be obtained *in situ*. These data will be logged on field data sheets and incorporated into a computer-based database maintained by NRA.

Water samples collected will be transported to WUL for bacteria enumeration, Ammonia-N, Nitrate-N, Nitrite-N, Total Kjeldahl Nitrogen, and Total Phosphorus. NRA will deliver water samples to WUL within designated holding times for respective analysis; WUL will use designated methods outlined in Tables A7.1, A7.2, A7.3 and B2.1. Appropriate DQOs and QA/QC requirements for this analysis are also reported in Tables A7.1 and B2.1.

Ambient Water Reporting Limits (AWRLs)

The AWRL establishes the reporting specification at or below which data for a parameter must be reported to be compared with freshwater screening criteria. The AWRLs specified in Appendix A, Table A7.1 are the program-defined reporting specifications for bacteria and yield data acceptable for the TCEQ's water quality assessment. 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 level, 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).

The following requirements must be met in order to report results to TCEQ for inclusion in SWQMIS:

- The laboratory's LOQ for bacteria must be at or below the AWRL as a matter of routine practice

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) or sample/duplicate pairs in the case of bacterial analysis. 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 Table A7.1.

Representativeness
Site selection, the appropriate sampling regime, the sampling of all pertinent media according to TCEQ SOP, V1, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected for water quality assessment are considered to be spatially and temporally representative of routine 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 18 months (to include inter-year variation) and include some data collected during an index period (March 15-October 15). For this project, monthly sampling will be conducted. 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 total representation of the water body will be tempered by the potential funding for complete representativeness.

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 and as described in this QAPP and in TCEQ SOP, V1. 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 Section B10.

Completeness

The completeness of the data is basically a relationship of 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.

Limit of Quantitation

AWRLs (Table A7.1) are used in this project as the *limit of quantitation specification*, so data collected under this QAPP can be compared against the Texas Surface Water Quality Standards. Laboratory *limits of quantitation* (Table A7.1) must be at or below the AWRL for each applicable parameter.

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

Table A7.1. Measurement Performance Specifications for Bacteria Parameters

Bacteriological Parameters in Water											
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Precision (RPD of LCS/LCSD)**	**Bias %Rec. of LCS**	**Lab**	**Completeness (%)**
E. coli, Colilert, IDEXX	MPN/100 mL	Water	SM9223 B	31699	1	1	NA	0.50*	NA	WUL	90
E. coli, Colilert, IDEXX, Holding Time	Hours	NA	NA	31704	NA	NA	NA	NA	NA	WUL	90

* 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.

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, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).

Table A7.2. Measurement Performance Specifications for Conventional Parameters

Parameter	Units	Matrix	Method	Parameter Code	AWRL *	Limit of Quantitation (LOQ)	Recovery at LOQ (%)	PRECISION (RPD of LCS/LCSD)	BIAS %Rec. of LCS	Completeness (%)	Lab
Nitrogen, Ammonia, Total (MG/L as N)	mg/L	water	EPA 350.1 Rev 2.0 (1993)	00610	0.1	0.1	70-130	20	80-120	90	WUL
Nitrite, Nitrogen, Total (MG/L as N)	mg/L	water	EPA 300.0 Rev 2.1 (1993)	00615	0.05	0.02	70-130	20	80-120	90	WUL
Nitrate, Nitrogen, Total (MG/L as N)	mg/L	water	EPA 300.0 Rev 2.1 (1993)	00620	0.05	0.02	70-130	20	80-120	90	WUL
Nitrogen, Kjeldahl, Total (MG/L as N)	mg/L	water	EPA 300.0 Rev 2.1 (1993)	00625	0.05	0.02	70-130	20	80-120	90	WUL
Phosphorus, Total, Wet Method (MG/L as P)	mg/L	water	EPA 365.1	00665	0.06	0.06	70-130	20	80-120	90	WUL

References:
* Reporting to be consistent with SWQM guidance and based on measurement capability.
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)

Table A7.3. Measurement Performance Specifications for Field and Flow Parameters

Parameter	Units	Matrix	Method	Parameter Code	AWRL *	Limit of Quantitation (LOQ)	Recovery at LOQ (%)	PRECISION (RPD of LCS/LCSD)	BIAS %Rec. of LCS	Completeness (%)
pH (standard units)	s.u.	water	EPA 150.1 & TCEQ SOP V1	00400	NA	NA	NA	NA	NA	90
Oxygen, dissolved	mg/L	water	SM4500 O-G & TCEQ SOP V1	00300	NA	NA	NA	NA	NA	90
specific conductance, field (us/cm @ 25c)	uS/cm	water	EPA 120.1 & TCEQ SOP V1	00094	NA	NA	NA	NA	NA	90
Temperature	degree C	water	SM2550B & TCEQ SOP V1	00010	NA	NA	NA	NA	NA	90
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)*	cfs	water	TCEQ SOP V1	00061	NA*	NA	NA	NA	NA	90
FLOW SEVERITY: 1=No Flow, 2=Low, 3=Normal, 4=Flood, 5=High, 6=Dry	NU	water	TCEQ SOP V1	01351	NA*	NA	NA	NA	NA	90
STREAM FLOW ESTIMATE (CFS)	cfs	water	TCEQ SOP V1	74069	NA*	NA	NA	NA	NA	90
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	NA*	NA	NA	NA	NA	90
Secchi Depth	meters	water	TCEQ SOP V1	00078	NA	NA	NA	NA	NA	90
Days since last significant rainfall	days	other	TCEQ SOP V1	72053	NA	NA	NA	NA	NA	90
Depth of bottom of water body at sample site	meters	water	TCEQ SOP V1	82903	NA	NA	NA	NA	NA	90
Maximum pool width+	meters	water	TCEQ SOP V1	89864	NA	NA	NA	NA	NA	90
Maximum pool depth+	meters	water	TCEQ SOP V1	89865	NA	NA	NA	NA	NA	90
Pool length in meters+	meters	water	TCEQ SOP V1	89869	NA	NA	NA	NA	NA	90
Percentage the pool covers within a 500 meter reach+	meters	water	TCEQ SOP V1	89870	NA	NA	NA	NA	NA	90
Present Weather 1=CLEAR 2=PTCLDY 3=CLDY 4=RAIN 5=OTHER	NU	Other	NA	89966	NA	NA	NA	NA	NA	90
Water Color 1=BRWN 2=RED 3=GRN 4=BLK 5=CLEAR 6=OTHR	NU	Water	NA	89971	NA	NA	NA	NA	NA	90

Water Surface 1=CALM 2=RIPPLES 3=WAVE 4=WHT CAP	NU	Water	NA	89968	NA	NA	NA	NA	NA	90
Wind Intensity 1=CALM 2=SLIGHT 3=MOD 4=STRONG	NU	Other	NA	89965	NA	NA	NA	NA	NA	90
Tide Stage 1=LOW 2=FALLING 3=SLCK 4=RISING 5=HIGH	NU	Water	NA	89972	NA	NA	NA	NA	NA	90
Wind Direction 1=NORTH 2=SOUTH 3=EAST 4=WEST 5=NE 6=SE 7=NW 8=SW	NU	Other	NA	89010	NA	NA	NA	NA	NA	90
Turbidity 1=LOW 2=MEDIUM 3=HIGH	NU	Water	NA	89842	NA	NA	NA	NA	NA	90
Rainfall (in past 1 day)	NU	Other	NA	82553	NA	NA	NA	NA	NA	90
Rainfall (in past 7 day)	NU	Other	NA	82554	NA	NA	NA	NA	NA	90

References:

* Reporting to be consistent with SWQM guidance and based on measurement capability.

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)

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).

+To be reported only when collecting data from perennial pools.

Section A8: Special Training Requirements/Certification

Surface Water Quality Monitoring

Work conducted for this project is covered under and documented in this QAPP. Personnel conducting work associated with this project are deemed qualified to perform their work through educational credentials, specific job/task training, required demonstrations of competency, and internal and external assessments. Laboratories are NELAP-accredited as required. Records of educational credentials, training, demonstrations of competency, assessments, and corrective actions are retained by project management and are available for review.

Staff responsible for operating the field-use multi-parameter sondes and flow loggers will undergo training event by a qualified trainer (the equipment manufacturer, TCEQ SWQM personnel, an experienced field sampler, or the QA Officer). Training may also occur at set statewide training events, such as the annual SWQM Workshop.

Field personnel will receive training in proper sampling and field analysis. Before actual sampling or field analysis occurs, they will demonstrate to the QA officer (in the field), their ability to properly operate the field-use multi-parameter sondes and retrieve the samples. The QA officer will sign off each field staff in their field logbooks. Field personnel training is documented and retained in the personnel file, and will be available during a monitoring systems audit.

Section A9: Documentation and Records

SWQM- Hard copies of general maintenance records, all field data sheets, chain of custody (COC) forms, laboratory data entry sheets, calibration logs, and corrective action reports (CARs) will be archived for at least five years. In addition, NRA will archive electronic forms of all project data for at least five years. All electronic data are backed up on an external networked server. A blank CAR form is presented in Appendix A, a blank COC form is presented in Appendix C, and blank field data reporting forms are presented in Appendix B.

Laboratory Documentation

Test/data reports from the laboratory must document the test results clearly and accurately. Routine data reports should be consistent with the *TNI Volume 1, Module 2, Section 5.10* (2009) and include the information necessary for the interpretation and validation of data. The requirements for reporting data and the procedures are provided.

Reports of results of analytical tests performed by the laboratory contain the following elements:

- Title of report
- Name and address of the laboratory
- Name and address of the client
- A clear identification of the sample(s) analyzed (unique identifiers)
- Identification of method used
- Identification of samples that did not meet QA requirements (by use of data qualifiers)
- Sample results
- Units of measurement
- Sample matrix
- Station information
- Date and time of collection
- 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
- Clearly identified subcontract laboratory results (as applicable)
- A name and title of the person accepting responsibility for the report
- Project-specific QC results

Upon completion of all analyses, WUL generates a Report Cover Page, a Laboratory Analysis Report, and a Quality Control Data Report. The chain of custody documentation, field data sheets, and subcontract laboratory reports (if applicable) are attached to form the final report. WUL reviews the report and submits it to the TWRI QAO for additional review. Upon final review by the TWRI QAO, the report is submitted to the TWRI PM for electronic submittal to SWQMIS.

Electronic Data

Data will be submitted to the TCEQ in the event/result format specified in the most current version of the TCEQ DMRG for upload to SWQMIS. The DMRG can be found at https://www.tceq.texas.gov/waterquality/data-management/dmrg_index.html. The Data Review Checklist and Summary as contained in Appendix D of this document will be submitted with the data.

All reported Events will have a unique TagID (see DMRG). TagIDs used in this project will be seven-character alphanumeric codes with the structure of the two-letter Tag prefix followed by a five-digit number: for example – O01234, O01235, etc.

Submitting Entity, Collecting Entity, and Monitoring Type codes will reflect the project organization and monitoring type in accordance with the DMRG. The proper coding of Monitoring Type is essential to accurately capture any bias toward certain environmental condition (for example, high flow events).

Table A9.1. SWQMIS Data Entry Codes

Sample Description	Tag Prefix	Submitting Entity	Collecting Entity	Monitoring Type
Routine Monitoring	TX	NR	NR	RT*
Routine Monitoring Watershed Characterization	TX	NR	NR	RTWD*

*RT: Samples are scheduled in advance without intentionally trying to target any certain environmental condition. The sample is collected regardless of the conditions encountered.
*RTWD: Routine monitoring solely intended to understand the basic physical, environmental, and human elements of the watershed. Water quality monitoring data which are determined to meet spatial, temporal, and other sample collection and quality requirements necessary for 305(b)/303(d) assessment should be coded "RT". Additional details about the sampling considerations for the 305(b)/303(d) assessment are included in the *Guidance for Assessing and Reporting Surface Water Quality in Texas.* Data which do not meet applicable requirements should be coded "RTWD".

Combined Project Documentation

Quarterly progress reports disseminated to the individuals listed in section A3 will note activities conducted in connection with the water quality project, items or areas identified as potential problems, and any variations or supplements to the QAPP.

CARs will be utilized when necessary (Appendix A). CARs will be maintained in an accessible location for reference at TWRI and will be disseminated to the individuals listed in section A3. CARs resulting in any changes or variations from the QAPP will be made known to pertinent project personnel and documented in updates or amendments to the QAPP.

All electronic data are backed up routinely. A blank CAR is presented in Appendix A and a blank COC form is presented in Appendix C. The TSSWCB may elect to take possession of records at the conclusion of the specified retention period.

Table A9.2. Project Documents and Records

Document/Record	Location	Retention	Form
QAPP, amendments, and appendices	TWRI, NRA, WUL	5 years	Electronic
QAPP distribution documentation	TWRI	5 years	Paper/Electronic
Corrective Action Reports (CARs)	TWRI, NRA, WUL	5 years	Paper/Electronic
Training Records	NRA, WUL	5 years	Paper/Electronic
Field notebooks or field data sheets	NRA	5 years	Paper/Electronic
Field equipment calibration/maintenance	NRA	5 years	Paper/Electronic
Chain of custody records	NRA, WUL	5 years	Paper/Electronic
Laboratory QA manuals	WUL	5 years	Paper/Electronic
Laboratory SOPs	WUL	5 years	Paper/Electronic
Laboratory procedures	WUL	5 years	Paper/Electronic
Instrument raw data files	WUL	5 years	Paper/Electronic
Instrument readings/printouts	WUL	5 years	Paper/Electronic
Laboratory data reports/results	WUL	5 years	Paper/Electronic
Laboratory equipment maintenance logs	WUL	5 years	Paper/Electronic
Laboratory calibration records	WUL	5 years	Paper/Electronic
Progress Reports/Final Reports	TWRI/TSSWCB	3 years	Electronic

Data Transfer between Entities

Data transfer between entities occurs via electronic means. Specific format of the data transferred depends on the specific data and includes ArcMap, MS Office, and PDF formats.

QAPP Revision and Amendments

Until the work described is completed, this QAPP shall be revised as necessary and reissued annually on the anniversary date, or revised and reissued within 120 days of significant changes, whichever is sooner. The last approved versions of QAPPs shall remain in effect until revised versions have been fully approved; the revision must be submitted to the TSSWCB for approval before the last approved version has expired. If the entire QAPP is current, valid, and accurately reflects the project goals and the organization's policy, the annual re-issuance may be done by a certification that the plan is current. This can be accomplished by submitting a cover letter stating the status of the QAPP and a copy of new, signed approval pages for the QAPP.

Amendments to the QAPP may be necessary to reflect changes in project organization, tasks, schedules, objectives and methods; address deficiencies and non-conformances; improve operational efficiency; and/or accommodate unique or unanticipated circumstances. Requests or amendments are directed from the TWRI Project Lead to the TSSWCB PM in writing. The changes are effective immediately upon approval by the TSSWCB PM and QAO, or their designees. Amendments to the QAPP and the reasons for the changes will be documented, and copies of the approved QAPP Expedited Amendment form will be distributed to all individuals on the QAPP distribution list by the TWRI QAO. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process.

Section B1: Sampling Process Design (Experimental Design)

SWQM- Sampling conducted for this project will supplement existing water quality data collection in Petronila and San Fernando Creeks at 11 stations, four of which are actively monitored CRP stations. Sampling will be conducted monthly over an 18-month period. CRP stations will only be sampled during non-CRP monitoring months. Four stations on San Fernando Creek, two stations on Santa Gertrudis Creek, and five on Petronila Creek will be sampled by NRA. Parameters listed in tables A7.1, A7.2 and A7.3 will be recorded in accordance with monitoring guidance outlined in TCEQ SOP, V1. *E. coli* bacteria in fresh water is the primary parameter of concern. Sampling types, frequencies and locations are described in Table A6.2. Physical parameters that will be measured *in situ* during routine sampling and include flow (where possible), specific conductance, DO, pH, and water temperature; other noted items will include the flow severity, days since last significant rainfall and present weather conditions. Water quality samples collected as part of the routine sampling schedule will be analyzed for bacteria as outlined in Table A7.1 and conventional parameters as described in Table A7.2.

Flow data for TCEQ station 13096 on Petronila Creek will be recorded using data from USGS stream gage 082128200. Flow data for the other ten TCEQ stations will be recorded instream (if possible) as described in TCEQ SOP V1.

In order to obtain representative results, ambient water sampling will occur on a routine schedule over the course of 18 months, capturing dry and runoff-influenced events at their natural frequency. There will be no prejudice against rainfall or high flow events, except that the safety of the sampling crew will not be compromised in case of lightning or flooding; this is left up to the discretion of the sampling crew. In the instance that a sampling site is inaccessible, no sample will be taken and will be documented in the field notebook and the event will be made up at a later date when safe conditions return.

Site Descriptions
Monitoring will be conducted at 11 stations that have been historically monitored by NRA and TCEQ. The stations are as follows:

Station 13093, Petronila Creek Immediately Upstream of FM 70 Bridge East of Bishop. This monitoring station is located on Segment 2204.

Station 13094, Petronila Creek at FM 892 SE of Driscoll. This monitoring station is located on Segment 2204.

Station 13096, Petronila Creek at FM 665, is located at the FM 665 crossing East of Driscoll on Segment 2204.

Station 13099, Petronila Creek at FM 2826 North of Driscoll. This monitoring station is located on Segment 2204.

Station 20806, Petronila Creek 181 M West and 6 M South of the Intersection of Alice Rd and Lost Creek Rd. This monitoring station is located on Segment 2204.

Station 13033, San Fernando Creek at US 77, is located northwest of Kingsville. This monitoring station is located on Segment 2492A.

Station 15969, San Fernando Creek at FM 2045/E Santa Gertrudis Street 3.62 km E of Kingsville. This monitoring station is located on Segment 2492A.

Station 15971, Santa Gertrudis Creek at N Kleberg CR 1070 644 Meters North of FM 1717 7.24 km SE of Kingsville. This monitoring station is not located on a segment.

Station 15972, Santa Gertrudis Creek at FM 1717 7.24 km SE of Kingsville. This monitoring station is not located on a segment.

Station 15975, San Fernando Creek at FM 1930 8.05 km SE of Alice in Jim Wells County. This monitoring station is located on Segment 2492A.

Station 22327, San Fernando Creek upstream of FM 1355 Approx 0.5 miles South of FM 70. This monitoring station is located on Segment 2492A.

The monitoring stations are included in Table A6.2. Detailed site location maps are located in Section A6.

Section B2: Sampling Method Requirements / Data Collection Method

SWQM

Field Sampling Procedures

Field sampling will be conducted according to procedures documented in the latest version of the TCEQ SOP, V1. Additional aspects outlined in Section B below reflect specific requirements for sampling. Field sampling activities are documented on field data reporting forms as presented in Appendix B.

All sample information will be logged into a field log. The following will be recorded for all water sampling:

- station ID
- location
- sampling time
- date
- water depth
- flow rate
- sample collector's name/signature

Detailed observational data are recorded including water appearance, weather, biological activity, stream uses, unusual odors, specific sample information, days since last significant rainfall, estimated hours since rainfall began (if applicable), and flow severity. Perennial pool measurements will also be recorded with observations such as maximum pool width, maximum pool depth, pool length, and percent pool coverage in 500 meter reach when appropriate.

Typically, water samples will be collected directly from the stream at the centroid of flow (typically midway in the stream channel) into approved sample containers.

Certificates from sample container manufacturers are maintained by WUL.

All sample containers will be labeled with the following information:

- collection date
- collection time
- sample location/station ID
- and sampler's initials

Care will be exercised to avoid the surface microlayer of water, which may be enriched with bacteria and not representative of the water column. In cases where, for safety reasons, it is inadvisable to enter the stream bed, and boat access is not practical, staff will use a clean bucket and rope from a bridge to collect the samples from the stream. If a bucket is used, care will be taken to avoid contaminating the sample. Specifically, technicians must exert care to ensure that the bucket and rope do not come into contact with the bridge. The bucket must be sanitized and thoroughly rinsed three times between stations. Samples are collected from subsequent buckets of water. This type of sampling will be noted in the field records.

Water temperature, pH, specific conductivity, specific conductance, and DO will be measured and recorded *in situ* with a multiprobe whenever samples are collected. Flow is measured with

an electronic flow meter or using an established rating curve as described in the TCEQ SOP, V1. All samples will be transported in an iced container to the laboratory for analysis.

Table B2.1. Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation	Sample Volume (mL)	Holding Time
E. coli	Water	SPS, IDEXX	< 6°C (but not frozen); sodium thiosulfate	100 (minimum); 250 (duplicates)	8 hours
TKN	Water	SPS	< 6°C (but not frozen); 1-2 mL H2SO4 pH<2	250	28 days
Nitrate	Water	SPS	< 6°C (but not frozen)	250	48 hours
Nitrite	Water	SPS	< 6°C (but not frozen)	250	48 hours
Ammonia N	Water	SPS	< 6°C (but not frozen); 1-2 mL H2SO4 pH<2	100	28 days
Total P	Water	SPS	< 6°C (but not frozen); 1-2 mL H2SO4 pH<2	100	28 days

* *E.coli* samples should always be processed as soon as possible and within 8 hours.
**Container Types: SPS = Sterile Polyethylene

Sample Containers

The preferred bacteriological sample containers are the 120 and 290 mL bottles from QEC or IDEXX (or equivalent). The bottles contain sufficient sodium thiosulfate to remove 10 mg/L or 15 mg/L total chlorine, respectively. WUL will provide sealed, sterile glass and/or plastic bottles for bacteria samples.

Processes to Prevent Contamination

The most recent version of the TCEQ SOP, V1 outlines the necessary steps to prevent contamination of samples. These include: direct collection into sample containers, when possible. Field QC samples as discussed in Section B5 are collected to verify that contamination has not occurred.

Failures in Sampling Methods Requirements and/or Deviations from Sample Design and Corrective Action

Examples of failures in sampling methods and/or deviations from sample design requirements include but are not limited to such things as sample container problems, sample site considerations, etc. Failures or deviations from the QAPP are documented on the field data reporting form and reported to the TWRI PM. The project manager, in consultation with the QAO, will determine if the deviation from the QAPP compromises the validity of resulting data. The project managers, in consultation with the TWRI and TSSWCB PM and QAO, will decide to accept or reject data associated with the sampling event, based on best professional judgment. The resolution of the situation will be reported to the TSSWCB in the quarterly progress report (QPR) and by completion of a corrective action report (CAR).

Section B3: Sample Handling and Custody Requirements

SWQM

Chain-of-Custody (COC)

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 COC form is a record that documents the possession of the samples from the time of collection to receipt in the laboratory. The list of items below is included on the COC form (See Appendix C for sample form).

1. Date and time of sample collection, shipping and receiving
2. Site identification
3. Sample matrix
4. Number of containers
5. Preservative used
6. Analyses required
7. Name of collector
8. Custody transfer signatures and dates and time of transfer

Sample Labeling

Samples will be labeled on the container with an indelible, waterproof marker. Label information will include site identification, date, sampler's initials, and time of sampling. The COC form will accompany all sets of sample containers.

Sample Handling

Field data sheets (Appendix B) are supplied to all field personnel prior to initiation of collection procedures. The field data sheets have spaces dedicated to recording of all pertinent field observations and water quality parameters. The field staff has the prime responsibility to insure that all pertinent information is recorded correctly and in the proper units.

Upon collection, sealing of the sample and following proper labeling, water samples are placed in an insulated cooler on ice and transported to the designated lab along with appropriate COCs within prescribed holding times. Routine samples will be delivered to WUL for processing. Once at the lab, samples and COCs are transferred to lab staff, are logged into the lab and analysis/bench sheets specific to the respective laboratory are established for each sample. Samples are placed in a refrigerated cooler dedicated to sample storage until sample processing begins. The LM has the responsibility to ensure that holding times are met with water samples. The holding time is documented on the COC.

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 COC form is used to document sample handling during transfer from the field to the laboratory and among contractors. The following information concerning the sample is recorded on the COC form (See Appendix C):

- 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 Tracking Procedure Deficiencies and Corrective Action

All failures associated with chain-of-custody procedures as described in this QAPP are immediately reported to the NRA PM. 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 NRA PM, in consultation with the TWRI PM and 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 TSSWCB PM in the project progress report. CARs will be prepared by the TWRI QAO and submitted to the TSSWCB PM along with project progress reports.

Section B4: Analytical Methods

SWQM- The analytical methods are listed in Table A7.1 and A7.2 of Section A7. Laboratories must be accredited in accordance with NELAP requirements for the matrix, method, parameter combinations listed in Table A7.1 and A7.2 of the QAPP. Procedures for laboratory analysis will be in accordance with the most recently published or online edition of *Standard Methods for the Examination of Water and Wastewater*, the latest version of the TCEQ SOP, V1 or other reliable procedures acceptable to TCEQ.

Laboratories that produce analytical data under this QAPP must be NELAP accredited. Copies of laboratory quality manuals (QMs) and SOPs are available for review by the TCEQ.

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

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 WUL LM, who will make the determination and notify the NRA and TWRI QAOs. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ SWQMIS database. The nature and disposition of the problem is reported on the data report. The TWRI PM/QAO will include this information in the CAR and submit it with the QPR, which is sent to the TSSWCB PM.

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

The TCEQ has determined that analyses associated with the qualifier codes (e.g. "holding time exceedance", "sample received unpreserved", "estimated value", etc.) may have unacceptable measurement uncertainty associated with them. 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 must have an appropriate data qualifier assigned which can be found in the most recent version of the SWQM DMRG.

Failures in Measurement Systems and Corrective Actions

Failures in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, QC 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 WUL LM, who will make the determination in coordination with the NRA and TWRI PM/QAO. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TSSWCB as part of this project. The nature and disposition of the problem is reported on the data report. The TWRI PM/QAO will include this information in the CAR and submit with the QPR which is sent to the TSSWCB PM.