Clean Water Act Section 319(h) Nonpoint Source Pollution Control Program

Surface Water Quality Monitoring to Support the Plum Creek Watershed Protection Plan Development

TSSWCB Project Number 03-19
Revision #2

Quality Assurance Project Plan

Texas State Soil and Water Conservation Board

Prepared by

Guadalupe-Blanco River Authority

Effective Period: June 1, 2007 – March 31, 2010

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

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A1 APPROVAL PAGE

Quality Assurance Project Plan for Surface Water Quality Monitoring to Support the Plum Creek Watershed Protection Plan Development.

United States Environmental Protection Agency (EPA), Region VI

Name: Donna Miller
Title: EPA Chief; State/Tribal Programs Section

Signature:_____Date:_____

Name: Henry Brewer
Title: EPA Texas Nonpoint Source Project Manager

Signature:_____Date:_____

Texas State Soil and Water Conservation Board (TSSWCB)

Name: Pamela Casebolt
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Signature:_____Date:_____

Name: Donna Long
Title: TSSWCB Quality Assurance Officer (QAO)

Signature:_____Date:_____

Guadalupe-Blanco River Authority (GBRA)

Name: Debbie Magin
Title: Project Manager

Signature:_____Date:_____

Name: Josie Longoria
Title: Quality Assurance Officer (QAO)

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San Antonio River Authority Environmental Laboratory (SARA-EL)

Name: Chuck Lorea
Title: Laboratory Director

Signature:_____Date:_____

Name: Patricia Carvajal
Title: Quality Assurance Officer (QAO)

Signature:_____Date:_____

Ana-Lab Corporation

Name: Skeeter Ludwig
Title: Laboratory Director

Signature:_____Date:_____

Name: Bill Peery
Title: Quality Assurance Officer (QAO)

Signature:_____Date:_____

The GBRA will secure written documentation from each sub-tier project participant (e.g., subcontractors, other units of government, laboratories) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. The GBRA will maintain this documentation as part of the project's quality assurance records, and will be available for review. (See sample letter in Attachment 1 of this document.)

A2 TABLE OF CONTENTS

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List of Acronyms and Abbreviations

AWRL	Ambient Water Reporting Limit
BMP	Best Management Practices
BOD	Bio-chemical Oxygen Demand
CAR	Corrective Action Report
CBOD	Carbonaceous Biological Oxygen Demand
COC	Chain-of Custody
COD	Chemical Oxygen Demand
CR	County Road
CRP	Clean Rivers Program
DO	Dissolved Oxygen
DOC	Demonstration of Capability
DQO	Data Quality Objective
FY	Fiscal Year
GBRA	Guadalupe-Blanco River Authority
ITRAX	Imaging Software used by GBRA
LCS	Laboratory Control Standard
LOD	Limit Of Detection
LOQ	Limit Of Quantitation
MPN	Most Probable Number
NCR	Nonconformance Report
NPS	Nonpoint Source
NRCS	Natural Resource Conservation Service
PC WPP	Plum Creek Watershed Protection Plan
PCWP	Plum Creek Watershed Partnership
QA	Quality Assurance
QM	Quality Manual
QASM	Quality Assurance System Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMP	Quality Management Plan
RL	Reporting Limit
RPD	Relative Percent Difference
SA	Sample Amount (reference concentration)
SARA-EL	San Antonio River Authority - Environmental Laboratory
SM	Standard Methods
SOP	Standard Operating Procedure
SR	Sample Result
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System (formerly TRACS)
SWCD	Soil and Water Conservation District
TAMU SSL	Texas A&M University Spatial Sciences Laboratory

TAG	Technical Advisory Group
TCE	Texas Cooperative Extension
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TWQI	Texas Water Quality Inventory
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WCSC	Regional Watershed Coordination Steering Committee
WPP	Watershed Protection Plan
WQMP	Water Quality Management Plan

A3 DISTRIBUTION LIST

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

U.S. Environmental Protection Agency Region 6 (EPA)
1445 Ross Avenue, Suite # 1200;
Dallas, TX 75202-2733

Name: Henry Brewer;
Title: Texas NPS Project Manager, Water Quality Division

Texas State Soil and Water Conservation Board (TSSWCB)
P.O. Box 658;
Temple, Texas 76503

Name: Pamela Casebolt
Title: TSSWCB Project Manager

Name: Donna Long
Title: TSSWCB Quality Assurance Officer (QAO)

The 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, other units of government, laboratories. 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 will be available for review.

A4 PROJECT/TASK ORGANIZATION

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

U.S. Environmental Protection Agency Region 6 (EPA)

Henry Brewer, EPA Project Officer
Responsible for managing the project for EPA. Reviews project progress and reviews and approves QAPP and QAPP amendments.

Texas State Soil and Water Conservation Board (TSSWCB)

Pamela Casebolt, TSSWCB Project Manager
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 the GBRA and the TSSWCB. Tracks and reviews deliverables to ensure that tasks in the work plan are completed as specified in the contract. Responsible for verifying that the QAPP is followed by the GBRA. Notifies the TSSWCB QAO of significant project nonconformances and corrective actions taken as documented in quarterly progress reports from GBRA Project Manager.

Donna Long, TSSWCB Quality Assurance Officer
Reviews and approves QAPP and any amendments or revisions and ensures distribution of approved/revised QAPPs to TSSWCB participants. Assists the TSSWCB Project Manager on QA-related issues. Coordinates reviews and approvals of QAPPs and amendments or revisions. Conveys QA problems to appropriate TSSWCB management. Monitors implementation of corrective actions. Coordinates and conducts audits.

Guadalupe Blanco River Authority (GBRA)

Debbie Magin, Project Manager/Data Manager
Responsible for implementing and monitoring PC WPP requirements in the contract, and the QAPP. Responsible for writing and maintaining records of the QAPP and its distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Coordinates project planning activities and work of project partners. Ensures monitoring systems audits are conducted to ensure QAPP is followed by project participants and that project is producing data of known quality. Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of project quality-assured water quality data to the TSSWCB. Ensures that subcontractors are qualified to perform contracted work. Maintains quality-assured data on GBRA Internet sites. Ensures TSSWCB project manager and/or QA Officer are notified of deficiencies and

nonconformances, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TSSWCB.

Josie Longoria, QAO/Regional Laboratory Director
Responsible for coordinating the implementation of the QA program. Responsible for maintaining the QAPP and monitoring its implementation. Responsible for identifying, receiving, and maintaining project quality assurance records. Responsible for coordinating with the TSSWCB QAO 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, nonconformances and corrective action. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Supervises laboratory, purchasing of equipment, maintain quality assurance manual for laboratory operations, and supervision of lab safety program. Ensures that field staff are properly trained and that training records are maintained.

Lee Gudgell, Water Quality Technician
Responsible for coordinating sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains records of field data collection and observations.

Clarissa Frnka, Laboratory Analyst I
Performs laboratory analysis for inorganic constituents, nutrients, etc.; assists in collection of field data and samples for stream monitoring and chemical sampling of environmental sites.

Brian Lyssy, Laboratory Analyst I
Performs laboratory analysis for inorganic constituents, nutrients, etc.; assists in collection of field data and samples for stream monitoring and chemical sampling of environmental sites.

Emmylou Roberts, Laboratory Technician II
Performs laboratory analysis for inorganic constituents, nutrients, etc.; assists in collection of field data and samples for stream monitoring and chemical sampling of environmental sites.

Kylie McNabb, Laboratory Technician III
Performs laboratory analysis for inorganic constituents, nutrients, etc.; assists in collection of field data and samples for stream monitoring and chemical sampling of environmental sites.

Stacy Frentzen, Laboratory Technician II/Sample Custodian
Perform sample custodial duties, collect field data and samples as directed by laboratory director.

San Antonio River Authority

Chuck Lorea, Lab Manager
Supervises laboratory, lab safety program, and purchasing of equipment. 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.

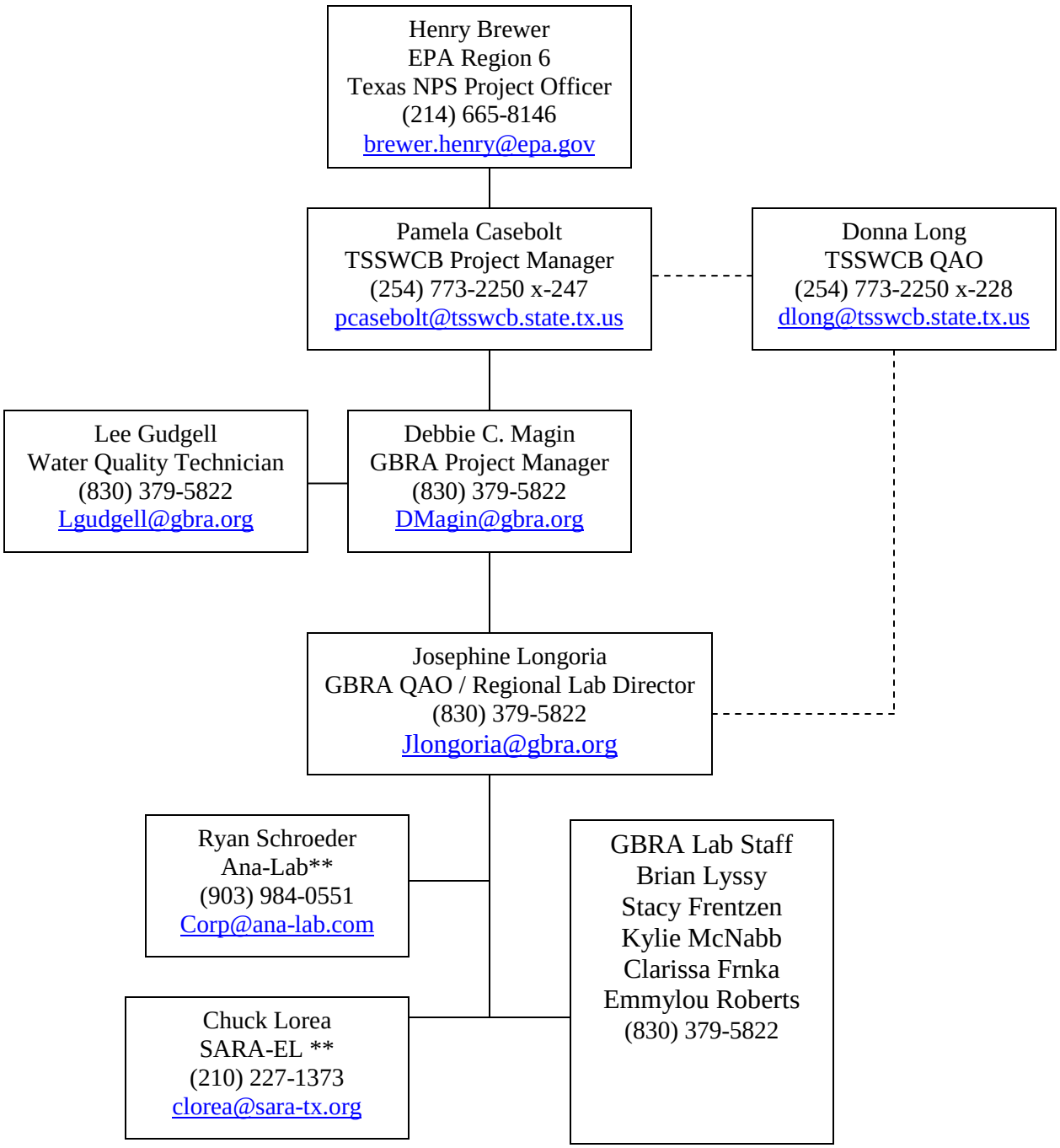
Patricia Carvajal, Quality Assurance Officer
Maintains quality assurance manual for laboratory operations, maintains operating procedures that are in compliance with the QAPP. Responsible for the overall quality control and quality assurance of analyses performed by SARA's Environmental Services Department.

Ana-Lab Corporation

Skeeter Ludwig, Lab Manager
Supervises laboratory, lab safety program, and purchasing of equipment.. Reviews and verifies all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and validates the data against the measurement performance specifications listed in Table A7.1.

Bill Peery, Quality Assurance Officer
Maintains quality assurance manual for laboratory operations, maintains operating procedures that are in compliance with the QAPP, amendments and appendices. Responsible for the overall quality control and quality assurance of analyses performed by Ana-Lab.

Figure A4.1 Project Organizational Chart*-- Lines of Communication



* See Project/Task Organization in this section for a description of each position's responsibilities.

** San Antonio River Authority Environmental Laboratory or Ana-Lab Corporation to be used to meet holding times in the event of equipment failure at the GBRA Regional laboratory.

A5 PROBLEM DEFINITION/BACKGROUND

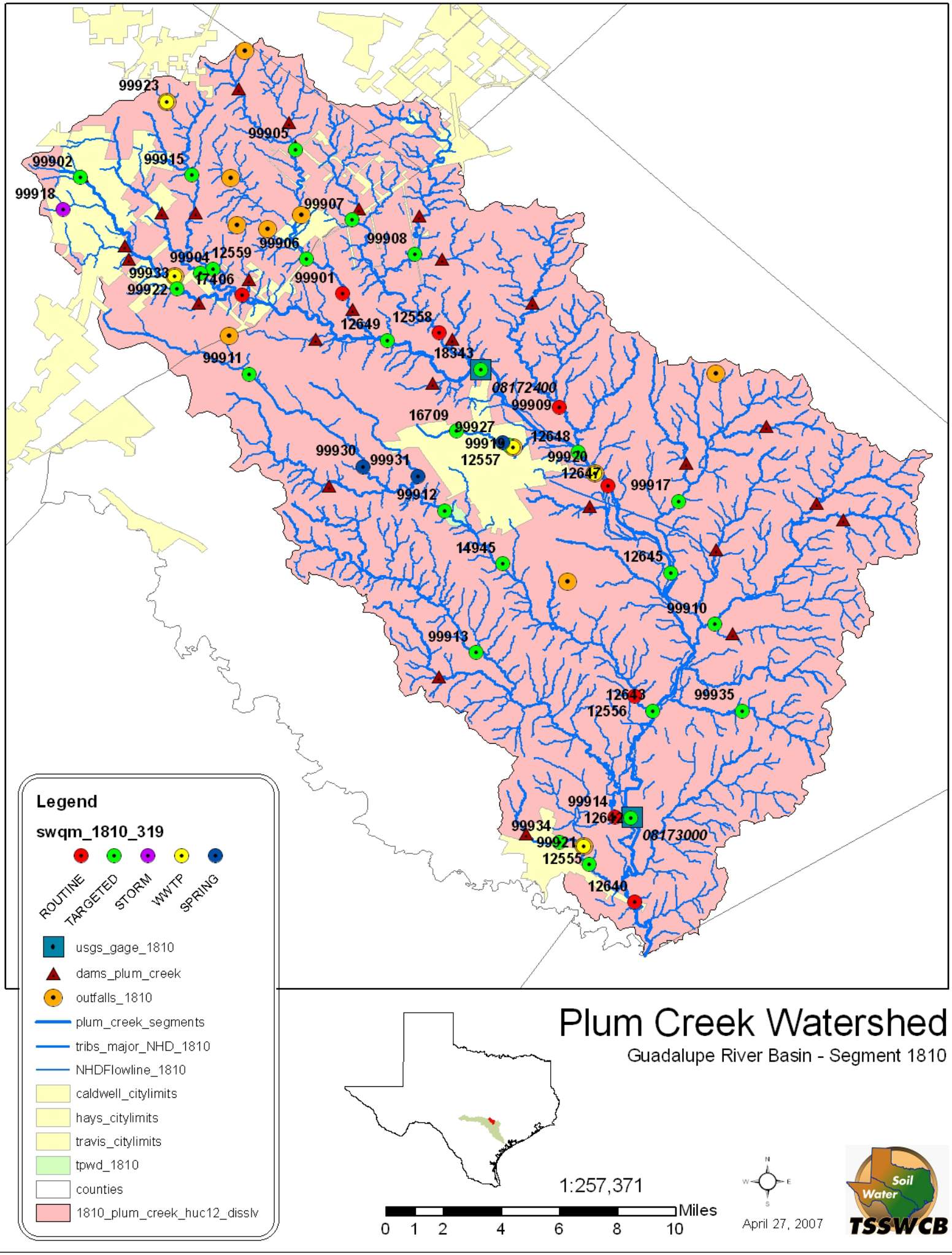
As a part of TSSWCB CWA §319(h) Project 04-19, Regional Watershed Coordinator, the TSSWCB Wharton Regional Watershed Coordinator established the Regional Watershed Coordination Steering Committee (WCSC) in January 2005. Over the course of the next twelve months, the WCSC quantified criteria to prioritize watersheds in southeast and south central Texas for Watershed Protection Plan (WPP) development. The WCSC is composed of river authorities, councils of governments, other state agencies, federal agencies, and land grant institutions with water quality responsibilities across the 47 counties in the TSSWCB Wharton Regional Office Service Area.

Discussions among WCSC members led to a consensus in December 2005 that Plum Creek (Segment 1810) had the highest potential to produce a successfully developed and implemented WPP. Key factors included the water quality issues (elevated bacteria and nutrient enrichment), increasing urban development in the northern half of the watershed, oil and gas production, and potential for agricultural nonpoint source pollution. As such, a WPP for the Plum Creek Watershed was developed and completed in February 2008. Texas AgriLife Extension Service facilitated the stakeholder process and provided technical assistance to develop the WPP through TSSWCB CWA §319(h) projects 04-17 and 05-05. TSSWCB provided technical assistance to develop the WPP through TSSWCB CWA §319(h) project 04-19.

Plum Creek rises in Hays County north of Kyle and runs south through Caldwell County, passing Lockhart and Luling, and eventually joins the San Marcos River at their confluence north of Gonzales County (see map below left). Plum Creek is 52 miles in length and has a drainage area of 389 mi2. According to the 2004 Texas Water Quality Inventory and 303(d) List, Plum Creek (Segment 1810) is impaired by elevated bacteria concentrations (category 5c) and exhibits nutrient enrichment concerns for ammonia, nitrate+nitrite nitrogen and total phosphorus.

Originally, the WPP would be developed using only existing water quality data. However, discussions with the Steering Committee, the Work Groups and the Technical Advisory Group (TAG), identified data gaps which would make source identification and establishment of water quality goals difficult, at best. Accurate source identification is key to prioritizing implementation projects for funding. This project will close that data gap allowing for successful WPP development and implementation. GBRA will collect SWQM data to characterize the Plum Creek watershed through this project, TSSWCB CWA §319(h) project 03-19. TAMU SSL will utilize data from this project to characterize the Plum Creek watershed with geostatistical analysis and SWAT modeling through TSSWCB CWA §319(h) project 04-17. Figure A5.1 is a map of the sampling locations in the Plum Creek watershed.

The purpose of this QAPP is to clearly delineate GBRA QA policy, management structure, and procedures, which are used to implement the QA requirements necessary to verify and validate the surface water quality data collected. Project results will be used to support the achievement of WCSC and Plum Creek Steering Committee objectives.



Plum Creek Watershed

Guadalupe River Basin - Segment 1810

A6 PROJECT/TASK DESCRIPTION

Currently, routine ambient water quality data is collected monthly at 2 main stem stations by GBRA (17406 and 12640) and quarterly at a third main stem station by the TCEQ (12647). Beginning September 1, 2009 GBRA assumed monitoring monthly at the TCEQ site. This project will generate data of known and acceptable quality for surface water quality monitoring of main stem and tributary stations on Segment 1810 (Plum Creek) for field, conventional, flow, bacteria and effluent parameters to support development of a WPP for the Plum Creek watershed in Caldwell and Hays Counties. Six types of surface water quality monitoring will be conducted: routine ambient, targeted watershed, stormflow, 24-hour DO, wastewater effluent and springflow.

GBRA will conduct all work performed under this project including technical and financial supervision, preparation of status reports, coordination with local stakeholders, surface water quality monitoring sample collection and analysis, and data management. GBRA will participate in the Plum Creek Watershed Partnership, Steering Committee, TAG and appropriate Work Groups in order to efficiently and effectively achieve project goals and to summarize activities and achievements made throughout the course of this project.

GBRA will conduct routine ambient monitoring at 6 sites monthly, collecting field, conventional, flow and bacteria parameter groups. Sampling period extends over 20 months. The routine monitoring will complement existing routine ambient monitoring regimes conducted by GBRA such that routine water quality monitoring is conducted monthly at 8 sites in the Plum Creek watershed. Prior to September 2009, GBRA coordinated with the TCEQ Regional Office to avoid duplicative routine ambient monitoring at site 12642.

GBRA will conduct targeted watershed monitoring at 35 sites twice per season, once under dry weather conditions and once under wet weather conditions each season, collecting field, conventional, flow and bacteria parameter groups. Sampling period extends through 6 seasons. Spatial, seasonal and meteorological variation will be captured in these snapshots of watershed water quality. The eight routine monitoring sites will be targeted for wet weather conditions if those conditions were not captured in the routine monitoring within each quarter, or dry conditions, if those conditions were not captured in the routine monitoring within each quarter.

GBRA will conduct automated stormflow monitoring at 1 urban/residential site during a minimum of 4 storm events. The stormflow monitoring will characterize urban/residential nonpoint source (NPS) loadings in the rapidly developing upper third of the watershed. Sampling period extends over 12 months. Depending on meteorological conditions, seasonal variation in storm events will be captured. Stormflow samples will be retrieved within 24 hours. Up to 24 discreet samples will be collected for bacteriological analyses, and the remaining volume will be composited in order to produce event mean concentrations for other parameters. A storm event will be defined

as a one-half inch rise in the height of the water in the stream channel measured by a bubble gage on the autosampler. The autosampler will be calibrated to measure flow conditions at the monitoring location and will be equipped with a rain gage.

GBRA will conduct 24-hour DO monitoring at 8 sites monthly during the index period collecting field and flow parameter groups. The sites for 24-hour DO monitoring shall be the same as the sites for routine ambient monitoring. Sampling period extends over 8 months during the index period. GBRA will conduct effluent monitoring at 7 wastewater treatment facilities (WWTFs) once per season collecting field, conventional, flow, bacteria and effluent parameter groups. Sampling period extends through 6 seasons. The WWTF sampling will characterize WWTF contributions to flow regime and pollutant loadings. GBRA will conduct springflow monitoring at 3 springs once per season collecting field, conventional, flow and bacteria parameter groups. Sampling period extends through 4 seasons. Spatial, seasonal and meteorological variation in springflow will be captured. This will characterize spring contributions to flow regime and pollutant loadings.

GBRA will manage monitoring data for use in the development of a Plum Creek WPP. GBRA will submit monitoring data to TSSWCB for review and submittal of the data to TAMU SSL for use in characterizing the Plum Creek watershed with geostatistical analysis and modeling through TSSWCB CWA §319(h) project 04-17. GBRA will submit monitoring data to TSSWCB for review and submittal to TCEQ for inclusion in the TCEQ SWQMIS.

GBRA will post monitoring data to the GBRA website in a timely manner. GBRA will summarize the results and activities of this project through inclusion in GBRA's Clean Rivers Program Basin Highlights Report and/or Basin Summary Report. Additionally, the results and activities of this project will be summarized in the Plum Creek WPP developed through TSSWCB CWA §319(h) project 04-17.

See Appendix A 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.

A7 QUALITY OBJECTIVES AND CRITERIA FOR DATA QUALITY

The purpose of routine water quality monitoring is to collect surface water data needed for water quality assessments in accordance with TCEQ's Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data. These water quality data, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be subsequently reconciled for use by the TSSWCB.

Systematic watershed monitoring, i.e. targeted monitoring, is defined by sampling that is planned for a short duration (1 to 2 years) and is designed to: screen waters that would not normally be included in the routine monitoring program, monitor at sites to check the water quality situation, and investigate areas of potential concern. Targeted monitoring in the Plum Creek watershed, done under wet and dry conditions, will be collected to capture spatial, seasonal and meteorological snapshots of water quality. Automated stormflow sampling will be conducted at one location in the upper watershed a minimum of once per season as meteorological conditions allow.

GBRA will conduct diurnal water quality monitoring monthly during the index period. The diurnal monitoring will adhere to the specifications described in the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415). GBRA will also conduct effluent monitoring at 7 wastewater treatment plants to characterize the contributions to flow and pollutant loadings. Monitoring will be conducted on spring flow to characterize contributions to the flow and pollutant loadings. Spatial, seasonal and meteorological variations will be captured. The data will be used to determine whether any of the springs contribute significantly to the flow regime or to the loading of pollutants that have led to the impairment of the stream. These water quality data will be subsequently reconciled for use and assessed by the TSSWCB.

The measurement performance specifications to support the project objectives for a minimum data set are specified in Table A7.1 and in the text following.

Table A7.1 GBRA Measurement Performance Specifications

PARAMETER	UNITS	MATRIX	METHOD	PARA-METER CODE	AWRL	LOQ	LOQ CHECK STD %Rec	PRECISION (RPD of LCS/LCS dup)	BIAS (%Rec. of LCS)	Lab
Field Parameters										
pH	pH/ units	water	SM 4500-H^+ B. and TCEQ SOP, V1	00400	NA[1]	NA	NA	NA	NA	Field
DO	mg/L	water	SM 4500-O G. and TCEQ SOP, V1	00300	NA[1]	NA	NA	NA	NA	Field
Conductivity	umhos/cm	water	SM 2510 and TCEQ SOP, V1	00094	NA[1]	NA	NA	NA	NA	Field
Conductivity	umhos/cm	water	SM 2510	00095	NA[1]	NA	NA	NA	NA	GBRA
Temperature	°C	water	SM 2550 and TCEQ SOP, V1	00010	NA[1]	NA	NA	NA	NA	Field
Flow	cfs	water	TCEQ SOP, V1	00061	NA[1]	NA	NA	NA	NA	Field
Flow measurement method	1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler	water	TCEQ SOP, V1	89835	NA[1]	NA	NA	NA	NA	Field
Flow severity	1-no flow 2-low 3-normal 4-flood 5-high 6-dry	water	TCEQ SOP, V1	01351	NA[1]	NA	NA	NA	NA	Field
Flow Estimate	cfs	water	TCEQ SOP, V1	74069	NA[1]	NA	NA	NA	NA	Field
Conventional and Bacteriological Parameters										
TSS	mg/L	water	SM 2540 D.	00530	4	1[7]	NA	20	80-120	GBRA[6]
Turbidity	NTU	water	SM 2130 B.	82079	0.5	0.5	NA	20	NA	GBRA[6]
Sulfate	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00945	5	1	70-130	20	80-120	GBRA[6]
Chloride	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00940	5	1	70-130	20	80-120	GBRA[6]
Chlorophyll-a, spectrophotometric method	ug/L	water	SM 10200-H[4]	32211	5	1[7]	70-130	20	NA	GBRA
Pheophytin, spectrophotometric method	ug/L	water	SM 10200-H[4]	32218	5	1	70-130	20	NA	GBRA
E. coli, IDEXX™ Colilert	MPN/100 mL	water	SM 9223-B	31699	1	1	NA	0.5[2]	NA	GBRA
Ammonia-N, total[3]	mg/L	water	SM 4500-NH_3 D.	00610	0.1	0.1	70-130	20	80-120	GBRA
Ammonia-N, total	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	00610	0.1	0.1	70-130	20	80-120	GBRA[6]
Hardness, total (as CaC03)	mg/L	water	SM 2340 C.	00900	5	5	NA	20	80-120	GBRA
Hardness, total (as CaC03)[3]	mg/L	water	EPA 130.1	00900	5	5	NA	20	80-120	GBRA

PARAMETER	UNITS	MATRIX	METHOD	PARA-METER CODE	AWRL	LOQ	LOQ CHECK STD %Rec	PRECISION (RPD of LCS/LCS dup)	BIAS (%Rec. of LCS)	Lab
Conventional and Bacteriological Parameters (cont.)										
Nitrate-N, total	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	GBRA[6]
Total phosphorus[5]	mg/L	water	EPA 365.3	00665	0.05	0.05	70-130	20	80-120	GBRA[6]
Total Kjeldahl Nitrogen	mg/L	water	EPA 351.2 Rev. 2 (1993)	00625	0.2	0.2	70.-130	20	80-120	GBRA[6]
BOD, 5-day	mg/L	water	SM 5210B	00310	2	1.0	NA	<10 = 33.3 >10 = 15.4	NA	GBRA
CBOD, 5-day	mg/L	water	SM 5210B	80082	2	1.0	NA	<10 = 33.3 >10 = 15.4	NA	GBRA
COD	mg/L	water	SM 5220 D.	00335	10	20.0	70-130	20	80-120	GBRA

Diurnal monitoring summary statistics									
PARAMETER	UNITS	MATRIX	METHOD	PARA-METER CODE	AWRL	LOQ	PRECISION (RPD of LCS/LCS dup)	BIAS (%Rec. of LCS)	Lab
24-hour average dissolved oxygen	mg/L	water	TCEQ SOP, V1 /Calculation	89857	NA	NA	NA	NA	GBRA
Maximum daily dissolved oxygen	mg/L	water	TCEQ SOP, V1 /Calculation	89856	NA	NA	NA	NA	GBRA
Minimum daily dissolved oxygen	mg/L	water	TCEQ SOP, V1 /Calculation	89855	NA	NA	NA	NA	GBRA
Number of measurements	none	none	TCEQ SOP, V1	89858	NA	NA	NA	NA	GBRA
24-hour average water temperature	°C	water	TCEQ SOP, V1 /Calculation	00209	NA	NA	NA	NA	GBRA
Maximum daily water temperature	°C	water	TCEQ SOP, V1 /Calculation	00210	NA	NA	NA	NA	GBRA
Minimum daily water temperature	°C	water	TCEQ SOP, V1 /Calculation	00211	NA	NA	NA	NA	GBRA
24-hour average conductivity	umhos/cm	water	TCEQ SOP, V1 /Calculation	00212	NA	NA	NA	NA	GBRA
Maximum daily conductivity	umhos/cm	water	TCEQ SOP, V1 /Calculation	00213	NA	NA	NA	NA	GBRA
Minimum daily conductivity	umhos/cm	water	TCEQ SOP, V1 /Calculation	00214	NA	NA	NA	NA	GBRA
Maximum daily pH	s.u.	water	TCEQ SOP, V1 /Calculation	00215	NA	NA	NA	NA	GBRA
Minimum daily pH	s.u.	water	TCEQ SOP, V1 /Calculation	00216	NA	NA	NA	NA	GBRA

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

2 Based on range statistic as described in Standard Methods, 20th Edition, Section 9020-B, " Quality Assurance / Quality Control – Intralaboratory Quality Control Guidelines." This criterion applies to bacteriological duplicates with concentrations greater than 10 MPN/100 mL or greater than 10 organisms/100 mL.

3 Secondary method listed. To be used in the event that the primary method cannot be used or needs to be confirmed, i.e. automated method cannot be used due to instrument failure.

4 In addition to SM 10200 H. cited for chlorophyll a, the SOP posted on the TCEQ CRP web site will be followed as well.

5 Automated method for total phosphorus on the Konelab Aquakem 200, following the GBRA SOP written based on the EPA method 365.3 and the Konelab operating procedures. The manual method will be used as a secondary method in case of instrument failure.
6 The SARA Environmental Laboratory and the Ana-Lab Corp. may be used in the event of lab equipment failure so that samples will be processed within prescribed holding times. Both labs adhere to the NELAP standards.
7 Reporting limit. Not a NELAP-defined LOQ (no commercially available spiking solution used as LOQ check standard.)

References for Table A7.1:

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
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures Manual, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, June 2003 or subsequent editions (RG-415)

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 Table A7.1 are the program-defined reporting specifications for each analyte and yield data acceptable for TCEQ water quality assessment. The limit of quantitation (LOQ; formerly known as reporting limit) 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. The following requirements must be met in order to report results to the TSSWCB:

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

- The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check standard for each batch of samples analyzed.

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.

Field splits are used to assess the variability of sample handling, preservation, and storage, as well as the analytical process, and are prepared by splitting samples in the field. Control limits for field splits are defined in Section B5.

Laboratory precision is assessed by comparing replicate analyses of laboratory control samples 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.

Bias

Bias is a statistical measurement of correctness and includes multiple components of systematic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias is determined through the analysis of laboratory control samples and LOQ check standards prepared with verified and known amounts of all target analytes in the sample matrix (e.g. deioinized water) 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 laboratory control standards are specified in Table A7.1.

Representativeness

Site selection, the appropriate sampling regime, the sampling of all pertinent media according to TCEQ SWQM SOPs, and use of only approved analytical methods will assure that the measurement data represents the conditions at the monitoring sites. Routine data collected for the *SWQM for the PC WPP*, and submitted to TSSWCB for water quality assessments, 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 four seasons (to include inter-seasonal variation) and in the case of diurnal sampling, monthly during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets collected during routine monitoring 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 availability of stream and meteorological conditions during the project and the potential funding for complete representativeness.

Data collection for targeted sampling will be toward both ambient conditions and those conditions that are influenced by storm events. Depending on meteorological conditions, monitoring for stormwater flows will occur a minimum of once per season during a measurable rainfall event. Springflow will be collected spatially, seasonally and under varying meteorological conditions. Sampling of wastewater treatment facilities will be conducted once per quarter and at the same time of day and week, without regard to specific meteorological conditions or facility flow regimes. Representativeness will be measured with the completion of sample collection in accordance with the approved QAPP.

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 SWQM SOPs. 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 Section B10.

Completeness

The completeness of the data is basically a relationship of how much of the data is 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

New field personnel receive training in proper sampling and field analysis. Before actual sampling or field analysis occurs, they demonstrate to the QA Officer (or designee) their ability to properly calibrate field equipment and perform field sampling and analysis procedures. Field personnel training is documented and retained in the personnel file and are available during a monitoring systems audit.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in section 5.4.4 of the NELAC® standards (concerning Review of Requests, Tenders and Contracts).

A9 DOCUMENTS AND RECORDS

The documents and records that describe, specify, report, or certify activities are listed. These reports may or may not be kept in paper form since the reports can be regenerated from the lab database at any time. If kept, the paper form is kept for a minimum of one year and then scanned into the GBRA ITRAX for permanent record.

The GBRA laboratory database is housed on the laboratory computer and is backed up on the network server nightly. A back up copy of the network server files, including ITRAX, is made every Monday and that copy is stored off-site at a protected location. The GBRA network administrator is responsible for the servers and back up generation.

Table A9.1 Project Documents and Records

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	TSSWCB/GBRA	One Year/ Indefinitely	Paper/ Electronic
QAPP distribution documentation	GBRA	One Year/ Indefinitely	Paper/ Electronic
QAPP commitment letters	GBRA	One Year/ Indefinitely	Paper/ Electronic
Field notebooks or data sheets	GBRA	One Year/ Indefinitely	Paper/ Electronic
Field staff training records	GBRA	One Year/ Indefinitely	Paper/ Electronic
Field equipment calibration/maintenance logs	GBRA	One Year/ Indefinitely	Paper/ Electronic
Chain of custody records	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Field SOPs	GBRA	One Year/ Indefinitely	Paper/ Electronic
Laboratory QA Manuals	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Laboratory SOPs	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Laboratory data reports/results	GBRA/SARA/Ana-Lab	One Year/Indefinitely	Paper/electronic
Laboratory staff training records	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Instrument printouts	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Laboratory equipment maintenance logs	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Laboratory calibration records	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic
Corrective Action Documentation	GBRA/SARA/Ana-Lab	One Year/ Indefinitely	Paper/ Electronic

The TSSWCB may elect to take possession of records at the conclusion of the specified retention period.

Laboratory Test Reports

Test reports from the laboratory will document the test results clearly and accurately. The requirements for reporting data and the procedures are provided.

* title of report and unique identifiers on each page
* name and address of the laboratory
* name and address of the client
* a clear identification of the sample(s) analyzed
* date and time of sample receipt
* date and time of collection
* sample depth
* identification of method used
* identification of samples that did not meet QA requirements and why (i.e.- holding times exceeded)
* sample results
* units of measurement
* sample matrix
* dry weight or wet weight (as applicable)
* clearly identified subcontract laboratory results (as applicable)
* a name and title of person accepting responsibility for the report
* project-specific quality control results to include field split results (as applicable); equipment, trip, and field blank results (as applicable); and LOQ and LOD confirmation (% recovery)
* narrative information on QC failures or deviations from requirements that may affect the quality of results or is necessary for verification and validation of data
* certification of NELAC® compliance on a result by result basis.

Electronic Data

Data will be submitted electronically to the TSSWCB for review in the Event/Result file format. A completed Data Summary (see example in Appendix E) will be submitted with each data submittal.

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 TSSWCB Project Manager electronically. Amendments are effective immediately upon approval by the GBRA Project Manager, the GBRA QAO, the TSSWCB Project Manager, and the TSSWCB QAO. They will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the GBRA Project Manager.

B1 SAMPLING PROCESS DESIGN

The sample design is based on the intent of the *SWQM for the PC WPP* as recommended by the Plum Creek Steering Committee. Under their direction, the TSSWCB and GBRA have been tasked with providing data to characterize water quality conditions in support of the 305(b) assessment, and to identify significant long-term water quality trends. Based on PC WPP Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues were used to develop the work plan which are in accord with available resources. As part of the PC WPP Steering Committee process, the TSSWCB and GBRA coordinate closely with other participants to ensure a comprehensive water monitoring strategy within the watershed.

Routine monitoring will compliment existing routine ambient monitoring being conducted by GBRA and TCEQ. Prior to September 2009, GBRA coordinated with the TCEQ Region 11 office to avoid duplicative efforts at site no. 12642, Plum Creek at Old McMahan Road (CR 202). After September 1, 2009, GBRA assumed monitoring at the CR 202 site monthly under the Clean Rivers Program. The five new routine monitoring sites have been selected to increase the spatial distribution of data. Monthly routine monitoring includes the conventional, bacterial and field parameter groups (E. coli, pH, dissolved oxygen, temperature, specific conductance, chloride, sulfate, chlorophyll a, pheophytin, nitrate-nitrogen, ammonia-nitrogen, total hardness, total suspended solids, turbidity, total phosphorus and total kjeldahl nitrogen) that are currently collected at the three existing sites being monitored by GBRA and TCEQ. Analytical results will be used in assessments conducted by TCEQ, in stream modeling by TAMU SSL and compared to historical data at the existing monitoring locations in the watershed. Flow will be measured by the USGS gaging station for sites 12642 and 12640. Flow at the remaining routine sites will be measured manually (mechanically, electronically or by Doppler.)

In addition to routine monitoring at these locations, 24-hour diurnal monitoring will be conducted once per month during the index period, March 15 through October 15. Dissolved oxygen, pH, temperature, and specific conductance will be recorded hourly through the diurnal cycle. Flow at stations 12640 and 12647 will be measured using the nearest USGS gage station. At the remaining six stations, stream flow will be measured manually at the time of data sonde deployment. Minimum, maximum, range, average (not pH) and number of measurements will be reported for each parameter.

Sites for targeted monitoring were selected to represent spatial, seasonal and meteorological conditions throughout the Plum Creek and contributing subwatersheds. Sampling will be conducted two times per quarter for six quarters, once under dry weather conditions and once during wet weather conditions. The area has been known to experience scattered showers, i.e. afternoon heat-related showers of short duration that may cause some portions of the watershed to be under wet weather conditions while others are not. Targeted monitoring sites will be visited when the overall watershed is under the specific weather conditions, dry or wet. There may be times, during dry weather conditions, when there is no water in the stream in the subwatersheds. Those

visits will be documented but no stream data will be collected. During wet weather conditions, the safety of the sampling crew will not be compromised in case of lightning or flooding. In the instance that a sampling site is inaccessible due to weather conditions or flooding, "no sample due to inaccessibility" will be documented in the field notebook. The routine monitoring sites will be targeted for wet weather conditions during each quarter if none of the routine monitoring events conducted met those conditions during that quarter, or targeted for dry conditions if those conditions were not met during that quarter.

GBRA will conduct automated stormflow monitoring at 1 site during a minimum of 4 storm events to characterize urban/residential NPS loadings in the rapidly developing upper third of the watershed. Sampling period extends over 12 months. Depending on meteorological conditions, seasonal variation in storm events will be captured. Stormflow samples will be retrieved within 24 hours. Up to 24 discreet samples will be collected for bacteriological analyses, and the remaining volume will be composited in order to produce event mean concentrations for other parameters. A storm event will be defined as a one-half inch rise in the stream channel, measured by a bubble gage on the autosampler. The autosampler will be calibrated to reflect flow conditions at the monitoring location and be equipped with a rain gage. Holding times for conventional parameters will begin at the time that the composite sample is prepared. Bacteriological analyses will be conducted on the proportional samples collected by the automated sampler at the beginning of the storm event, at approximately mid-event (up to 12 hours) and on the aliquot sampled at the retrieval of the stormwater samples (up to 24 hours) at a minimum. If budget allows, additional bacteriological analyses will be performed on other discreet sample aliquots within a each storm event. During a storm event, the safety of the sampling crew will not be compromised in case of lightning or flooding. In the instance that the stormflow sampler is inaccessible due to weather conditions or flooding, the sampler will be retrieved when conditions allow and the event will be documented in the field notebook. Samples from these severe weather events will not be analyzed if inaccessibility prevents compliance with holding times.

Seven wastewater treatment facilities will be sampled once per quarter over the span of the project. Data will be collected to characterize the wastewater facilities' contributions to the flow regime and pollutant loading. Samples will be collected at the outfall of each facility, before it mixes with the receiving stream. Parameters will include flow, field, and conventional parameters, including biochemical oxygen demand, carbonaceous oxygen demand and chemical oxygen demand. The wastewater facilities measure the effluent flow in million gallons per day. At the time of sampling, the flow will be obtained from the wastewater treatment plant and converted to cubic feet per second.

Springflow sites have been identified using local and historical knowledge. Springs will be monitored for conventional and field parameters. The data will be collected at a location that is in the closest proximity to the headwaters of each spring and with enough depth to collect a representative sample. Care will be given to sample above stream

features such as riffles that could influence water quality after the spring emerges from the ground. Flow will be measured manually at each spring.

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 according to procedures documented in the *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415). Additional aspects outlined in Section B below reflect specific requirements for sampling under the *SWQM for the PC WPP* and/or provide additional clarification.

Table B2.1 Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation*	Sample Volume	Holding Time
Turbidity	Water	Plastic or glass	Cool, 0-6^{o}C	100 mL	48 hours
Hardness	Water	Plastic or glass	Cool, 0-6^{o}C, H_2SO_4 to pH < 2*	1 L	6 months
TSS	Water	Plastic or glass	Cool, 0-6^{o}C	1 L	7 days
Nitrate-nitrogen	Water	Plastic or glass	Cool, 0-6^{o}C	1 L	48 hours
Ammonia-nitrogen	Water	Plastic or glass	Cool, 0-6^{o}C, H_2SO_4 to pH < 2*	1 L	28 days
Total Kjeldahl Nitrogen	Water	Plastic or glass	Cool, 0-6^{o}C, H_2SO_4 to pH < 2*	1 L	28 days
Total phosphorus	Water	Plastic or glass	Cool, 0-6^{o}C, H_2SO_4 to pH < 2*	1 L	28 days
Sulfate	Water	Plastic or glass	Cool, 0-6^{o}C	1 L	28 days
Chloride	Water	Plastic or glass	Cool, 0-6^{o}C	1 L	28 days
Chlorophyll a /Pheophytin	Water	Amber plastic or glass	Dark, Cool, 0-6^{o}C before Filtration; Dark, 0^{o}C after Filtration	1 L	Filter within 24 hours/28 days at 0^{o}C
E. coli	Water	Sterile, plastic	Cool, 0-6^{o}C	100 mL	6 hours
BOD	Water	Plastic	Cool, 0-6^{o}C	1 L	48 hours
C-BOD	Water	Plastic	Cool, 0-6^{o}C	1 L	48 hours
COD	Water	Plastic	Cool, 0-6^{o}C, H_2SO_4 to pH < 2*	1 L	28 days

*Preservation occurs within 15 minutes of sample collection.

Sample Containers

Sample containers are plastic one liter bottles that are cleaned and reused for conventional parameters. The bottles are cleaned with the following procedure: 1) wash containers with tap water and alconox (laboratory detergent), 2) triple rinse with hot tap water, and 3) triple rinse with deionized water. Amber plastic bottles are used routinely for chlorophyll samples. Disposable, pre-cleaned, sterile bottles are purchased for

bacteriological samples. Disposable, sterile bottles are used to collect proportional stormwater samples. Stormwater composite samples are made in plastic two-liter bottles that are cleaned and reused for compositing. Aliquots of the composite stormwater sample are split into two one-liter bottles (one to be preserved) that are cleaned and reused for conventional parameters. Certificates of analysis and/or sterility sample containers for bacteriological or stormwater sampling are maintained in a notebook by each laboratory.

Processes to Prevent Contamination

Procedures outlined in the *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415) outline the necessary steps to prevent contamination of samples, including direct collection into sample containers, when possible. 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 field data sheets as presented in Appendix C. The following will be recorded for all visits:

- Station ID
- Sampling date
- Location
- Sampling depth
- Sampling time
- Sample collector's name/signature
- Values for all field parameters, including flow and flow severity
- Detailed observational data, including:
- water appearance
- weather
- biological activity
- unusual odors
- pertinent observations related to water quality or stream uses
  (i.e.- exceptionally poor water quality conditions/standards not met; stream uses such as swimming, boating, fishing, irrigation pumps)
- watershed or instream activities
  (i.e.- bridge construction, livestock watering upstream)
- missing parameters
  (i.e.- when a scheduled parameter or group of parameters is not collected)

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:

- Legible writing in indelible ink with no modifications, write-overs or cross-outs;
- Correction of errors with a single line followed by an initial and date;
- Close-out on incomplete pages with an initialed and dated diagonal line.

Deficiencies, Nonconformances and Corrective Action Related to Sampling Requirements

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies which affect data quantity and/or quality and render the data unacceptable or indeterminate. Deficiencies related to sampling methods requirements include, but are not limited to, such things as sample container, volume, and preservation variations, improper/inadequate storage temperature, holding-time exceedances, and sample site adjustments.

Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the GBRA Project Manager. The GBRA Project Manager will notify the GBRA QAO of the potential nonconformance. The GBRA QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The GBRA Project Manager, in consultation with the GBRA QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the GBRA Project Manager, in consultation with GBRA QAO, will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the GBRA QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and the means by which completion of each corrective action will be documented. CARs will be included with quarterly progress reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

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 D). The following list of items matches the COC form in Appendix D.

- Date and time of collection
- Site identification
- Sample matrix
- Number of containers and respective volumes
- Preservative used or if the sample was filtered
- Analyses required
- Name of collector
- Custody transfer signatures and dates and time of transfer
- Bill of lading (if applicable)
- Subcontract laboratory, if used

Sample Labeling

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

- Site identification
- Date and time of sampling
- Preservative added, if applicable
- Designation of “field-filtered” as applicable
- Sample type (i.e., analysis(es)) to be performed

Sample Handling

After collection of samples are complete, sample containers are immediately stored in an ice chest for transport to the GBRA laboratory, accompanied by the chain of custody. Ice chests will remain in the possession of the field technician or in the locked vehicle until delivered to the lab. After receipt at the GBRA lab, the samples are stored in the

refrigeration unit or given to the analyst for immediate analysis. Only authorized laboratory personnel will handle samples received by the laboratory.

Deficiencies, Nonconformances and Corrective Action Related to Chain-of-Custody

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies which affect data quantity and/or quality and render the data unacceptable or indeterminate. Deficiencies related to chain-of-custody include but are not limited to delays in transfer, resulting in holding time violations; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc.

Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the GBRA Project Manager. The GBRA Project Manager will notify the GBRA QAO of the potential nonconformance. The GBRA QAO will initiate a NCR to document the deficiency.

The GBRA Project Manager, in consultation with GBRA QAO, will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the GBRA Project Manager in consultation with the GBRA QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the GBRA QAO by completion of a Corrective Action Report.

CARs document: root cause(s); impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and the means by which completion of each corrective action will be documented. CARs will be included with quarterly progress reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

B4 ANALYTICAL METHODS

The analytical methods, associated matrices, and performing laboratories are listed in Table A7.1 of Section A7. The authority for analysis methodologies under the *SWQM for the PC WPP* is derived from the TSWQS (§§307.1 - 307.10) in that data generally are generated for comparison to those standards and/or criteria. The standards state that "Procedures for laboratory analysis will be in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, the latest version of the TCEQ Surface Water Quality Monitoring Procedures, 40 CFR 136, or other reliable procedures acceptable to the Agency."

Laboratories collecting data under this QAPP are compliant with the NELAC® standards, at a minimum. Copies of laboratory QASMs and SOPs are available for review by the TSSWCB.

Standards Traceability

All standards used in the field and laboratory are traceable to certified reference materials. Standards preparation is fully documented and maintained in a standards log book. 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. Table A7.1. Measurement Performance Specifications, lists the methods to be used for field and laboratory analyses.

Deficiencies, Nonconformances and Corrective Action Related to Analytical Methods

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies which affect quantity and/or quality and render the data unacceptable or indeterminate. Deficiencies related to field and laboratory measurement systems include, but are not limited to, instrument malfunctions, blank contamination, quality control sample failures, etc.

Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the GBRA Project Manager. The GBRA Project Manager will notify the GBRA QAO of the potential nonconformance. The GBRA QAO will initiate a NCR to document the deficiency.

The GBRA Project Manager, in consultation with GBRA QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the GBRA Project

Manager, in consultation with the GBRA QAO, will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the GBRA QAO by completion of a Corrective Action Report (see Appendix F).

CARs document: root cause(s); impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs will be included with quarterly progress reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

B5 QUALITY CONTROL

Sampling Quality Control Requirements and Acceptability Criteria

The minimum Field QC Requirements are outlined in the *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415). Specific requirements are outlined below. Field QC sample results are submitted with the laboratory data report (see Section A9.).

Field Split - A field split is a single sample subdivided by field staff immediately following collection and submitted to the laboratory as two separately identified samples according to procedures specified in the *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415). Split samples are preserved, handled, shipped, and analyzed identically and are used to assess variability in all of these processes. Field splits apply to conventional samples only and are collected on a 10% basis, or one per batch, whichever is more frequent.

The precision of field split results is calculated by relative percent difference (RPD) using the following equation:

$$RPD = (X1-X2)/((X1+X2)/2)) \times 100\%$$

A 30% RPD criteria will be used to screen field split results as a possible indicator of excessive variability in the sample handling and analytical system. If it is determined that elevated quantities of an analyte (i.e., > RL) were measured and analytical variability can be eliminated as a factor, then variability in field split results will primarily be used as a trigger for discussion with field staff to ensure samples are being handled in the field correctly. Some individual sample results may be invalidated based on the examination of all extenuating information. The information derived from field splits is generally considered to be event specific and would not normally be used to determine the validity of an entire batch; however, some batches of samples may be invalidated depending on the situation. Professional judgment during data validation will be relied upon to interpret the results and take appropriate action. The qualification (i.e.- invalidation) of data will be documented on the Data Summary. Deficiencies will be addressed as specified in this section under Deficiencies, Nonconformances, and Correction Action related to Quality Control.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Method Specific QC requirements – QC samples, other than those specified later this section, are run (i.e.- sample duplicates, surrogates, internal standards, continuing calibration samples, interference check samples, positive control, negative control, and media blank) as specified in the methods. 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 QASMs. The minimum requirements that all participants abide by are stated below.

Limit of Quantitation (LOQ) – The laboratory will analyze a calibration standard (if applicable) at the LOQ on each day the project samples are analyzed. Calibrations including the standard at the LOQ will meet the calibration requirements of the analytical method or corrective action will be implemented.

LOQ Check Standard – An LOQ check standard 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 standard is spiked into the sample matrix at a level less than or near the LOQ for each analyte for each batch of samples that are run.

The LOQ check standard is carried through the complete preparation and analytical process. LOQ check standards are run at a rate of one per analytical batch. A batch is defined as 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.

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

$$\%R = SR/SA * 100$$

Measurement performance specifications are used to determine the acceptability of LOQ Check Standard analyses as specified in Table A7.1.

Laboratory Control Standard (LCS) - A LCS consists of a sample matrix (e.g. deionized water) free from the analytes of interest spiked with verified known amounts of analyte. The LCS is spiked into the sample matrix at a level less than or equal to the mid-point of the calibration curve 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.

The LCS is carried through the complete preparation and analytical process. The LCS is used to document the bias of the analytical process. LCSs are run at a rate of one per batch. A batch is defined as a set of environmental samples that are prepared and/or analyzed together within the same process using the same lot of reagents.

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; SR is the measured result; and SA is the true result:

$$\%R = SR/SA * 100$$

Performance limits and control charts are used to determine the acceptability of LCS analyses. Project control limits are specified in Table A7.1.

Laboratory Duplicates - A laboratory duplicate is prepared in the laboratory by splitting aliquots of an LCS. Both samples are carried through the entire preparation and analytical process. LCS duplicates are used to assess precision and are performed at a rate of one per batch. A batch is defined as a set of environmental samples that are prepared and/or analyzed together within the same process using the same lot of reagents.

For most parameters, precision is calculated by the relative percent difference (RPD) of LCS 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, X1 and X2, the RPD is calculated from the following equation:

$$RPD = (X1 - X2)/\{(X1+X2)/2\} * 100$$

A bacteriological duplicate is considered to be a special type of laboratory duplicate and applies when bacteriological samples are run in the field as well as in the lab. Bacteriological duplicate analyses are performed on samples from the sample bottle on a 10% basis. Results of bacteriological duplicates are evaluated by calculating the logarithm of each result and determining the range of each pair.

Performance limits and control charts are used to determine the acceptability of duplicate analyses. Project control limits are specified in Table A7.1. The specifications for bacteriological duplicates in Table A7.1 apply to samples with concentrations > 10 org./100mL.

Matrix spike (MS) –Matrix spikes are prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Percent recovery of the known concentration of added analyte is used to assess accuracy of the analytical process. The spiking occurs prior to sample preparation and analysis. Spiked samples are routinely prepared and analyzed at a rate of 10% of samples processed, or one per batch whichever is greater. A batch is defined as 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. The information from these controls is sample/matrix specific and is not used to determine the validity of the entire batch. The MS is spiked at a level less than or equal to the midpoint of the calibration or analysis range for each analyte. Percent recovery (%R) is defined as 100 times the observed concentration, minus the sample concentration, divided by the true concentration of the spike.

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 laboratory shall document the calculation for %R. The percent recovery of the matrix spike is calculated using the following equation in which %R is percent recovery, SSR is the observed spiked sample concentration, SR is the sample result, and SA is the reference concentration of the spike added:

$$\%R = (SSR - SR)/SA * 100$$

Measurement performance specifications for matrix spikes are not specified in this document.

The results are compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, the laboratory shall determine the internal criteria and document the method used to establish the limits. For matrix spike results outside established criteria, corrective action shall be documented or the data reported with appropriate data qualifying codes.

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 carried through the complete sample preparation and analytical procedure. 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 then 5% of the lowest value of the batch, or corrective action will be implemented.

Deficiencies, Nonconformances and Corrective Action Related to Quality Control

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP. Nonconformances are deficiencies which affect data quantity and/or quality and render the data unacceptable or indeterminate. Deficiencies related to quality control include but are not limited to field and laboratory quality control sample failures.

Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the GBRA Project Manager. The GBRA Project Manager will notify the GBRA QAO of the potential nonconformance. The GBRA QAO will initiate a NCR to document the deficiency.

The GBRA Project Manager, in consultation with GBRA QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the GBRA Project Manager in consultation with the GBRA QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the GBRA QAO by completion of a Corrective Action Report (see Appendix F).

CARs document: root cause(s); impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs will be included with quarterly progress reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

All sampling equipment testing and maintenance requirements are detailed in the *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415). 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 QASM(s).

B7 INSTRUMENT CALIBRATION AND FREQUENCY

Field equipment calibration requirements are contained in the *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003* (RG-415). Post-calibration error limits and the disposition resulting from error are adhered to. Data not meeting post-error limit requirements invalidate associated data collected subsequent to the pre-calibration and are not submitted to the TSSWCB.

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

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

No special requirements for acceptance are specified for field sampling supplies and consumables. All field supplies and consumables are accepted upon inspection for breaches in shipping integrity.

All new batches of field and laboratory supplies and consumables received by the GBRA laboratory are inspected upon receipt for damage, missing parts, expiration date, and storage and handling requirements. Chemicals, reagents, and standards are logged into an inventory database that documents grade, lot number, manufacturer, dates received, opened, and emptied. All reagents shall meet ACS grade or equivalent where required. Acceptance criteria are detailed in organization's standard operating procedures.

B9 NON-DIRECT MEASUREMENTS

This QAPP does not include the use of routine data obtained from non-direct measurement sources.

B10 DATA MANAGEMENT

Data Management Process

Field technicians and laboratory personnel follow protocols that ensure that data collected for the *SWQM for the PC WPP* maintains its integrity and usefulness in the WPP development. Field data collected at the time of the sampling event is logged by the field technician, along with notes on sampling conditions on field data sheets. The field sheet is the responsibility of the field technician and is transported with the sample to the laboratory. The lab technician /sample custodian 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. The lab technician /sample custodian must review the chain of custody to verify that it is filled out correctly and complete. Lab technicians take receipt of the sample and review the chain of custody, begin sample prep or analysis and transfer samples into the refrigerator for storage. Examples of the field data sheet and chain of custody used can be found in Appendices C and D.

Data generated by lab technicians 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. A second review by another lab analyst/technician validates that the data meets the data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. After this review the lab analyst/technician inputs the data and quality control information into the Lab Samples Database for report generation and data storage.

The GBRA Regional Laboratory Director supervises the GBRA Regional laboratory and reviews the report that is generated when all analyses are complete. Again, 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 director signs the report. If the GBRA lab director or QAO designee 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 Project Manager reviews the data for reasonableness and if errors or anomalies are found the report is returned to the laboratory staff for review and tracking to correct the error. After review for reasonableness the data is cross-checked to the analysis logs by the GBRA Project Manager. If at any time errors are identified, the laboratory and water quality databases are corrected.

The GBRA Project Manager, in consultation with GBRA QAO (and other affected individuals/organizations), will determine if the error constitutes a nonconformance. If it is determined a nonconformance does exist, the GBRA Project Manager in consultation with the GBRA QAO will determine the disposition of the nonconforming activity or

item and necessary corrective action(s); results will be documented by the GBRA QAO by completion of a Corrective Action Report (see Appendix F).

CARs document: root cause(s); impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs will be included with data summary report that accompanies the data submittal. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

The GBRA Project Manager is responsible for transmitting the data to the TSSWCB Project Manager, who then transmits the data to TCEQ and TAMU SSL. If errors are found after the TSSWCB, TCEQ or TAMU SSL reviews, those errors are corrected by the GBRA Project Manager, logged in a data correction log and all participants are notified.

The following flow diagram outlines the path that data that is generated in the field takes:

Field data collected → Field data sheets → Lab database → Report generation → Quality control review by GBRA QAO → Data checked for reasonableness by GBRA Project Manager → Data transferred to GBRA water quality database → Data verification to analysis logs by GBRA Project Manager → ASCII file format created → TSSWCB Project Manager

The following flow diagram outlines the path that data that is generated by the lab takes:

Laboratory data → Laboratory analysis logs → Lab database → Report generation → Quality control review by GBRA QAO → Data checked for reasonableness by GBRA Project Manager → Data transferred to GBRA water quality database → Data verification to analysis logs by GBRA Project Manager → ASCII file format created → TSSWCB Project Manager

Data Errors and Loss

The GBRA Regional Laboratory Director supervises the GBRA Regional laboratory and reviews the report that is generated when all analyses are 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 director signs the report. If the GBRA lab director or QAO designee 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 Project Manager reviews the data for reasonableness and if errors or anomalies are found the report is returned to the laboratory director for review and tracking to correct the error. After review for reasonableness the data is cross-checked to the analysis logs by the GBRA Project

Manager. If at any time errors are identified, the laboratory and water quality databases are corrected. The GBRA Project Manager is responsible for transmitting the data to the TSSWCB Project Manager who then transmits the data to TCEQ and TAMU SSL. If errors are found after the TSSWCB, TCEQ or TAMU SSL reviews, those errors are corrected by the GBRA Project Manager, logged in a data correction log and all participants are notified.

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.

Record Keeping and Data Storage

After data is collected and recorded on field data sheets, the data sheets are filed for review and use later. These files are kept in paper form for a minimum of one year and then scanned into the GBRA ITRAX for permanent record.

The data produced during each analysis is recorded on analysis bench sheets. The information contained on the benchsheet includes all quality control data associated with each day's or batch's analysis. The data from the benchsheet are transferred to the laboratory database for report generation. The analysis benchsheets are kept in paper form for a minimum of one year and then scanned into the GBRA ITRAX for permanent record.

The data reports that are generated are reviewed by the GBRA laboratory director and signed. They are then given to the GBRA Project Manager for verification. If an anomaly or error is found the report is marked and returned to the laboratory for review, verification and correction, if necessary. These reports may or may not be kept in paper form since the reports can be regenerated from the lab database at any time. If kept, the paper form is kept for a minimum of one year and then scanned into the GBRA ITRAX for permanent record.

The GBRA laboratory database is housed on the laboratory computer and is backed up on the network server nightly. A back up copy of the network server files is made every Monday and that copy is stored off-site at a protected location. The GBRA network administrator is responsible for the servers and back up generation.

After data is sent to the TSSWCB for review and submittal to TCEQ and TAMU SSL, 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 scanned into the GBRA ITRAX for permanent record.

The GBRA ITRAX is part of the network that is backed up each evening. The GBRA records manager is the custodian of these files.

Data Handling, Hardware, and Software Requirements

The laboratory database is housed on a GBRA server and backed up each evening. The laboratory database will be using Microsoft Access 2000 software until October 2007 and upgraded to Sequel 2000 at that time. The systems are operating in Windows 2003 and any additional software needed for word processing, spreadsheet or presentations uses Microsoft Office 2003.

Information Resource Management Requirements

Data will be managed in accordance with the TCEQ Surface *Water Quality Monitoring Data Management Reference Guide, GIS Policy* (TCEQ OPP 8.11), *GPS Policy* (TCEQ OPP 8.12) and applicable GBRA information resource management policies. The personnel collecting data for the *SWQM for the PC WPP* do not create TCEQ certified locational data using Global Positioning System (GPS) equipment. GPS equipment may be used as a component of the information required by the Station Location (SLOC) request process, but TCEQ staff are responsible for creating the certified locational data that will ultimately be entered into the TCEQ's SWQMIS. Any information developed for the *SWQM for the PC WPP* using a Geographic Information System (GIS) will be used solely to meet deliverable requirements and will not be submitted to the TCEQ as a certified data set.

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 TSSWCB in Quarterly Report
Monitoring Systems Audit of GBRA	Dates to be determined by TSSWCB	TSSWCB	Field sampling, handling and measurement; facility review; and data management as they relate to the *SWQM for the PC WPP*	30 days to respond in writing to the TSSWCB to address corrective actions
Laboratory Inspection	Dates to be determined by TSSWCB	TSSWCB	Analytical and quality control procedures employed at the GBRA laboratory and the contracted laboratories	30 days to respond in writing to the TSSWCB to address corrective actions

Corrective Action

The GBRA Project Manager is responsible for implementing and tracking corrective action resulting from audit findings outlined in the audit report. Records of audit findings and corrective actions are maintained by both the TSSWCB and the GBRA Project Managers. Audit reports and corrective action documentation will be submitted to the TSSWCB with the Quarterly Report.

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

C2 REPORTS TO MANAGEMENT

Reports to GBRA Project Management

Laboratory data reports contain QC information so that this information can be reviewed by the GBRA Project Manager. After review, if the GBRA Project Manager finds no anomalies or questionable data, the process of data transmittal to TSSWCB begins. Project status, assessments and significant QA issues will be dealt with by the GBRA Project Manager who will determine whether it will be included in reports to the TSSWCB Project Management.

Reports to TSSWCB Project Management

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

Quarterly Report - Summarizes the GBRA's activities for each task; reports monitoring status, problems, delays, and corrective actions; 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 TSSWCB in the quarterly progress report.

D1 DATA REVIEW, VERIFICATION, AND VALIDATION

For the purposes of this document, the term verification refers to the data review processes used to determine data completeness, correctness, and compliance with technical specifications contained in applicable documents (i.e.-QAPPs, SOPs, QASMs, analytical methods). Validation refers to a specific review process that extends the evaluation of a data set beyond method and procedural compliance (i.e.- data verification) to determine the quality of a data set specific to its intended use.

All field and laboratory 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. 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 TSSWCB.

D2 VERIFICATION AND VALIDATION METHODS

All field and laboratory data will be reviewed, verified and validated to ensure they conform to project specifications and meet the conditions of end use as described in Section A7 of this document.

Data review, verification, and validation will be performed using self-assessments and 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 sections of Table D.2, respectively. Potential errors are identified by examination of documentation and by manual examination of corollary or unreasonable data. 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 higher level project management to establish the appropriate course of action, or the data associated with the issue are rejected. 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 Table D.2 is performed by the GBRA Data Manager and QAO. 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.

Another element of the data validation process is consideration of any findings identified during the monitoring systems audit conducted by the TSSWCB Quality Assurance Officer. 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 Project Manager validates that the data meet the data quality objectives of the project and are suitable for reporting to TSSWCB.

If any requirements or specifications of the *SWQM for the PC WPP* are not met, based on any part of the data review, the responsible party should document the nonconforming activities (with a CAR) and submit the information to the GBRA Data Manager with the data. This information is communicated to the TSSWCB by the GBRA in the Data Summary. The data is not transmitted to TSSWCB, TCEQ or TAMU SSL for their use in assessment or modeling.

Table D2.1: Data Review Tasks

Field Data Review	Responsibility
Field data reviewed for conformance with data collection, sample handling and chain of custody, analytical and QC requirements	GBRA Field Technicians
Post-calibrations checked to ensure compliance with error limits	GBRA Field Technicians
Field data calculated, reduced, and transcribed correctly	GBRA Project Manager
Laboratory Data Review	**Responsibility**
Laboratory data reviewed for conformance with data collection, sample handling and chain of custody, analytical and QC requirements to include documentation, holding times, sample receipt, sample preparation, sample analysis, project and program QC results, and reporting	GBRA/SARA/Ana-Lab Laboratory Directors(QAOs)
Laboratory data calculated, reduced, and transcribed correctly	GBRA/SARA/Ana-Lab Laboratory Directors(QAOs) and GBRA Project Manager
LOQs consistent with requirements for Ambient Water Reporting Limits	GBRA/SARA/Ana-Lab Laboratory Directors(QAOs) and GBRA Project Manager
Analytical data documentation evaluated for consistency, reasonableness and/or improper practices	GBRA/SARA/Ana-Lab Laboratory Directors(QAOs) and GBRA Project Manager
Analytical QC information evaluated to determine impact on individual analyses	GBRA/SARA/Ana-Lab Laboratory Directors(QAOs) and GBRA Project Manager
All laboratory samples analyzed for all parameters	GBRA Project Manager
Data Set Review	**Responsibility**
The test report has all required information as described in Section A9 of the QAPP	GBRA Project Manager
Confirmation that field and lab data have been reviewed	GBRA Laboratory Director(QAO) and GBRA Project Manager
Data set (to include field and laboratory data) evaluated for reasonableness and if corollary data agree	GBRA Project Manager
Outliers confirmed and documented	GBRA Project Manager
Field QC acceptable (e.g., field splits and trip, field and equipment blanks)	GBRA Field Technicians
Sampling and analytical data gaps checked and documented	GBRA Field Technicians and GBRA Project Manager
Verification and validation confirmed. Data meets conditions of end use and are reportable	GBRA Project Manager

D3 RECONCILIATION WITH USER REQUIREMENTS

Data produced in this project, and data collected by other organizations (i.e.- USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data meeting project requirements will be used in the development and implementation of the Plum Creek WPP and in the assessment process for the Texas Water Quality Inventory and 303(d) List.

Appendix A *SWQM for the PC WPP* Work Plan

NONPOINT SOURCE SUMMARY PAGE for the CWA §319(h) Agricultural/Silvicultural Nonpoint Source Grant Program						
Title of Project:	Surface Water Quality Monitoring to Support Plum Creek Watershed Protection P Development [Short Title: SWQM for Plum Creek WPP]					
Project Goals/Objectives:	Provide quality assured surface water quality monitoring data to support development a implementation of a Watershed Protection Plan for the Plum Creek Watershed Caldwell, Hays and Travis Counties.					
Project Tasks:	1) Project Administration and Coordination 2) Routine Ambient Surface Water Quality Monitoring 3) Targeted Watershed Surface Water Quality Monitoring 4) Stormflow Surface Water Quality Monitoring 5) 24-hour DO Surface Water Quality Monitoring 6) Effluent Surface Water Quality Monitoring 7) Springflow Surface Water Quality Monitoring 8) Quality Assurance 9) Data Management and Final Report					
Measures of Success:	Data of known and acceptable quality are generated for surface water quality monitori (routine ambient, targeted watershed, stormflow, 24-hour DO, effluent and springflow) main stem and tributary stations on Segment 1810 (Plum Creek) for field, convention flow, bacteria and effluent parameters.					
Project Type:	Statewide ( ); Watershed Implementation/Education ( ); Watershed Planning/Assessment (X); Watershed Protection (X)					
Status of Water Body: 2004 Water Quality Inventory and 303(d) List	Segment ID: 1810	Impairment: bacteria Concerns: ammonia; nitrate+nitrite nitrogen; total phosphorus	Category: 5c			
Project Location:	Plum Creek (Segment 1810) Watershed (entirety of HUC 1210020304) in Caldwell, Ha and Travis Counties					
Key Project Activities:	Hire Staff (X); Monitoring (X); Regulatory Assistance ( ); Technical Assistance ( ); Education ( ); Implementation ( ); Demonstration ( ); Other ( )					
NPS Management Program Elements:	• Element One (STG 1A; STG 1B; STG 1C; STG 1D) • Element Two • Element Five					
Project Costs:	Federal:	$138,603	Non-Federal Match:	$32,561	Total:	$171,164
Project Management:	Guadalupe-Blanco River Authority					
Project Period:	May 1, 2007 – March 31, 2010					

Part I – Applicant Information

Applicant							
Project Lead	Debbie Magin						
Title	Water Quality Services Director						
Organization	Guadalupe-Blanco River Authority						
E-mail Address	dmagin@gbra.org						
Street Address	933 E Court St						
City	Seguin	County	Guadalupe	State	TX	Zip Code	78155
Telephone	830-379-5822			Fax	830-379-9718		

Project Partners	
Names	Roles & Responsibilities
Guadalupe-Blanco River Authority (GBRA)	Perform all work described in tasks. Provide non-federal match.
Texas Commission on Environmental Quality (TCEQ)	Provide non-federal match through Clean Rivers Program funds.
Plum Creek Conservation District (PCCD), Caldwell-Travis Soil and Water Conservation District (SWCD 304), and Hays County Soil and Water Conservation District (SWCD 351)	Assist in providing access to certain sampling locations throughout watershed.
Texas A&M University Spatial Sciences Laboratory (TAMU SSL)	Utilize data to characterize watershed with geostatistical analysis and modeling to develop WPP through TSSWCB CWA §319(h) project 04-17.
Texas AgriLife Extension Service (AgriLife)	Facilitate stakeholder process and provide technical assistance to develop WPP through TSSWCB CWA §319(projects 04-17 and 05-05.
Texas State Soil and Water Conservation Board (TSSWCB)	Provide state oversight and management of all project activities, ensure coordination of activities with TCEQ, and provide technical assistance to develop WPP through TSSWCB CWA §319(h) project 04-19.

Part II – Project Information

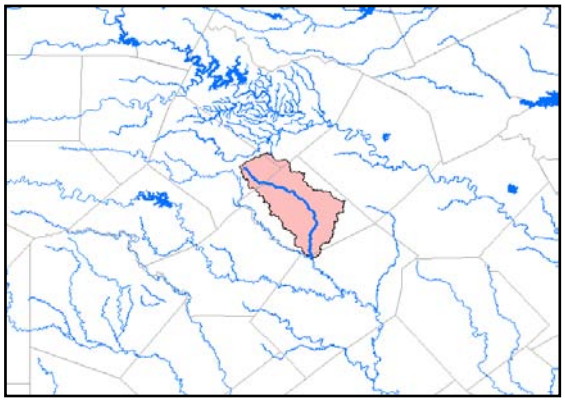
Project Type							
Surface Water	X	Groundwater					
Does the project implement recommendations made in a completed Watershed Protection Plan or approved TMDL Report or Implementation Plan?				Yes	X	No	
If yes, identify the document.		Plum Creek Watershed Protection Plan					
If yes, identify the agency/group that developed and/or approved the document.		Plum Creek Watershed Partnership facilitated by the Texas AgriLife Extension Service and TSSWCB		Year Developed	2008		

Watershed Information				
Watershed Name(s)	Hydrologic Unit Code (8 Digit)	Segment ID	305(b) Category (2004)	Size (Acres)
Plum Creek Watershed	12100203	1810	5c	288,240

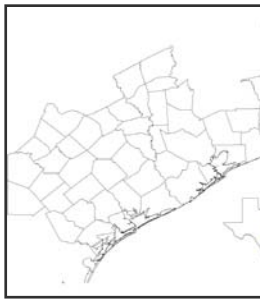
Project Narrative

Problem/Need Statement

Plum Creek rises in Hays County north of Kyle and runs south through Caldwell County, passing Lockhart and Luli and eventually joins the San Marcos River at their confluence north of Gonzales County (see map below left). Pl Creek is 52 miles in length and has a drainage area of 389 mi^2. According to the *2004 Texas Water Quality Inventory a 303(d) List*, Plum Creek (Segment 1810) is impaired by eleva bacteria concentrations (category 5c) and exhibits nutrient enrichm concerns for ammonia, nitrate+nitrite nitrogen and total phosphorus.



As a part of TSSWCB CWA §319(h) project 04-19, *Regio Watershed Coordinator*, the TSSWCB Wharton Regional Watersh Coordinator established the Regional Watershed Coordination Steer Committee (WCSC) in January 2005. Over the course of the n twelve months, the WCSC quantified criteria to prioritize watersheds southeast and south central Texas for Watershed Protection Plan (WP development. The WCSC is composed of river authorities, councils governments, other state agencies, federal agencies, and land gr institutions with water quality responsibilities across the 47 counties the TSSWCB Wharton Regional Office Service Area (see map below right). Information about the Wharton Regio WCSC is available at http://www.tsswcb.state.tx.us/cwp.



Discussions among WCSC members led to a consensus in December 2005 that Plum Creek (Segment 1810) had the highest potential to produce a successfully developed and implemented WPP. Key factors included the water quality issues, increasing urban development in the northern third of the watershed, oil and gas production, and potential for agricultural NPS pollution. As such, a WPP for the Plum Creek watershed will be developed. AgriLife will facilitate the stakeholder process and provide technical assistance to develop the WPP through TSSWCB CWA §319(h) projects 04-17, *Development of the Plum Creek Watershed Protection Plan*, and 05-05, *Community-based Water Quality Curriculum Which Enhances Stakeholder Involvement in Watershed Protection Plan Initiatives*. TSSWCB will provide technical assistance to develop the WPP through TSSWCB CWA §319(h) project 04-19.

TSSWCB and AgriLife convened the Plum Creek Watershed Partnership (PCWP) in April 2006 with a series of th public meetings. The Plum Creek Watershed Steering Committee was formalized after meeting in May and again in Ju 2006. The Steering Committee directed the formation of five Work Groups to carry out the detailed work of develop the WPP. These five Work Groups (Agricultural NPS, Urban NPS & Stormwater, Habitat & Water Quality, Outreach Education, and Wastewater Infrastructure & Industry) and Steering Committee met almost monthly for the next months. Additionally, a Plum Creek Watershed Technical Advisory Group (TAG) consisting of state and fede agencies also met during the WPP process. The PCWP Steering Committee completed the "Plum Creek Watersh Protection Plan" in February 2008. Information about the PCWP is available at http://plumcreek.tamu.edu/.

Originally, the WPP would be developed using only existing water quality data. However, discussions with the Steer Committee, the Work Groups and the TAG, identified data gaps which would make source identification a establishment of water quality goals difficult at best. Accurate source identification is key to prioritizing implementat projects for funding. This project will close that data gap allowing for successful WPP development and implementati GBRA will collect SWQM data to characterize the Plum Creek watershed through this project. TAMU SSL will util data from this project to characterize the Plum Creek watershed with geostatistical analysis and modeling throu TSSWCB CWA §319(h) project 04-17.

Project Narrative

General Project Description

Currently, routine ambient water quality data is collected monthly at 2 main stem stations by GBRA (17406 and 1264 and quarterly at a third main stem station by the TCEQ (12647). This project will generate data of known and accepta quality for surface water quality monitoring of main stem and tributary stations on Segment 1810 (Plum Creek) for fie conventional, flow, bacteria and effluent parameters to support development of a WPP for the Plum Creek watershed Caldwell, Hays and Travis Counties. Six types of surface water quality monitoring will be conducted: routine ambie targeted watershed, stormflow, 24-hour DO, effluent and springflow.

GBRA will conduct all work performed under this project including technical and financial supervision, preparation status reports, coordination with local stakeholders, surface water quality monitoring sample collection and analysis, a data management. GBRA will participate in the Plum Creek Watershed Partnership, Steering Committee, TAG a appropriate Work Groups in order to efficiently and effectively achieve project goals and to summarize activities a achievements made throughout the course of this project.

GBRA will conduct routine ambient monitoring at 5 sites monthly and at 1 site twice per quarter year, collecting fie conventional, flow and bacteria parameter groups. Sampling period extends over 20 months. This will compleme existing routine ambient monitoring regimes conducted by GBRA and TCEQ such that routine water quality monitori is conducted monthly at 8 sites in the Plum Creek watershed. GBRA will coordinate with the TCEQ Regional Office avoid duplicative routine ambient monitoring at site 12642. GBRA will conduct targeted watershed monitoring at sites twice per season, once under dry weather conditions and once under wet weather conditions each season, collecti field, conventional, flow and bacteria parameter groups. Sampling period extends through 6 seasons. Spatial, seaso and meteorological variation will be captured in these snapshots of watershed water quality. GBRA will cond automated stormflow monitoring at 1 urban/residential site during 4 storm events collecting field, conventional, flow a bacteria parameter groups. This will characterize urban/residential NPS loadings in the rapidly developing upper third the watershed. Sampling period extends over 12 months. Depending on meteorological conditions, seasonal variation storm events will be captured. GBRA will conduct 24-hour DO monitoring at 8 sites monthly during the index peri collecting field and flow parameter groups. These sites shall be the same as the sites for routine ambient monitori Sampling period extends over 8 months during the index period. GBRA will conduct effluent monitoring at 7 WWT once per season collecting field, conventional, flow, bacteria and effluent parameter groups. Sampling period exten through 6 seasons. This will characterize WWTF contributions to flow regime and pollutant loadings. GBRA w conduct springflow monitoring at 3 springs once per season collecting field, conventional, flow and bacteria parame groups. Sampling period extends through 4 seasons. Spatial, seasonal and meteorological variation in springflow will captured. This will characterize spring contributions to flow regime and pollutant loadings.

GBRA will develop and implement a QAPP to ensure water quality data of known and acceptable quality are genera through this project. See table on page 5 or map on page 6 for proposed sites for all types of monitoring. The QAPP w precisely identify sites. GBRA will manage monitoring data for use in the development of a Plum Creek WPP. GBR will submit monitoring data to TAMU SSL for use in characterizing the Plum Creek watershed with geostatisti analysis and modeling through TSSWCB CWA §319(h) project 04-17. GBRA will submit monitoring data to TSSW for inclusion in the TCEQ SWQM database.

GBRA will post monitoring data to the GBRA website in a timely manner. GBRA will summarize the results a activities of this project through inclusion in GBRA's Clean Rivers Program Basin Highlights Report and/or Ba Summary Report. Additionally, the results and activities of this project will be summarized in the Plum Creek W developed through TSSWCB CWA §319(h) project 04-17.

Federal funds will provide for technicians' salary and travel and analysis of water quality samples and automa sampling equipment. GBRA and TCEQ Clean Rivers Program will each provide portions of the non-federal match.

Proposed Monitoring Locations

Station_ID[1]	Lat_dd	Long_dd	Task	Short_Description[2, 3, 4]
12556	29.760135	-97.602083	2 – ROUTINE	CLEAR FORK PLUM CREEK AT SALT FLAT RD (CR 128)
12558	29.941452	-97.699623	2 – ROUTINE	ELM CREEK AT CR 233
12640	29.657329	-97.601895	2 – ROUTINE	PLUM CREEK AT CR 135
12647	29.865290	-97.615261	2 – ROUTINE	PLUM CREEK AT OLD MCMAHAN RD (CR 202)
17406	29.960328	-97.798169	2 – ROUTINE	PLUM CREEK AT PLUM CREEK RD
20488	29.961136	-97.747981	2 – ROUTINE	BRUSHY CREEK AT ROCKY RD (UPSTREAM OF NRCS 14)
20491	29.904499	-97.639690	2 – ROUTINE	DRY CREEK AT FM 672
20500	29.699616	-97.611752	2 – ROUTINE	WEST FORK PLUM CREEK AT BIGGS RD (CR 131)
12555	29.676201	-97.624745	3 – TARGETED	SALT BRANCH AT FM 1322
12557	29.885462	-97.665213	3 – TARGETED	TOWN CREEK AT E MARKET ST (UPSTREAM OF LOCKHART 1 WWTF)
12559	29.973520	-97.812572	3 – TARGETED	PORTER CREEK AT DAIRY RD
12642	29.699576	-97.603849	3 – TARGETED	PLUM CREEK AT BIGGS RD (CR 131)
12643	29.752783	-97.592958	3 – TARGETED	PLUM CREEK AT FM 1322
12645	29.821800	-97.584232	3 – TARGETED	PLUM CREEK AT YOUNG LN (CR 197)
12648	29.881869	-97.630368	3 – TARGETED	PLUM CREEK AT CR 186
12649	29.937758	-97.725391	3 – TARGETED	PLUM CREEK AT CR 233
14945	29.826294	-97.667809	3 – TARGETED	CLEAR FORK PLUM CREEK AT OLD LULING RD (CR 213)
16709	29.892423	-97.691030	3 – TARGETED	TOWN CREEK WEST OF LOCKHART
18343	29.923288	-97.678864	3 – TARGETED	PLUM CREEK UPSTREAM OF US 183
20480	30.019034	-97.878859	3 – TARGETED	PLUM CREEK DOWNSTREAM OF NRCS 1 SPILLWAY
20481	29.971198	-97.818635	3 – TARGETED	BUNTON BRANCH AT HEIDENREICH LN
20482	30.033032	-97.771327	3 – TARGETED	BRUSHY CREEK AT FM 2001 (DOWNSTREAM OF NRCS 12)
20487	29.978394	-97.765739	3 – TARGETED	BRUSHY CREEK AT SH 21
20483	29.997951	-97.743359	3 – TARGETED	ELM CREEK AT SH 21 (DOWNSTREAM OF NRCS 16)
20489	29.980675	-97.711878	3 – TARGETED	COWPEN CREEK AT SCHUELKE RD
20496	29.796080	-97.562103	3 – TARGETED	TENNEY CREEK AT TENNEY CREEK RD
20490	29.920943	-97.794519	3 – TARGETED	CLEAR FORK PLUM CREEK AT FARMERS RD
20493	29.852633	-97.696935	3 – TARGETED	CLEAR FORK PLUM CREEK AT PR 10 (STATE PARK)
20497	29.782009	-97.681234	3 – TARGETED	WEST FORK PLUM CREEK AT FM 671
99915	30.020278	-97.823333	3 – TARGETED	PORTER CREEK UPSTREAM OF NRCS 6
20495	29.857500	-97.580278	3 – TARGETED	DRY CREEK AT FM 713
20484	29.963415	-97.830645	3 – TARGETED	PLUM CREEK AT HEIDENREICH LN (DOWNSTREAM OF KYLE WWTF)
20501	29.687082	-97.640094	3 – TARGETED	SALT BRANCH AT SALT FLAT RD (UPSTREAM OF LULING WWTF)
20498	29.752690	-97.485810	3 – TARGETED	COPPERAS CREEK AT TENNEY CREEK RD (DOWNSTREAM OF CAL-MAINE
12538	30.030363	-97.827320	3 – TARGETED	ANDREWS BRANCH AT CR 131
20505	30.024289	-97831044	3 – TARGETED	RICHMOND BRANCH AT DACY LANE
20504	30.024378	-97.822186	3 – TARGETED	PORTER CREEK TRIBUTARY AT QUAIL COVE ROAD
20510	29.766720	-97.55702	3 – TARGETED	HINES BRANCH AT TENNEY CREEK ROAD (CR 141 – DOWNSTREAM OF CALMAINE)
20503	29.991145	-97.858179	3 – TARGETED	PLUM CREEK AT LEHMAN ROAD
20502	30.009444	-97.846667	3 – TARGETED	BUNTON BRANCH AT DACY LANE (UPSTREAM OF NRCS 5)
20479	30.003040	-97.887410	4 – STORM	UNNAMED TRIBUTARY AT FM 150 NEAR HAWTHORN DR
20492	29.884318	-97.662874	6 – WWTF	10210-001 CITY OF LOCKHART [#1] & GBRA
20494	29.871627	-97.621926	6 – WWTF	10210-002 GBRA [& CITY OF LOCKHART #2]
20499	29.685416	-97.627428	6 – WWTF	10582-002 CITY OF LULING
20486	29.969940	-97.831670	6 – WWTF	11041-002 CITY OF KYLE & AQUASOURCE INC
99923	30.056882	-97.835838	6 – WWTF	11060-001 CITY OF BUDA & GBRA
99936	30.043056	-97.806111	6 – WWTF	14431-001 SHADOW CREEK WWTP
99937	30.082750	-97.799333	6 – WWTF	14377-001 SUNFIELD WWTP
20509	29.886656	-97.668058	7 – SPRING	LOCKHART SPRINGS
20507	29.874722	-97.737500	7 – SPRING	SWN 67-11-104 CLEAR FORK SPRINGS
20508	29.870000	-97.710278	7 – SPRING	SWN 67-11-105 BOGGY CREEK SPRINGS

1 – 999## indicates temporary Station ID

2 – NRCS # indicates PCCD Floodwater Retarding Dam

3 – #####-### indicates TCEQ Wastewater Discharge Permit

4 – SWN indicates Texas Water Development Board State Well Number

Water Quality Impairment

Describe all known causes (pollutants of concern) of water quality impairments from any of the following sources: 200
Water Quality Inventory and 303(d) List, 2004 Summary of Waterbodies with Water Quality Concerns (Secondary Concerns List) or Other Documented Sources (ex. Clean Rivers Program Basin Summary or Basin Highlights Reports)

- *2002 TWQI* – contact recreation use concern, nutrient enrichment concerns
- *2004 TWQI* – contact recreation use impairment, nutrient enrichment concerns
- *2003 GBRA CRP Basin Summary Report* – significant oil and gas activity, historic occasional spills, and improper plugged wells make observations of TDS, sulfates and chlorides extremely important
- *2005* and *2006 GBRA CRP Basin Highlights Report* – rapid urbanization resulting in changes to run characteristics, wastewater disposal concerns, and NPS pollution

Project Goals

Generate data of known and acceptable quality for surface water quality monitoring (routine ambient, target watershed, stormflow, 24-hour DO, effluent and springflow) of main stem and tributary stations on Segment 1810 (Plu Creek) for field, conventional, flow, bacteria and effluent parameters to support development of a WPP for the Plu Creek watershed in Caldwell, Hays and Travis Counties.

Tasks, Objectives and Schedules						
Task 1:	Project Administration and Coordination					
Costs:	Federal:	$0	Non-Federal:	$9,674	Total:	$9,674
Objective:	To effectively coordinate and monitor all work performed under this project including technical a financial supervision, preparation of status reports, and coordination with local stakeholders.					
Subtask 1.1:	GBRA will prepare electronic quarterly progress reports for submission to TSSWCB. Progress repo shall document all activities performed within a quarter and shall be submitted by the 15th of Janua April, July, and October. All progress reports will also be provided to AgriLife, TAMU SSL, USGS, a TCEQ.					
	Start Date:	Month 1		Completion Date:	Month 35	
Subtask 1.2:	GBRA will perform accounting functions for project funds and will submit appropriate Reimbursem Forms to TSSWCB at least quarterly.					
	Start Date:	Month 1		Completion Date:	Month 35	
Subtask 1.3:	GBRA will participate in the Plum Creek Watershed Partnership, Steering Committee, Techni Advisory Group and appropriate Work Groups in order to efficiently and effectively achieve proj goals and to summarize activities and achievements made throughout the course of this project.					
	Start Date:	Month 1		Completion Date:	Month 35	
Deliverables	• Quarterly Reports in electronic format. • Reimbursement Forms in either electronic or hard copy format.					

Tasks, Objectives and Schedules						
Task 2:	Routine Ambient Surface Water Quality Monitoring					
Costs:	Federal:	$38,112	Non-Federal:	$13,056	Total:	$51,168
Objective:	To provide water quality data to support the on-going WPP development process in the Plum Cre watershed by enhancing current routine ambient monitoring regimes.					
Subtask 2.1:	GBRA will conduct routine ambient monitoring at 5 sites monthly and at 1 site twice per quarter ye collecting field, conventional, flow and bacteria parameter groups. See table on page 5 or map on pag for proposed sites. The QAPP, as detailed in Task 8, will precisely identify sites. Sampling period extends over 20 months. Total number of sample events scheduled for collecti through this subtask is 105. This will complement existing routine ambient monitoring regim conducted by GBRA and TCEQ such that routine water quality monitoring is conducted monthly a sites in the Plum Creek watershed. Currently, routine ambient monitoring is conducted monthly at 2 stations by GBRA (17406 and 1264 and quarterly at 1 station by TCEQ (12647). GBRA will coordinate with the TCEQ Regional Office avoid duplicative routine ambient monitoring at site 12647. GBRA's Regional Laboratory will conduct sample analysis. Field parameters are pH, temperature, conductivity, and dissolved oxygen. Conventional parameters total suspended solids, turbidity, sulfate, chloride, nitrate nitrogen, ammonia nitrogen, chlorophyll pheophytin, total hardness, total kjeldahl nitrogen and total phosphorus. Flow parameters are fl collected by gage, electric, mechanical or Doppler, including severity. Bacteria parameters are *E. coli*.					
	Start Date:	Month 2		Completion Date:	Month 35	
Deliverables	• Water quality data from routine ambient monitoring as reported through Tasks 1 and 9.					

Tasks, Objectives and Schedules						
Task 3:	Targeted Watershed Surface Water Quality Monitoring					
Costs:	Federal:	$57,500	Non-Federal:	$0	Total:	$57,500
Objective:	To provide water quality data to support the on-going WPP development process in the Plum Cre watershed through targeted watershed monitoring.					
Subtask 3.1:	GBRA will conduct targeted watershed monitoring at 35 sites twice per season, once under dry weath conditions and once under wet weather conditions each season, collecting field, conventional, flow a bacteria parameter groups. Of these 35 sites, 8 sites shall be the same as the sites for routine ambi monitoring described in Task 2 and 1 site shall be the same as the site for stormflow monitori described in Task 4, allowing for 26 sites for targeted watershed monitoring only. See table on page 5 map on page 6 for proposed sites. The QAPP, as detailed in Task 8, will precisely identify sites. Sampling period extends through 6 seasons. Total number of sample events scheduled for collecti through this subtask is 318. Spatial, seasonal and meteorological variation will be captured in the snapshots of watershed water quality. GBRA's Regional Laboratory will conduct sample analysis. Field parameters are pH, temperature, conductivity and dissolved oxygen. Conventional parameters nitrate nitrogen, ammonia nitrogen, total kjeldahl nitrogen and total phosphorus. Flow parameters flow collected by gage, electric, mechanical or Doppler, including severity. Bacteria parameters are *coli*.					
	Start Date:	Month 2	Completion Date:	Month 35		
Deliverables	• Water quality data from targeted watershed monitoring as reported through Tasks 1 and 9.					

Tasks, Objectives and Schedules						
Task 4:	Stormflow Surface Water Quality Monitoring					
Costs:	Federal:	$17,155	Non-Federal:	$0	Total:	$17,155
Objective:	To provide water quality data to support the on-going WPP development process in the Plum Cre watershed through stormflow monitoring.					
Subtask 4.1:	GBRA will conduct automated stormflow monitoring at 1 urban/residential site during 4 storm eve collecting field, conventional, flow and bacteria parameter groups. This will character urban/residential NPS loadings in the rapidly developing upper third of the watershed. See table on pa 5 or map on page 6 for proposed site. The QAPP, as detailed in Task 8, will precisely identify sit Depending on meteorological conditions and funds availability, additional sites may be identified stormflow monitoring. Sampling period extends over 12 months. Total number of storm events scheduled for collection throu this subtask is 4. Depending on meteorological conditions, seasonal variation in storm events will captured. GBRA's Regional Laboratory will conduct sample analysis. Field parameters are pH, temperature, conductivity and dissolved oxygen. Conventional parameters total suspended solids, sulfate, chloride, nitrate nitrogen, ammonia nitrogen, and total phosphorus. Fl parameters are flow collected by gage, electric, mechanical or Doppler, including severity. Bacte parameters are *E. coli*.					

	Start Date:	Month 2	Completion Date:	Month 13
Deliverables	• Water quality data from stormflow monitoring as reported through Tasks 1 and 9.			

Tasks, Objectives and Schedules						
Task 5:	24-hour DO Surface Water Quality Monitoring					
Costs:	Federal:	$11,318	Non-Federal:	$0	Total:	$11,318
Objective:	To provide water quality data to support the on-going WPP development process in the Plum Cre watershed through 24-hour DO monitoring.					
Subtask 5.1:	GBRA will conduct 24-hour DO monitoring at 8 sites monthly during the index period collecting fi and flow parameter groups. These sites shall be the same as the sites for routine ambient monitori described in Task 2. See table on page 5 or map on page 6 for proposed sites. The QAPP, as detailed Task 8, will precisely identify sites. Sampling period extends over 8 months during the index period between March 15 and October Samples will be collected during the index period in 2007 and 2008. Total number of sample eve scheduled for collection through this subtask is 64. Field parameters are pH, temperature, conductivity and dissolved oxygen. Flow parameters are fl collected by gage, electric, mechanical or Doppler, including severity.					
	Start Date:	Month 2	Completion Date:	Month 13		
Deliverables	• Water quality data from 24-hour DO monitoring as reported through Tasks 1 and 9.					

Tasks, Objectives and Schedules						
Task 6:	Effluent Surface Water Quality Monitoring					
Costs:	Federal:	$7,776	Non-Federal:	$0	Total:	$7,776
Objective:	To provide water quality data to support the on-going WPP development process in the Plum Cre watershed through effluent monitoring.					
Subtask 6.1:	GBRA will conduct effluent monitoring at 7 WWTFs once per season collecting field, convention flow, bacteria and effluent parameter groups. See table on page 5 or map on page 6 for proposed sit The QAPP, as detailed in Task 8, will precisely identify sites. Sampling period extends through 6 seasons. Total number of sample events scheduled for collecti through this subtask is 22. GBRA's Regional Laboratory will conduct sample analysis. Field parameters are pH, temperature, conductivity and dissolved oxygen. Conventional parameters total suspended solids, sulfate, chloride, nitrate nitrogen, ammonia nitrogen, and total phosphorus. Fl parameters are flow collected by gage, electric, mechanical or Doppler, including severity. Bacte parameters are *E. coli*. Effluent parameters are BOD, CBOD and COD.					
	Start Date:	Month 2	Completion Date:	Month 35		
Deliverables	• Water quality data from effluent monitoring as reported through Tasks 1 and 9.					

Tasks, Objectives and Schedules						
Task 7:	Springflow Surface Water Quality Monitoring					
Costs:	Federal:	$3,382	Non-Federal:	$0	Total:	$3,382
Objective:	To provide water quality data to support the on-going WPP development process in the Plum Cre watershed through springflow monitoring.					
Subtask 7.1:	GBRA will conduct springflow monitoring at 3 springs once per season collecting field, convention flow and bacteria parameter groups. See table on page 5 or map on page 6 for proposed site. The QAI as detailed in Task 8, will precisely identify sites. Sampling period extends through 4 seasons. Total number of sample events scheduled for collecti through this subtask is 12. Spatial, seasonal and meteorological variation in springflow will be capture GBRA's Regional Laboratory will conduct sample analysis. Field parameters are pH, temperature, conductivity and dissolved oxygen. Conventional parameters total suspended solids, sulfate, chloride, nitrate nitrogen, ammonia nitrogen, and total phosphorus. Fl parameters are flow collected by gage, electric, mechanical or Doppler, including severity. Bacte parameters are *E. coli*.					
	Start Date:	Month 2	Completion Date:	Month 13		
Deliverables	• Water quality data from springflow monitoring as reported through Tasks 1 and 9.					

Tasks, Objectives and Schedules						
Task 8:	Quality Assurance					
Costs:	Federal:	$3,360	Non-Federal:	$4,428	Total:	$7,788
Objective:	To develop and implement DQOs and QA/QC activities to ensure water quality data of known a acceptable quality are generated through this project.					
Subtask 8.1:	GBRA will develop a QAPP for activities in Tasks 2-7 consistent with *EPA Requirements for Qua Assurance Project Plans (QA/R-5)* and the *TSSWCB Environmental Data Quality Management Plan*. All monitoring procedures and methods prescribed in the QAPP shall be consistent with the guideli detailed in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemi Monitoring Methods for Water, Sediment, and Tissue (RG-415)* and *Volume 2: Methods for Collecti and Analyzing Biological Assemblage and Habitat Data (RG 416)*.					
	Start Date:	Month 1	Completion Date:	Month 1		
Subtask 8.2:	GBRA will implement approved QAPP. GBRA will submit amendments to the QAPP as needed.					
	Start Date:	Month 2	Completion Date:	Month 35		
Deliverables	• QAPP for Tasks 2-7 approved by TSSWCB and USEPA in both electronic and hard copy formats. • Data of know and acceptable quality as reported through Tasks 1 and 9.					

Tasks, Objectives and Schedules						
Task 9:	Data Management and Final Report					
Costs:	Federal:	$0	Non-Federal:	$5,403	Total:	$5,403
Objective:	To manage and transfer monitoring data for use in the development of a Plum Creek WPP and inclusion in the TCEQ SWQM database and to develop a final report summarizing the results a activities of the project.					
Subtask 9.1:	GBRA will submit Station Location Requests as needed to obtain TCEQ stations numbers for n monitoring sites from activities in Tasks 2-7.					
	Start Date:	Month 1	Completion Date:	Month 6		
Subtask 9.2:	GBRA will transfer monitoring data from activities in Tasks 2-7 to TSSWCB for inclusion in the TCI SWQM database. Data will be transferred in the correct format using the TCEQ file structure, along w a completed Data Summary, as described in the most recent version of *TCEQ Surface Water Qua Monitoring Data Management Reference Guide*. Data Correction Request Forms will be submitted to TSSWCB whenever errors are discovered in d already reported. All monitoring data files, Data Summary and Data Correction Request Forms will also be provided AgriLife and TAMU SSL.					
	Start Date:	Month 1	Completion Date:	Month 35		
Subtask 9.3	GBRA will post monitoring data from activities in Tasks 2-7 to the GBRA website in a timely manner.					
	Start Date:	Month 1	Completion Date:	Month 35		
Subtask 9.4	No independent final report will be prepared for this project. Rather, GBRA will summarize the results and activities of this project through inclusion in GBRA Clean Rivers Program Basin Highlights Report and/or Basin Summary Report. Additionally, the results and activities of this project will be summarized in the Plum Creek Watersh Protection Plan developed through TSSWCB CWA §319(h) project 04-17.					
	Start Date:	Month 1	Completion Date:	Month 35		
Deliverables	• Station Location Request Forms (as needed) in electronic format. • Monitoring data files and Data Summary in electronic format. • Data Correction Request Forms (as needed) in electronic format. • Monitoring data updates posted to the GBRA website. • Final report (GBRA CRP BHR and/or BSR) at culmination of project in both electronic and ha copy formats.					

Measures of Success
• Data of known and acceptable quality are generated for surface water quality monitoring (routine ambient, targe watershed, stormflow, 24-hour DO, effluent and springflow) of main stem and tributary stations on Segment 18 (Plum Creek) for field, conventional, flow, bacteria and effluent parameters.

2005 Texas Nonpoint Source Management Program Document Reference
Goals &/or Milestone(s)
NPS Management Program - Element One – Explicit short- and long-term goals, objectives and strategies that prot surface and groundwater.
Short-Term Goal One – Data Collection and Assessment – Objective A - Identify surface waterbodies…from the *Tex Water Quality Inventory and 303(d) List*…that need additional information to characterize non-attainment of designa uses and quality standards.
Short-Term Goal One – Data Collection and Assessment – Objective B - Ensure that monitoring procedures meet qual assurance requirements and are in compliance with EPA-approved TCEQ and/or TSSWCB Quality Management Plans
Short-Term Goal One – Data Collection and Assessment – Objective C - Conduct special studies to determine sources NPS pollution and gain information to target…BMP implementation.
Short-Term Goal One – Data Collection and Assessment – Objective D – Develop…Watershed Protection Plans maintain and restore water quality in waterbodies identified as impacted by NPS pollution.
NPS Management Program - Element Two – Working partnerships and linkages to appropriate state, interstate, trib regional, and local entities, private sector groups, and Federal agencies.
NPS Management Program - Element Five – The state program identifies waters and their watersheds impaired nonpoint source pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, state establishes a process to progressively address these identified waters by conducting more detailed watersh assessments and developing watershed implementation plans, and then by implementing the plans.

Part III – Financial Information

Budget Summary			
Federal 319(h)	$ 138,603	% of total project	81%
Non-Federal Match	$ 32,561	% of total project (≥ 40%)	19%
Total Project Cost	$ 171,164		

Category	Federal 319(h)	Non-Federal Match	Total Project Cost
Personnel	$ 21,189	$ 13,056	$ 34,245
Fringe Benefits	$ 8,051	$ 4,962	$ 13,013
Subtotal Personnel & Fringe	$ 29,240	$ 18,018	$ 47,258
Travel	$ 4,050	$ 1,446	$ 5,496
Equipment	$ 10,480	$ 0	$ 10,480
Supplies	$ 250	$ 0	$ 250
Contractual	$ 0	$ 0	$ 0
Construction	$ 0	$ 0	$ 0
Other (Analysis)	$ 88,226	$ 9,180	$ 97,406
Subtotal	$ 103,006	$ 10,626	$ 113,632
Total Direct Costs	$ 132,246	$ 28,644	$ 160,890
Indirect Costs (≤ 15%)	$ 6,357	$ 3,917	$ 10,274
Total Project Costs	$ 138,603	$ 32,561	$ 171,164

Budget Justification		
Category	Total Amount	Justification
Personnel & Fringe Benefits	$ 29,240 $ 15,437 $ 2,581	Federal • GBRA – Technicians salary to collect and analyze water qual samples for Tasks 2-7. Amend QAPP. Non-Federal: • GBRA – Water Quality Services Director salary for proj administration, QA/QC, reporting, data management and PCV participation. • CRP – Technicians salary to collect and analyze water qual samples for pre-existing sites.
Travel	$ 4,050 $ 712 $ 734	Federal • GBRA – Technicians mileage to collect water quality samples Tasks 2-7. Non-Federal: • GBRA – Water Quality Services Director mileage for PCV participation. • CRP – Technicians mileage to collect water quality samples pre-existing sites.
Equipment	$ 10,480	Federal: • GBRA – Purchase of automated sampling equipment for Task including ISCO with bubble flow meter, Hydrolab DataSonde.
Supplies	$ 250	Federal: • GBRA – Purchase of supplies necessary for installation automated sampling equipment for Task 4 including housi batteries.
Contractual	$ 0	
Construction	$ 0	
Other (Analysis)	$ 88,226 $ 9,180	Federal: • GBRA – Analysis of water quality samples for Tasks 2-7. Non-Federal: • CRP – Analysis of water quality samples for pre-existing sites.
Indirect	$ 6,357 $ 3,356 $ 561	Federal: • GBRA – Established 30% of salary only. Non-Federal: • GBRA – Established 30% of salary only. • CRP – Established 30% of salary only.

Appendix B Sampling Process Design and Monitoring Schedule

Sample Design Rationale

The sample design is based on the intent of the *SWQM for the PC WPP* as recommended by the Plum Creek Steering Committee. Under their direction, the TSSWCB and GBRA have been tasked with providing data to characterize water quality conditions in support of the 305(b) assessment, and to identify significant long-term water quality trends. Based on PC WPP Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues were used to develop the work plan, which are in accord with available resources. As part of the PC WPP Steering Committee process, the TSSWCB and GBRA coordinate closely with other participants to ensure a comprehensive water monitoring strategy within the watershed.

Site Selection Criteria

This data collection effort involves monitoring routine water quality, using procedures that are consistent with the TCEQ SWQM program, for the purpose of data entry into the statewide database maintained by the TCEQ and for modeling by TAMU SSL. To this end, some general guidelines are followed when selecting sampling sites, as basically outlined below, and discussed thoroughly in the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1* (RG-415). Overall consideration is given to accessibility and safety. All monitoring activities have been developed in coordination with the PC WPP Steering Committee and with the TSSWCB.

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 few sites are available for a stream segment, choose one that would best represent the water body, and not an unusual condition or contaminant source. Avoid backwater areas or eddies when selecting a stream site.

2. Because historical water quality data can be very useful in assessing use attainment or impairment, those historical sites were selected that are on current or past monitoring schedules.

3. Routine monitoring sites were selected to bracket sources of pollution, influence of tributaries, changes in land uses, and hydrological modifications.

4. Sites should be accessible. When possible, stream sites should have a USGS stream flow gauge. If not, flow measurement will be made during routine and targeted monitoring visits.

Monitoring Sites

The Monitoring Table for the *SWQM for the PC WPP* are presented on the following page.

Legend for Table B1.1:

GB = Guadalupe Blanco River Authority
RT = Program code for routine samples
BF = Program code for targeted monitoring samples and for stormwater samples
BS = Program code for diurnal monitoring conducted during index period
DO 24hr = diurnal monitoring for dissolved oxygen, conductivity, temperature and pH; measurements taken every hour for 24 hours; includes minimum, maximum and average.
Bacteria = E. coli
Conventional = total suspended solids, turbidity, sulfate, chloride, nitrate nitrogen, ammonia nitrogen, total kjeldahl nitrogen, chlorophyll a, pheophytin, total hardness, total phosphorus, BOD (effluent only), CBOD(effluent only) and COD (effluent only)
Flow = flow collected by gage, electric, mechanical or Doppler; includes severity
Field = pH, temperature, conductivity, dissolved oxygen

Table B1.1 Monitoring Sites and Schedule, SWQM for PC WPP

Segment	TCEQ Station ID	Site Description	Workplan Task	Monitor	Monitor Type	DO 24hr	Bacteria	Con-ventional	Flow	Field	Comments
1810	12556	Clear Fork Plum Creek at Salt Flat Road	2	GB	RT		15	15	15	15	
1810	12556	Clear Fork Plum Creek at Salt Flat Road	5	GB	BS	8			8	8	
1810	12556	Clear Fork Plum Creek at Salt Flat Road	3	GB	BF		4	4	4	4	1
1810	12558	Elm Creek at CR 233	2	GB	RT		15	15	15	15	
1810	12558	Elm Creek at CR 233	5	GB	BS	8			8	8	
1810	12558	Elm Creek at CR 233	3	GB	BF		4	4	4	4	1
1810	12640	Plum Creek at CR 135	-	GB	RT		15	15	15	15	3
1810	12640	Plum Creek at CR 135	5	GB	BS	8			8	8	
1810	12640	Plum Creek at CR 135	3	GB	BF		4	4	4	4	1
1810	12647	Plum Creek at Old McMahan Road (CR 202)	2	GB	RT		10	10	10	10	5
1810	12647	Plum Creek at Old McMahan Road (CR 202)	5	GB	BS	8			8	8	
1810	12647	Plum Creek at Old McMahan Road (CR 202)	3	GB	BF		4	4	4	4	1
1810	17406	Plum Creek at Plum Creek Road	-	GB	RT		15	15	15	15	3
1810	17406	Plum Creek at Plum Creek Road	5	GB	BS	8			8	8	
1810	17406	Plum Creek at Plum Creek Road	3	GB	BF		4	4	4	4	1
1810	20488	Brushy Creek at Rocky Road (Upstream of NRCS 14)	2	GB	RT		15	15	15	15	
1810	20488	Brushy Creek at Rocky Road (Upstream of NRCS 14)	5	GB	BS	8			8	8	

Table B1.1 Monitoring Sites and Schedule, SWQM for PC WPP

Segment	TCEQ Station ID	Site Description	Workplan Task	Monitor	Monitor Type	DO 24hr	Bacteria	Con-ventional	Flow	Field	Comments
1810	20488	Brushy Creek at Rocky Road (Upstream of NRCS 14)	3	GB	BF		4	4	4	4	1
1810	20491	Dry Creek at FM 672	2	GB	RT		15	15	15	15	
1810	20491	Dry Creek at FM 672	5	GB	BS	8			8	8	
1810	20491	Dry Creek at FM 672	3	GB	BF		4	4	4	4	1
1810	20500	West Fork Plum Creek at Biggs Road (CR 131)	2	GB	RT		15	15	15	15	
1810	20500	West Fork Plum Creek at Biggs Road (CR 131)	5	GB	BS	8			8	8	
1810	20500	West Fork Plum Creek at Biggs Road (CR 131)	3	GB	BF		4	4	4	4	1
1810	12555	Salt Branch at FM 1322	3	GB	BF		8	8	8	8	
1810	12557	Town Creek at E. Market St. (Upstream of Lockhart #l WWTP)	3	GB	BF		8	8	8	8	
1810	12559	Porter Creek at Dairy Road	3	GB	BF		8	8	8	8	
1810	12642	Plum Creek at Biggs Road (CR 131)	3	GB	BF		8	8	8	8	
1810	12643	Plum Creek at FM 1322	3	GB	BF		8	8	8	8	
1810	12645	Plum Creek at Young Lane (CR 197)	3	GB	BF		8	8	8	8	
1810	12648	Plum Creek at CR 186	3	GB	BF		8	8	8	8	
1810	12649	Plum Creek at CR 233	3	GB	BF		8	8	8	8	
1810	14945	Clear Fork Plum Creek at Old Luling Road (CR 213)	3	GB	BF		8	8	8	8	
1810	16709	Town Creek West of Lockhart	3	GB	BF		8	8	8	8	
1810	18343	Plum Creek Upstream of US 183	3	GB	BF		8	8	8	8	
1810	20480	Plum Creek Downstream of NRCS 1 Spillway	3	GB	BF		8	8	8	8	

Table B1.1 Monitoring Sites and Schedule, SWQM for PC WPP

Segment	TCEQ Station ID	Site Description	Workplan Task	Monitor	Monitor Type	DO 24hr	Bacteria	Con-ventional	Flow	Field	Comments
1810	20481	Bunton Branch at Heidenreich Lane	3	GB	BF		8	8	8	8	
1810	20482	Brushy Creek at FM 2001 (Downstream of NRCS 12)	3	GB	BF		8	8	8	8	
1810	20487	Brushy Creek at SH 21	3	GB	BF		8	8	8	8	
1810	20483	Elm Creek at SH 21 (Downstream of NRCS 16)	3	GB	BF		8	8	8	8	
1810	20489	Cowpen Creek at Schuelke Road	3	GB	BF		8	8	8	8	
1810	20496	Tenney Creek at Tenney Creek Road	3	GB	BF		8	8	8	8	
1810	20490	Clear Fork Plum Creek at Farmers Road	3	GB	BF		8	8	8	8	
1810	20493	Clear Fork Plum Creek at PR 10 (State Park)	3	GB	BF		8	8	8	8	
1810	20497	West Fork Plum Creek at FM 671	3	GB	BF		8	8	8	8	
1810	12538	Andrews Branch at CR 131	3	GB	BF		8	8	8	8	7
1810	20495	Dry Creek at FM 713	3	GB	BF		8	8	8	8	
1810	20484	Plum Creek at Heidenreich Lane (Downstream of Kyle WWTP)	3	GB	BF		8	8	8	8	
1810	20501	Salt Branch at Salt Flat Road (Upstream of Luling WWTP)	3	GB	BF		8	8	8	8	
1810	20498	Copperas Creek at Tenney Creek Road/Bronco Lane (CR 141, Downstream of Cal-Maine)	3	GB	BF		8	8	8	8	6
1810	20505	Richmond Branch at Dacy Lane	3	GB	BF		8	8	8	8	7
1810	20504	Porter Creek Tributary at Quail Cove Road	3	GB	BF		8	8	8	8	7
1810	20510	Hines Branch at Tenney Creek Road (CR 141, Downstream of Cal-Maine)	3	GB	BF		8	8	8	8	8
1810	20503	Plum Creek at Lehman Road	3	GB	BF		8	8	8	8	8
1810	20502	Bunton Branch at Dacy Lane (upstream of NRCS 5)	3	GB	BF		8	8	8	8	8

Table B1.1 Monitoring Sites and Schedule, SWQM for PC WPP

Segment	TCEQ Station ID	Site Description	Workplan Task	Monitor	Monitor Type	DO 24hr	Bacteria	Con-ventional	Flow	Field	Comments
1810	20479	Unnamed Tributary at FM 150 near Hawthorn Dr.	3	GB	BF		8	8	8	8	4
1810	20479	Unnamed Tributary at FM 150 near Hawthorn Dr.	4	GB	BF		4	4	4	4	4
1810	20492	10210-001 City of Lockhart and GBRA #1(Larremore plant)	6	GB	-		4	4	4	4	2
1810	20494	10210-002 City of Lockhart and GBRA #2 (FM 20 plant)	6	GB	-		4	4	4	4	2
1810	20499	10582-001 City of Luling	6	GB	-		4	4	4	4	2
1810	20486	11041-002 City of Kyle and Aquasource Inc.	6	GB	-		4	4	4	4	2
1810	99923	11060-001 City of Buda and GBRA	6	GB	-		4	4	4	4	2
1810	99936	14431-001 GBRA Shadow Creek	6	GB	-		4	4	4	4	2, 9
1810	99937	14377-001 Sunfield MUD	6	GB	-		4	4	4	4	2, 9
1810	20509	Lockhart Springs	7	GB	BF		4	4	4	4	
1810	20507	Clear Fork Springs at Borchert Loop (CR 108)	7	GB	BF		4	4	4	4	10
1810	20508	Boggy Creek Springs at Boggy Creek Road (CR 218)	7	GB	BF		4	4	4	4	10

1. The eight “routine” sites double as “targeted” sites. “Targeted” sampling will collect biased flow (BF) samples twice per quarter – once under wet weather conditions and once under dry weather conditions. Whether these samples will satisfy the wet (biased high flow) or dry (biased low flow) weather conditions depends on the flow condition when samples are collected during the “routine’ sampling that quarter.

2. The data collected from WWTF sampling will not be used for enforcement or compliance monitoring by TCEQ. As such, results will not be reported to TCEQ for inclusion in any data tracking system. Monitor type code is not applicable.

3. These samples are collected/analyzed by GBRA utilizing Texas Clean Rivers Program funding and serve as a portion of the non-federal match for this project.

4. This site doubles as the “stormflow” monitoring site and one of the “targeted” sampling sites.

5. This site is sampled routinely, once per quarter, by the TCEQ Regional Office. GBRA will coordinate with the TCEQ Regional Office to avoid duplicative routine sampling at this site.

6. The site name was corrected to reflect exact sample site location.

7. Site no. 99915 was not reasonably accessible. No site was available in close proximity to that site. The site was replaced with 3 sites that constitute the bulk of the flow into the original site located on Porters Creek.

8. Site was added after discussions with stakeholders that were aware of possible land uses in the area that could impact water quality.

9. Wastewater plant effluent added when it came on line after the initiation of the sampling plan.

10. Sites were adjusted to accommodate access.

Appendix C. Field Data Sheet

Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

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)
00480		SALINITY (ppt, marine only)
50060		CHLORINE RESIDUAL (mg/L)
00078		SECCHI DISK (meters)
82078		TURBIDITY-FIELD (NTU)
31616		FECAL COLIFORM (#/100 ml)
31699		E. coli (#/100 ml) (Colilert Method)
31701		Enterococci (#/100 ml) (Enterolert Method)

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
74069		FLOW ESTIMATE (ft^3/sec)
82903		TOTAL WATER DEPTH (meters)
00055		WATER VELOCITY (maximum)(ft/sec)
89864		MAXIMUM POOL WIDTH (meters) *
89869		POOL LENGTH (meters) *
89865		MAXIMUM POOL DEPTH (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 zero reported.

Measurement Comments and Field Observations:

TCEQ-20154 (Rev. 05/14/2004)

Appendix D. Chain of Custody Form

GBRA REGIONAL LABORATORY

GBRA Doc. # 3019-C

Rev. 11 Eff. 02/20/09 by: JL

Chain of Custody

ACCREDITED IN ACCORDANCE WITH ilac

Guadalupe Blanco River Authority- Regional Laboratory
933 E. Court Street, Seguin, Texas 78155
(830) 379-5822 fax: (830) 379-7478

Account #: _____

Customer Info. Name: _____ Phone #: _____

Address: _____ Cell #: _____ Email: _____

_____ Fax #: _____

Sample Collected By: _____ _____

Signature Printed Name

Thermometer # _____

Temp C	Date Collected	Time Collected	Matrix WW=Wastewater DW=Drinking Water SW=Surface Water S=soil/sludge	Sx Vol. P=Plastic G=Glass	Sample Name/Description	TCEQ I.D. #	Grab / Comp.	Analysis Requested	GBRA Sample I.D.	Bottle I.D.#	pH	Preservation

Delivered By: _____ Date/Time: _____ Received By: _____ Date/Time: _____

Delivered By: _____ Date/Time: _____ Received By: _____ Date/Time: _____

**Special Notes/Ship to: _____

_____

Ice: _____(y or n) Number of containers _____ Condition of Container(s): (intact) _____

Appendix E Data Summary Report

Data Summary

Data Information

Data Source: _____

Date Submitted: _____

Tag_id Range: _____

Date Range: _____

Comments

Please explain in the space below any data discrepancies including:

- **Inconsistencies with AWRL specifications;**
- **Failures in sampling methods and/or laboratory procedures that resulted in data that could not be reported to the TSSWCB, TCEQ or TAMU SSL; and**
- **Other discrepancies.**

-
-
-
-
-
-
-

Data Manager: _____

Date: _____

Appendix F Corrective Action Form

Document # 3016 A

Corrective Action(s) for: _____

Date:_____

Analyst:_____

Sample #'s affected_____

STATE THE PROBLEM:

CAUSE OF THE PROBLEM(s) (if known):

ACTIONS TAKEN TO RESOLVE PROBLEM (s):

FOLLOW UP:

REVIEWED BY QA OFFICER:(date/sign)

ATTACHMENT 1
Example Letter to Document Adherence to the QAPP

TO: (name)
(organization)

FROM: (name)
(organization)

Please sign and return this form by (date) to:

(address)

I acknowledge receipt of the referenced document(s). I understand the document(s) describe quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria.

Signature Date

Copies of the signed forms should be sent by the GBRA to the TSSWCB Project Manager within 60 days of EPA approval of the QAPP.