TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

November 1, 2012

Ms. Leslie Rauscher
US Environmental Protection Agency (EPA)
(6MD-AT) Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Re: FY09 319(h) Plum Creek Watershed Protection Plan (WPP) – City of Lockhart Illicit Discharge Monitoring Quality Assurance Project Plan (QAPP) Grant No. 99614614

Approval Date: October 30, 2012 (Update due by October 30, 2013)

Dear Ms. Rauscher:

The above named QAPP has been approved. The original QAPP and signature page have been uploaded to the Grants Recording Tracking System (GRTS) as documentation of approval.

Should you have any questions, please contact Jack Higginbotham at Jack.Higginbotham@tceq.texas.gov or (512) 239-6699.

Sincerely,

Kerry Niemann
Team Leader, NPS Team
Office of Water

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

October 31, 2012

Lee Weatherford
Public Works – City of Lockhart
705 Wichita
Lockhart, Texas 78644

Re: Plum Creek Watershed Protection Plan (WPP) – City of Lockhart Illicit Discharge Detection Monitoring, Data Collection and Validation Quality Assurance Project Plan (QAPP)

Approved: October 30, 2012 (Next update due October 30, 2013)
QAPP Revision Date: September 15, 2012

Dear Mr. Weatherford:

The above named QAPP has been approved. The original document and signature pages are enclosed as documentation of approval.

In accordance with the terms of the QAPP, **please ensure that copies of this document and any subsequent amendments are distributed to each sub-tier participant as noted in Section A3 of the QAPP.** This approval letter must be available for review during a monitoring systems audit.

Should you have questions, please contact me at (512) 239-0425.

Sincerely,

Kyle Girten
Quality Assurance Specialist

enclosure

cc: Sharon Coleman, Senior Quality Assurance Specialist, MC 165
Jack Higginbotham, Project Manager, MC 203

Jack Higginbotham

From: Jack Higginbotham
Sent: Thursday, November 01, 2012 5:13 PM
To: Nancy Ragland
Subject: City of Lockhart Illicite Discharge Monitoring QAPP 582-10-90465
Attachments: lockhart319- illicit dischg monitoring qapp_FINAL.pdf

Hi Nancy!

Here's another executed QAPP for you. Hope you have a great evening!

Thanks,

Jack

Jack Higginbotham
Project Manager, Nonpoint Source Pollution Program
Planning & Implementation Section
Water Quality Planning Division
Office of Water

Texas Commission on Environmental Quality
P.O. Box 13087, MC 203
Austin, TX 78711-3087
(512) 239-6699
Fax: (512) 239-1414
e-mail: jack.higginbotham@tceq.texas.gov

ATTACHMENT 1
Example Letter to Document Adherence to the QAPP

TO: Jack Higginbotham
Texas Commission on Environmental Quality (TCEQ)

FROM: Lee Weatherford
City of Lockhart

RE: Plum Creek Watershed Protection Plan (WPP) - City of Lockhart, Illicit Discharge Detection Monitoring, Data Collection and Validation Quality Assurance Project Plan (QAPP)

Please sign, .pdf, and return this form via email by 11/02/12 to:

Jack.Higginbotham@tceq.texas.gov

I acknowledge receipt of the Plum Creek WPP - City of Lockhart, Illicit Discharge Detection Monitoring, Data Collection and Validation QAPP. I understand that the document describes quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria.

My signature on this document signifies that I have read and approved the document contents. Furthermore, I will ensure that all staff members participating in activities covered under this QAPP will be required to familiarize themselves with the document contents and adhere to the contents as well.

Lee Weatherford 11-1-12
Signature Date

Note: Copies of the signed letter should be sent by the Lead Organization to the TCEQ NPS Project Manager within 30 days of the final TCEQ approval the QAPP. This letter should be submitted for all subcontractors that did not sign the QAPP (under section A1 of this QAPP).

Plum Creek Watershed Protection Plan – City of Lockhart
Illicit Discharge Detection Monitoring, Data Collection and Validation

Quality Assurance Project Plan

City of Lockhart
P.O. Box 239
Lockhart, TX 78644

Funding Source:

Nonpoint Source Program CWA §319(h)
Prepared in cooperation with the Texas Commission on Environmental Quality
and the U.S. Environmental Protection Agency
Federal ID #_____

Effective Period: One year from date of final approval

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

Lee Weatherford
Director, Public Works
P.O. Box 239
Lockhart, Texas 78644
(512) 398-6452
gweatherford@lockhart-tx.org

A1 APPROVAL PAGE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Monitoring Division

Sharon Coleman 10/30/2012
~~Stephen Gibson,~~ TCEQ QA Manager Date
10/30/12 Sharon Coleman (Acting)

10/30/12
Kyle Girten, Lead NPS QA Specialist Date
Quality Assurance Team

Water Quality Planning Division

10/25/12
Kerry Niemann, Team Leader Date
Nonpoint Source Program

10/29/12
Nancy Ragland, Team Leader Date
Data Management and Analysis

Anju Sharma Chalise 10/25/2012
Anju Chalise, QA Specialist Date
Nonpoint Source Program

10/24/12
Jack Higginbotham Date
Project Manager, Nonpoint Source Program

CITY OF LOCKHART

10/12/12
Lee Weatherford, City of Lockhart Date

Debbie Magin 10/11/12
Debbie Magin, QA Officer Date

GUADALUPE-BLANCO RIVER AUTHORITY

10/11/2012
Josie Longoria, Lab Director/QAO Date

Debbie Magin 10/11/12
Debbie Magin, Data Manager Date

The City of Lockhart will secure written documentation from additional project participants (e.g., subcontractors, laboratories) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or revisions of this plan. The City of Lockhart will maintain this documentation as part of the project's quality assurance records. This documentation will be available for review. Copies of this documentation will also be submitted as deliverables to the TCEQ NPS Project Manager within 30 days of final TCEQ approval of the QAPP. (See sample letter in Attachment 1 of this document.)

A2 TABLE OF CONTENTS

Attachment 1 Example Letter to Document Adherence to the QAPP

A3 DISTRIBUTION LIST

The Lead NPS QA Specialist will provide original versions of this project plan and any amendments or revisions of this plan to the TCEQ NPS Project Manager and the City of Lockhart Project Manager. The TCEQ NPS Project Manager will provide copies to the TCEQ Data Management and Analysis Team Leader and EPA Project Officer within two weeks of approval. The TCEQ NPS Project Manager will document receipt of the plan and maintain this documentation as part of the project's quality assurance records. This documentation will be available for review.

Nancy Ragland, Team Leader
Data Management and Analysis
MC-234
(512) 239-6546

U.S. Environmental Protection Agency Region 6
State/Tribal Section
1445 Ross Avenue
Suite # 1200
Dallas, TX 75202-2733
Leslie Rauscher, Project Officer
(214) 665-2773

The City of Lockhart will provide copies of this project plan and any amendments or revisions of this plan to each project participant defined in the list below. The City of Lockhart will document receipt of the plan by each participant and maintain this documentation as part of the project's quality assurance records. This documentation will be available for review.

City of Lockhart
P.O. Box 40
Lockhart, TX 78640

Lee Weatherford, Project Manager
(512) 398-6452

Debbie Magin, Quality Assurance Officer
(830) 379-5822

Guadalupe-Blanco River Authority
933 E. Court St.
Seguin, TX 78155

Josie Longoria, GBRA Lab Director/QAO
(830) 379-5822

Debbie Magin, GBRA Data Manager
(830) 379-5822

List of Acronyms

AWRL	Ambient Water Reporting Limit
BMP	Best Management Practice
CAP	Corrective Action Plan
COC	Chain of Custody
CWA	Clean Water Act
DOC	Demonstration of Capability
DMP	Data Management Plan
DMRG	Data Management Reference Guide
DM&A	Data Management and Analysis
DQO	Data Quality Objective
EPA	Environmental Protection Agency
GBRA	Guadalupe-Blanco River Authority
GIS	Geographic Information System
GPS	Global Positioning System
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LIMS	Laboratory Information Management System
LOD	Limit of Detection
LOQ	Limit of Quantitation
NELAC	National Environmental Laboratory Accreditation Conference
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
PO	Project Officer
QA/QC	Quality Assurance/Quality Control
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QMP	Quality Management Plan
RPD	Relative Percent Difference
SLOC	Station Location
SOP	Standard Operating Procedure
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
TNI	The NELAC Institute
TSWQS	Texas Surface Water Quality Standards
WQI	Water Quality Inventory

A4 PROJECT/TASK ORGANIZATION

TCEQ

Monitoring Division

Kyle Girten
Lead NPS QA Specialist
Assists the TCEQ Project Manager in QA related issues. Serves on planning team for NPS projects. Participates in the planning, development, approval, implementation, and maintenance of the QAPP. Determines conformance with program quality system requirements. Coordinates or performs audits, as deemed necessary and using a wide variety of assessment guidelines and tools. Concurs with proposed corrective actions and verifications. Monitors corrective action. Provides technical expertise and/or consultation on quality services. Provides a point of contact at the TCEQ to resolve QA issues. Recommends to TCEQ management that work be stopped in order to safe guard project and programmatic objectives, worker safety, public health, or environmental protection.

Water Quality Planning Division

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

Jack Higginbotham
TCEQ NPS Project Manager
Maintains a thorough knowledge of work activities, commitments, deliverables, and time frames associated with projects. Develops lines of communication and working relationships between the City of Lockhart, the TCEQ, and the EPA. Tracks deliverables to ensure that tasks are completed as specified in the contract. Responsible for ensuring that the project deliverables are submitted on time and are of acceptable quality and quantity to achieve project objectives. Serves on planning team for NPS projects. Participates in the development, approval, implementation, and maintenance of the QAPP. Assists the TCEQ QAS in technical review of the QAPP. Responsible for verifying that the QAPP is followed by the City of Lockhart. Notifies the TCEQ QAS of particular circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Enforces corrective action.

Anju Chalise
NPS Quality Assurance Specialist
Assists Lead QAS with NPS QA management. Serves as liaison between NPS management and Agency QA management. Responsible for NPS guidance development related to program quality assurance. Serves on planning team for NPS projects. Participates in the development, approval, implementation, and maintenance of the QAPP.

Rebecca Ross
NPS Data Manager
Responsible for coordination and tracking of NPS data sets from initial submittal through NPS Project Manager review and approval. Ensures that data is reported following instructions in the Surface Water Quality Monitoring Data Management Reference Guide (January 2012, or most current version). Runs automated data validation checks in SWQMIS and coordinates data verification and error correction with NPS Project Managers' data review. Generates SWQMIS summary reports to assist NPS Project Managers' data reviews. Provides training and guidance to NPS and Planning Agencies on technical data issues. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related standard operating procedures for NPS data management. Serves on planning team for NPS projects.

City of Lockhart

Lee Weatherford, Director of Public Works
City of Lockhart Project Manager
Responsible for ensuring tasks and other requirements in the contract are executed on time and are of acceptable quality. Monitors and assesses the quality of work. Coordinates attendance at conference calls, training, meetings, and related project activities with the TCEQ. Responsible for verifying the QAPP is followed and the project is producing data of known and acceptable quality. Ensures adequate training and supervision of all monitoring and data collection activities. Complies with corrective action requirements. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project quality assurance records. Responsible for reporting on status of illicit discharge detection monitoring to TCEQ NPS Project Manager.

Debbie Magin
City of Lockhart QAO
Responsible for coordinating development and implementation of the QA program. Responsible for writing and maintaining the QAPP. Responsible for coordinating with the TCEQ QAS to resolve QA- related issues. Notifies the City of Lockhart Project Manager and TCEQ Project Manager of particular circumstances which may adversely affect the quality of data. Responsible for validation and verification of all data collected according with Table A7.1 procedures and acquired data procedures after each task is performed. Coordinates the research and review of technical QA material and data related to water quality monitoring system design

and analytical techniques. Conducts laboratory inspections. Develops, facilitates, and conducts monitoring systems audits.

Joe Leal
City of Lockhart Field Supervisor
Responsible for supervising all aspects of the sampling and measurement of surface waters and other parameters in the field. Supervises field staff. Responsible for field scheduling, staffing, and ensuring that staff is appropriately trained as specified in Sections A6 and A8.

City of Lockhart Field Staff
Responsible for the acquisition of water samples in a timely manner that meet the quality objectives specified in Table A7.1, as well as the requirements of Sections B1 through B8. Responsible for transporting sample bottles, chains-of-custody and field data sheets to laboratory.

Guadalupe-Blanco River Authority

Josie Longoria
GBRA Laboratory Director/QAO
Responsible for supervision of laboratory personnel involved in generating analytical data for this project. Responsible for ensuring that laboratory personnel involved in generating analytical data have adequate training and a thorough knowledge of the QAPP and all SOPs specific to the analyses or task performed and/or supervised. Responsible for oversight of all operations, ensuring that all QA/QC requirements are met, and documentation related to the analysis is completely and accurately reported. Enforces corrective action, as required. Develops and facilitates monitoring systems audits. Monitors the implementation of the QAM and the QAPP within the laboratory to ensure complete compliance with QA objectives as defined by the contract and in the QAPP. Conducts internal audits to identify potential problems and ensure compliance with written SOPs. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Insures that all QA reviews are conducted in a timely manner from real-time review at the bench during analysis to final pass-off of data to the QA officer.

Debbie Magin
GBRA Data Manager
Performs validation and verification of data before the report is sent to the City of Lockhart Project Manager. Oversees data management for the study. Performs data quality assurances prior to transfer of data to City of Lockhart Project Manager. Responsible for transferring data to the City of Lockhart Project Manager in the acceptable format. Ensures data are submitted according to workplan specifications. Provides the point of contact for the City of Lockhart Project Manager to resolve issues related to the data.

Lee Gudgell
GBRA Water Quality Field Technician

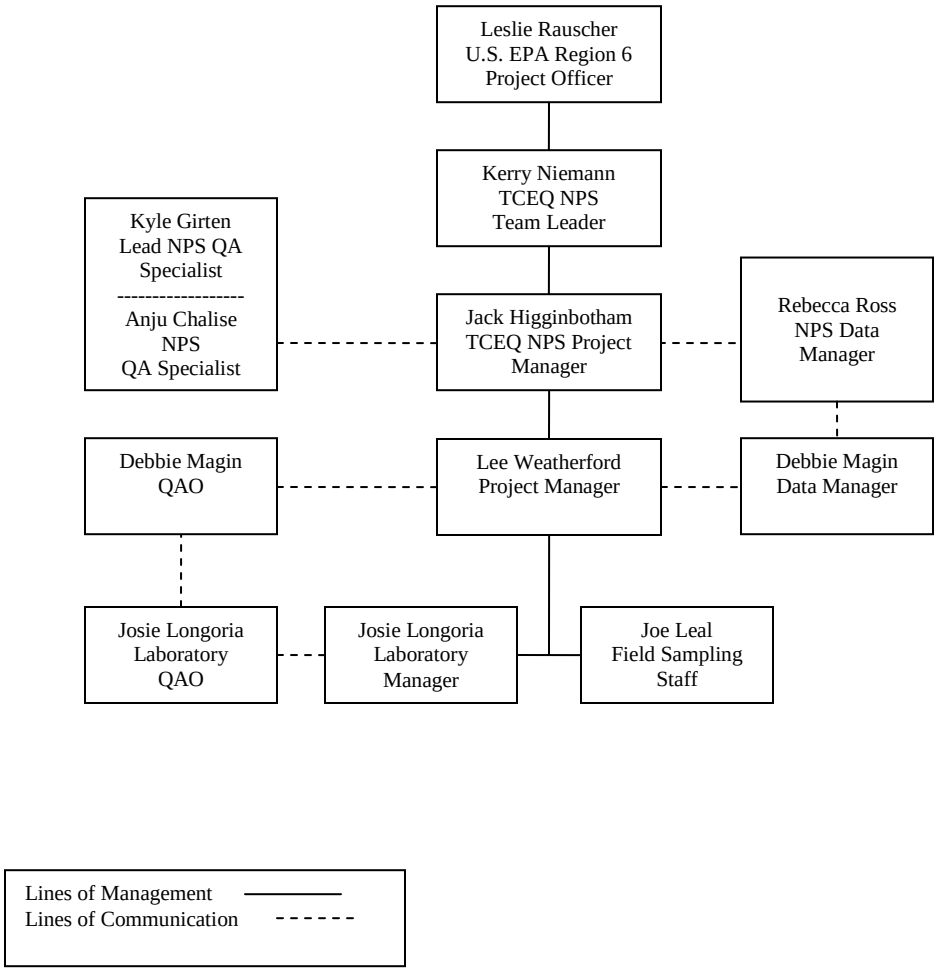
Responsible for providing sampling bottles, supplies, and equipment to city's field staff. Provides training of city's field staff for collecting water samples. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings.

GBRA Laboratory Technicians
Responsible for receipt of sample bottle racks, chains-of-custody and field sheets. Responsible for reviewing chains-of-custody for completeness. Responsible for sample analyses per the lab and project quality assurance and control requirements. Responsible for sample input into lab database and creating sample reports for review.

U.S. EPA Region 6

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

Figure A4.1. Organization Chart - Lines of Communication



A5 PROBLEM DEFINITION/BACKGROUND

The 2004 Texas Water Quality Inventory and 303(d) List identifies the upper reaches of Plum Creek (Segment 1810) as exceeding the contact recreation standard criterion for *E. coli* bacteria. The lower reaches of Plum Creek have concerns for nutrients (ammonia-nitrogen, nitrate+nitrite nitrogen, and total phosphorus).

The Texas State Soil and Water Conservation Board Wharton Regional Watershed Coordination Steering Committee selected the Plum Creek Watershed for the development of a watershed protection plan in December 2005 from a list of prioritized watersheds within the Wharton Region service area. The result was the formation of the Plum Creek Watershed Protection Plan (PCWPP), facilitated by the Texas AgriLife Extension Service. The WPP in the Plum Creek Watershed has identified control measures and compliance strategies that will enhance water quality in the impaired Plum Creek watershed by focusing on improving urban storm water quality.

Under this work plan, the City of Lockhart will provide oversight of the program in the Plum Creek Watershed during the life of the project. Of the many PCWPP stakeholders, the City of Lockhart has taken a leading role in working toward improving water quality in the Plum Creek. The City of Lockhart, located in middle of the Plum Creek drainage basin, is in a position to help the health of the Plum Creek by improving the quality of the urban storm water leaving their jurisdiction. In order to be able to make significant improvements, the City of Lockhart's Implementation Project will include mapping and evaluating existing storm water system, identifying and prioritizing upgrades to the city's storm water management system including cleaning out and installing storm drain filters, education and stenciling of storm sewer inlets, maintaining the newly implemented dog waste collection station program in the parks, and coordinating city "housekeeping" activities designed to improve water quality (street sweeping, creek cleanup days, household hazardous and electronic waste collection days, etc). A component included in the *Plum Creek Watershed Protection Plan Implementation – City of Lockhart Project* is an illicit discharge detection survey of the city's storm water conveyance system that will allow the city to identify and fix any existing issues.

This QAPP is reviewed by the TCEQ to help ensure that data generated for the purposes described above are scientifically valid and legally defensible. This process will ensure that all data reported to TCEQ NPS Project Manager have been collected and analyzed in a way that guarantees their reliability and therefore can be used in programs deemed appropriate by the TCEQ.

A6 PROJECT/TASK DESCRIPTION

This environmental data collection project will monitor the storm water conveyance system for illicit discharges. In order to identify contributions of target pollutants from illicit discharges, the storm water conveyance system will be monitored under dry weather conditions. If water is present in the conveyance system, water quality samples will be collected and analyzed for *E.*

coli, nitrate-nitrogen (NO_3-N), ammonia-nitrogen (NH3-N), and total phosphorus-P (Total P). The illicit discharge detection survey will be conducted so that 25% of the system is inspected once per quarter, resulting in 100% of the system surveyed in a year. All aspects of the city's stormwater conveyance systems, including inlets, culverts, channels and stormwater lines will be inspected.

Typical primary data collected for the illicit discharge survey includes location description, antecedent dry period, type of structure, shape of structure, type of material, dimensions, staining, deposits, odor, flow volume, flow color, turbidity, floatables, classification, physical condition, photographs, potential receiving water of the state and general comments about the feature.

The inspections will be conducted at random times that have not been impacted by antecedent rainfall within seven days. If there is water in the conveyance system during a dry period, samples will be collected and analyzed for the pollutants of concern. IDDE surveys will include chlorine residual measurements in order to eliminate possible leaks from the city's potable water distribution system.

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

See Section B1 for monitoring to be conducted under this QAPP.

Revisions to the QAPP

Until the work described is completed, this QAPP shall be reissued annually on the anniversary date, or revised and reissued prior to any significant changes being made in activities, whichever is sooner. Reissuances and annual updates must be submitted to the TCEQ for approval at least 90 days before the last approved version has expired. If the QAPP expires, the QAPP is longer in effect and the work covered by the QAPP must be halted. If the entire QAPP is current, valid, and accurately reflects the project goals and the organization's policy, the annual re-issuance may be done by a certification that the plan is current. This can be accomplished by submitting a cover letter stating the status of the QAPP and a copy of new, signed approval pages for the QAPP. If the QAPP needs to be updated to incorporate amendments made earlier in the year or to incorporate new changes, a full annual update is required. This is accomplished by submitting a cover letter, a document detailing changes made, and a full copy of the updated QAPP (including signature pages).

Amendments

Amendments to the QAPP may be necessary to reflect changes in project organization, tasks, schedules, objectives, and methods; address deficiencies and nonconformances; improve operational efficiency; and/or accommodate unique or unanticipated circumstances. Requests for amendments are directed from the City of Lockhart Project Manager to the TCEQ Project Manager in writing using the QAPP Amendment shell. The changes are effective immediately

upon approval by the TCEQ NPS Project Manager and Quality Assurance Specialist, or their designees, and the EPA Project Officer (if necessary).
Amendments to the QAPP and the reasons for the changes will be documented, and full copies of amendments will be forwarded-to all persons on the QAPP distribution list by the City of Lockhart QAO. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process or within 120 days of the initial approval in cases of significant changes.

A7 QUALITY OBJECTIVES AND CRITERIA

Only data collected that have a valid parameter code in Table A7.1 will be stored in SWQMIS. Any parameters listed in Table A7.1 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Table A7.1 Measurement Performance Specifications for Illicit Discharge Detection Monitoring

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL[3]	Limit of Quantitation (LOQ)	Recovery at LOQ (%)	PRECISION (RPD of LCS/LCSD)	BIAS %Rec. of LCS	Completeness (%)	Lab
E. COLI, IDEXX COLILERT	MPN/100 mL	water	Colilert-18	31699	1	1	NA	0.5[1]	NA	90	GBRA
NITROGEN, AMMONIA, TOTAL	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	00610	0.1	0.1	70-130	20	80-120	90	GBRA
NITRATE-NITROGEN, TOTAL	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	90	GBRA
PHOSPHORUS, TOTAL, WET METHOD[2]	mg/L	water	EPA 365.3	00665	0.06	0.05	70-130	20	80-120	90	GBRA
TOTAL CHLORINE RESIDUAL	mg/L	water	SM 4500-Cl G and TCEQ SOP, V1	50060	0.1	NA	NA	NA	NA	NA	Lockhart Field Staff
STREAM FLOW ESTIMATE	cfs	water	TCEQ SOP V1	74069	NA	NA	NA	NA	NA	NA	Lockhart Field Staff
FLOW SEVERITY	1=No flow, 2=Low, 3=Normal, 4=Flood, 5=High, 6=Dry	water	TCEQ SOP V1	01351[4]	NA	NA	NA	NA	NA	NA	Lockhart Field Staff

1 This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.

2 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 parameters. The manual method will be used as a secondary method in case of instrument failure.

3 The most up-to-date AWRL is located at http://www.tceq.state.tx.us/compliance/monitoring/nps/grants/NPS-QAPP.html
4 Reporting to be consistent with SWQM guidance and based on measurement capability.

References: *US EPA Methods for Chemical Analysis of Water and Wastewater*, Manual #EPA-600/4-79-020. American Public Health Association, American Water Works Association and Water Environment Federation, *Standard Methods for the Examination of Water and Waste Water*, 20th Ed., Texas Commission on Environmental Quality *Surface Water Quality Monitoring Procedures*, Volume One: RG-415 (August 2012 or most recent version).

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. deioinized 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, sand, commercially available tissue) and by calculating percent recovery. Results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for bias are specified in Table A7.1.

Representativeness

Site selection, the appropriate sampling regime, the sampling of all pertinent media according to TCEQ SOPs, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected for water quality assessment are considered to be spatially and temporally representative of routine water quality conditions. Water Quality data are collected on a routine frequency and are separated by approximately even time intervals. At a minimum, samples are collected over at least two seasons (to include inter-seasonal variation) and over two years (to include inter-year variation) and include some data collected during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets will not be biased toward unusual

conditions of flow, runoff, or season. The goal for meeting total representation of the water body will be tempered by the potential funding for complete representativeness

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.

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 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.

Limit of Quantitation

AWRLs (Table A7.1) are used in this project as the *limit of quantitation specification*s. Laboratory *limits of quantitation* (Table A7.1) must be at or below the AWRL for each applicable parameter.

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

Analytical Quantitation

To demonstrate the ability to recover at the limit of quantitation, the laboratory will analyze an LOQ check standard for each batch of samples run.

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

A8 SPECIAL TRAINING/CERTIFICATION

Staff responsible for collecting the dry weather flows in the city's storm water conveyance system will undergo a one day training event by GBRA Water Quality Field Technician and City of Lockhart Field Supervisor. Field personnel will receive training in proper sampling technique. Before actual sampling occurs, they will demonstrate to the City of Lockhart Field

Supervisor (in the field), their ability to retrieve the samples. The City of Lockhart Field Supervisor will sign off each field staff in their field logbooks.

Global Positioning System (GPS) equipment may be used as a component of the information collected for creating the certified positional data. Any positional data obtained by the City of Lockhart using a Global Positioning System will follow the TCEQ's OPP 8.11 and 8.12 policy regarding the collection and management of positional data.

Positional data entered into SWQMIS will be collected by a GPS certified individual with an agency approved GPS device to ensure that the agency receives reliable and accurate positional data. Certification can be obtained in any of three ways: completing a TCEQ training class, completing a suitable training class offered by an outside vendor, or by providing documentation of sufficient GPS expertise and experience. City of Lockhart must agree to adhere to relevant TCEQ policies when entering GPS-collected data.

In lieu of entering certified GPS Coordinates, positional data may be acquired with a GPS and verified with photo interpolation using a certified source, such as Google Earth or Google Map. The verified coordinates and map interface can then be used to develop a new SLOC.

City of Lockhart and its subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in the TNI Volume 1 Module 2, Section 4.5.5 (concerning Review of Requests, Tenders and Contracts).

A9 DOCUMENTS AND RECORDS

The documents and records that describe, specify, report, or certify activities are listed.

Table A9.1 Project Documents and Records

Document/Record	**Location**	**Retention * (Paper/electronic)**	**Format**
QAPPs, amendments and appendices	TCEQ/City of Lockhart/GBRA	8 years/one year/ indefinitely	Paper/Electronic
QAPP distribution documentation	City of Lockhart	one year/ indefinitely	Paper/Electronic
QAPP commitment letters	City of Lockhart	one year/ indefinitely	Paper/Electronic
Document/Record	**Location**	**Retention * (Paper/electronic)**	**Format**
Field notebooks or data sheets	City of Lockhart	one year/ indefinitely	Paper/electronic
Field equipment calibration/maintenance logs	City of Lockhart	one year/ indefinitely	Paper/electronic
Field staff training records	City of Lockhart	one year/ indefinitely	Paper/electronic

Chain-of-custody records	City of Lockhart	one year/ indefinitely	Paper/electronic
Laboratory QA Manuals	GBRA	one year/ indefinitely	Paper/electronic
Laboratory SOPs	GBRA	one year/ indefinitely	Paper/electronic
Laboratory staff training records	GBRA	one year/ indefinitely	Paper/electronic
Laboratory data reports/results	GBRA	one year/ indefinitely	Paper/electronic
Instrument printouts	GBRA	one year/ indefinitely	Paper/electronic
Laboratory equipment maintenance logs	GBRA	one year/ indefinitely	Paper/electronic
Laboratory calibration records	GBRA	one year/ indefinitely	Paper/electronic
Corrective Action Documentation	GBRA	one year/ indefinitely	Paper/electronic

* City of Lockhart retains written and electronic formats at a frequency based on State of Texas document retention requirements. GBRA - Retention of data in paper format is for one year and indefinitely in electronic or microfilm format.

Laboratory Test Reports

Test/data reports from the laboratory must document the test results clearly and accurately. Routine data reports should be consistent with the TNI Volume 1, Module 2, Section 5.10 and include the information necessary for the interpretation and validation of data. The laboratory report for each sample will be transmitted to the City of Lockhart Project Manager as soon as all laboratory procedures are completed on that sample. 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 (e.g., holding times exceeded)
* sample results
* units of measurement
* sample matrix
* a name and title of person accepting responsibility for the report

* project-specific quality control results to include 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 TNI compliance on a result by result basis.

Electronic Data

Because of the nature of sampling conducted under this project, sample locations will not be known until staff has performed field investigations. This makes following the usual SLOC procedure established by the TCEQ Data Management & Analysis (DM&A) Team impractical. After consultation with the TCEQ NPS, DM&A, and QA Programs, agency staff made the decision that the station location procedure for this project would be re-evaluated after sample collection has taken place. However, at a minimum, field investigators will collect a short description of the sampling location that references the distance from at least one mappable feature (i.e., street intersection, water body, municipal building, etc.), latitude, and longitude and assign a unique temporary ID. This information will be kept in spreadsheet format. It is likely that SLOCs will be generated later in order to load the data to SWQMIS. Therefore, a general map of the area denoting sample locations and the method of latitude/longitude collection should also be kept on file. Please see Chapter 3 of the TCEQ *Surface Water Quality Data Management Reference Guide (January 2012, or most current version)* at http://www.tceq.texas.gov/assets/public/compliance/monops/water/wdma/dmrg/dmrg_ch3.pdf, for guidance on map creation.

B1 SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

The sample design rationale for the study is based on the intent to identify illicit discharges into Plum Creek. Monitoring sites can be anywhere within the city's storm water conveyance system that has been mapped and is depicted Appendix D. Water samples will be collected based on the presence of water in the conveyance system when there should be no runoff present (no rainfall in area for seven days). Rainfall of an amount to create runoff will be measured and recorded by the National Weather Service station located at the San Marcos Municipal Airport and the Clear Fork Elementary School located in central Lockhart.

If water is found in the conveyance system during dry weather conditions, sample bottles will be filled, put on ice and transported to the laboratory where they will be stored at 0-6^0 C. The chain-of-custody form (Appendix F) will accompany the samples to the GBRA laboratory. On the chain of custody, the GPS coordinates will be noted, as well as a description of the location by street, i.e. storm culvert at the crossing of Main Street and Elm Street.

One set of bottles will be collected at each site where an illicit discharge is identified. Each set of bottles contains one 100-mL sterile container containing sodium thiosulfate for *E. coli*, one 1-

liter container with preservative for total phosphorus and ammonia-nitrogen and one 1-liter container with no preservative for nitrate-nitrogen.

Samples will be collected following procedures detailed in the latest version of the TCEQ guidance document, *Surface Water Quality Monitoring Procedures Manual, Volume 1:RG-415 (August 2012 or most recent version).*

B2 SAMPLING METHODS

Field Sampling Procedures

Routine sample collection will follow the field sampling procedures for conventional and microbiological parameters documented in the TCEQ *Surface Water Quality Monitoring Procedures Manual, Volume 1:RG-415 (August 2012 or most recent version).*

The sample volumes, container types, minimum sample volume, preservation requirements, and holding time requirements are specified in Table B2.1.

Table B2.1 Illicit Discharge Detection Monitoring Parameters

Parameter	Matrix	Sample Type	Container	Preservation	Sample Volume	Holding Time
E. coli	Water	Grab	Pre-cleaned, sterile bottle with thio-sulfate	ice, dark	100 mL	6 hours
Nitrate-Nitrogen	Water	Grab	Pre-cleaned, sterile one liter bottle	ice, dark	1 liter	48 hours
Total Phosphorus	Water	Grab	Pre-cleaned, sterile one liter bottle	ice, dark, pH<2 with H2SO4	1 liter	28 days
Ammonia-Nitrogen	Water	Grab	Pre-cleaned, sterile one liter bottle	ice, dark, pH<2 with H2SO4	1 liter	28 days

Sample Containers

Sample containers for nitrate-nitrogen analyses are plastic one-liter bottles that are cleaned and reused. 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. Disposable, pre-cleaned, sterile bottles are purchased for bacteriological samples. The sample containers for ammonia-nitrogen and total phosphorus are new, certified plastic bottles containing preservative. Certificates are maintained in a notebook by the laboratory.

Processes to Prevent Cross Contamination

Procedures outlined in the TCEQ Surface Water Quality Procedures outline the necessary steps to prevent cross-contamination of samples. These include such things as direct collection into sample containers and the use of commercially pre-cleaned sample containers.

Documentation of Field Sampling Activities

Field sampling activities are documented on the Field Data Reporting Form as presented in Appendix E. For all visits, station GPS coordinates and location description, sampling time, sampling date, number of bottles filled and sample collector's name/signature are recorded. Flow value and severity are estimated at each sample location. Detailed observational data are recorded including water appearance, weather, unusual odors, specific sample information, days since last significant rainfall, chlorine residual and flow severity on field data report form.

Recording Data

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

1. Legible writing in indelible, waterproof ink with no modifications, write-overs or cross-outs;
2. Changes should be made by crossing out original entries with a single line, entering the changes, and initialing and dating the corrections.
3. Close-outs on incomplete pages with an initialed and dated diagonal line.

Sampling Method Requirement or Sampling Process Design Deficiencies and Corrective Action

Examples of sampling method requirement or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP and appropriate sampling procedures may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the City of Lockhart Project Manager, in consultation with the City of Lockhart QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the NPS Project Manager both verbally and in writing in the project progress reports and by completion of a corrective action plan (CAP).

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

B3 SAMPLE HANDLING AND CUSTODY

Sample Labeling

Samples from the field are labeled on the container (*or on a label; please specify*) with an indelible marker. Label information includes:

1. Site identification
2. Date and time of collection
3. Preservative added, if applicable

Sample Handling

The City of Lockhart field staff will collect the samples and place the bottles on ice and in the dark for delivery to the GBRA Regional Laboratory. After receipt at the GBRA lab, the chain-of-custody and field sheet are checked for completeness, and 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.

Sample Tracking

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

A sample is in custody if it is in actual physical possession or in a secured area that is restricted to authorized personnel. The COC form is used to document sample handling during transfer from the field to the laboratory. The following information concerning the sample is recorded on the COC form (See Appendix G).

1. Date and time of collection
2. Site identification
3. Sample matrix
4. Number of containers
5. Preservative used
6. Was the sample filtered
7. Analyses required
8. Name of collector
9. Custody transfer signatures and dates and time of transfer
10. Bill of lading (*if applicable*)

Sample Tracking Procedure Deficiencies and Corrective Action

All deficiencies associated with chain-of-custody procedures as described in this QAPP are immediately reported to the City of Lockhart Project Manager. These include such items as delays in transfer, resulting in holding time violations; violations of sample preservation requirements;

incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc. The City of Lockhart Project Manager in consultation with the City of Lockhart QAO will determine if the procedural violation may have compromised the validity of the resulting data. Any failures that have reasonable potential to compromise data validity will invalidate data, and the sampling event should be repeated. The resolution of the situation will be reported to the TCEQ NPS Project Manager in the project progress report. Corrective Action Plans will be prepared by the City of Lockhart QAO and submitted to TCEQ NPS Project Manager along with project progress report.

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

B4 ANALYTICAL METHODS

The analytical methods are listed in Table A7.1 of Section A7. The GBRA Regional Laboratory analyzing the samples under this QAPP is compliant with the TNI Standards. Procedures for laboratory analysis will be in accordance with the most recently published or online edition of Standard Methods for the Examination of Water and Wastewater, the latest version of the TCEQ *Surface Water Quality Monitoring Procedures Manual, Volume 1: Physical and Chemical Monitoring Methods, RG-415, August 2012, Austin, TX* or the most recent version or other reliable procedures acceptable to TCEQ.

Copies of laboratory SOPs are retained by the GBRA and are available for review by the TCEQ. Laboratory SOPs are consistent with EPA requirements as specified in the method.

Standards Traceability

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

Analytical Method Deficiencies and Corrective Actions

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the City of Lockhart Laboratory Supervisor, who will make the determination and notify the City of Lockhart QAO. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the City of Lockhart

Manager. The City of Lockhart Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ NPS Project Manager.

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

The TCEQ has determined that analyses associated with the qualifier codes such as holding time exceedance, sample received unpreserved, estimated value, etc. may have unacceptable measurement uncertainty associated with them. This will immediately disqualify analyses from reporting to TCEQ NPS Project Manager. Therefore, data with these types of problems should not be reported to the TCEQ. Additionally, any data collected or analyzed by means other than those stated in the QAPP, or data suspect for any reason should not be reported to the TCEQ NPS Project Manager or must have an appropriate TCEQ data qualifier assigned which can be found in the SWQM DMRG (2012, or most recent version).

B5 QUALITY CONTROL

Sampling Quality Control Requirements and Acceptability Criteria

The minimum Field QC Requirements are outlined in the *TCEQ Surface Water Quality Monitoring Procedures Manual, Volume One: RG-415 (August 2012, or most recent version).* 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 SWQM Procedures. 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. To the extent possible, field splits prepared and analyzed over the course of the project should be performed on samples from different sites.

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

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

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 analyte (i.e., > 5 times the LOQ) were measured and analytical variability can be eliminated as a factor, than 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 Quality Control or Acceptability Requirements Deficiencies and Corrective Actions.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Batch – A batch is defined as environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** is composed of one to 20 environmental samples of the same NELAP-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 25 hours. An **analytical batch** is composed of prepared environmental samples (extract, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

Method Specific QC requirements – QC samples, other than those specified later this section, are run (e.g., 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 quality manuals (QMs). 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 calibrations are performed. In addition, an LOQ check standard will be analyzed with each analytical batch. 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 analytical batch of samples 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.

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

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

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

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

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

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

Laboratory Duplicates – A laboratory duplicate is prepared by taking aliquots of a sample from the same container under laboratory conditions and processed and analyzed independently. A laboratory control sample duplicate (LCSD) is prepared in the laboratory by splitting aliquots of an LCS. Both samples are carried through the entire preparation and analytical process. LCSDs are used to assess precision and are performed at a rate of one per preparation batch.

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, X_1 and X_2, the RPD is calculated from the following equation:

$$RPD = [(X_1 - X_2)/\{(X_1+X_2)/2\} * 100]$$

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.

Measurement performance specifications are used to determine the acceptability of duplicate analyses as 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 preparation batch whichever is greater. 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:

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

Matrix spike recoveries are compared to the same acceptance criteria established for the associated LCS recoveries, rather than the matrix spike recoveries published in the mandated test method. The EPA 1993 methods (i.e. ammonia-nitrogen) that establish matrix spike recovery acceptance criteria are based on recoveries from drinking water that has very low interferences and variability and do not represent the matrices sampled in this QAPP. If the matrix spike results are outside laboratory-established criteria, there will be a review of all other associated quality control data in that batch. If all of quality control data in the associated batch passes, it will be the decision of the GBRA QAO or City of Lockhart Project Manager to report the data for the analyte that failed in the parent sample or to determine that the result from the parent sample associated with that failed matrix spike is considered to have excessive analytical variability and does not meet project QC requirements. Depending on the similarities in composition of the samples in the batch, GBRA may consider excluding all of the results in the batch related to the analyte that failed recovery.

Method blank – A method blank is a sample of matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with

and under the same conditions as the samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. The method blanks are performed at a rate of once per preparation batch. 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. Samples associated with a contaminated blank shall be evaluated as to the best corrective action for the samples (e.g. reprocessing or data qualifying codes). In all cases the corrective action must be documented.

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

Quality Control or Acceptability Requirement Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the City of Lockhart Project Manager, in consultation with the City of Lockhart QAO. In that differences in sample results are used to assess the entire sampling process, including environmental variability, the arbitrary rejection of results based on pre-determined limits is not practical. Therefore, the professional judgment of the City of Lockhart Project Manager and City of Lockhart QAO will be relied upon in evaluating results. Rejecting sample results based on wide variability is a possibility.

Laboratory measurement quality control failures are evaluated by the laboratory staff. The disposition of such failures and the nature and disposition of the problem is reported to the GBRA Laboratory Director/QAO. The GBRA Laboratory Director/QAO will discuss with the City of Lockhart Project Manager and City of Lockhart QAO. If applicable, the City of Lockhart Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ NPS Project Manager.

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

B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

Equipment records are kept on all field equipment and a supply of critical spare parts is maintained by the City of Lockhart Field Supervisor (chlorine residual and flow estimate).

All laboratory tools, gauges, instrument, and equipment testing and maintenance requirements are contained within laboratory QAM(s). Testing and maintenance records are maintained and are available for inspection by the TCEQ. Instruments requiring daily or in-use testing may include, but are not limited to, water baths, ovens, autoclaves, incubators, refrigerators, and

laboratory pure water. Critical spare parts for essential equipment are maintained to prevent downtime. Maintenance records are available for inspection by the TCEQ.

B7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

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

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

New batches of supplies are tested before use to verify that they function properly and are not contaminated. The laboratory QAM provides additional details on acceptance requirements for laboratory supplies and consumables.

B9 NON-DIRECT MEASUREMENTS

Only data collected directly under this QAPP will be reported to the TCEQ NPS Project Manager. This project will not report any acquired or non-direct measurement data to the TCEQ NPS Project Manager that has been or is going to be collected under another QAPP. All data collected under this QAPP and any acquired or non-direct measurements will comply with all requirements/guidance of the project.

B10 DATA MANAGEMENT

Personnel

Section A4 lists responsibilities and lines of communication for data management personnel.

Data Management Process

Field technicians and laboratory personnel follow protocols that ensure that the project data files maintain their integrity and usefulness. Field data collected at the time of the sampling event, along with notes on sampling conditions is recorded on field data sheets. The field data is the responsibility of the City of Lockhart field staff. The lab technician /sample custodian logs the samples as grab samples in the Lab Samples Database. Each sample is assigned a separate and distinct sample number. The sample bottles are 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 bottles and review the chain of custody. The samples are prepped and analyzed or transferred into the refrigerator for storage. Examples of the field data sheets and chains-of-custody used can be found in Appendices E and F.

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. The analysis log is reviewed to see that all necessary information is included and that the data quality objectives have been met. When the report generated by the GBRA laboratory 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 Data Manager reviews the respective 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 Data Manager. If at any time errors are identified, the laboratory and water quality databases are corrected. The GBRA Data Manager is responsible for transmitting the data to the City of Lockhart Project Manager and after his review and approval, will report to TCEQ NPS Project Manager. If errors are found after the TCEQ review, those errors are corrected by the GBRA Data Manager and logged in a data correction log.

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

Field data collected → Field data sheets → Lab database → Quality control review by GBRA Lab Director/QAO → Report generation → Data checked for reasonableness by GBRA Data Manager → Data transferred by email written lab report to City of Lockhart Project Manager→ Final report to TCEQ NPS Project Manager → TCEQ NPS Data Manager → SWQMIS

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

Laboratory data → Laboratory analysis logs → Lab database → Quality control review by GBRA Lab Director/QAO→ Report generation → Data checked for reasonableness by GBRA Data Manager → Data transferred by email written lab report to City of Lockhart Project Manager→ Final report to TCEQ NPS Project Manager → TCEQ NPS Data Manager → SWQMIS

Record-keeping and Data Storage

City of Lockhart record keeping and document control procedures are contained in the water quality sampling and laboratory standard operating procedures (SOPs) and this QAPP. Original

field sheets are stored in the City of Lockhart offices in accordance with the record-retention schedule in Section A9. Original lab sheets are stored in the GBRA offices in fireproof files. Two copies of the GBRA database are backed up each Friday on magnetic tape. One copy is stored in a fireproof safe in a GBRA office, and one copy is stored off-site. If necessary, disaster recovery will be accomplished by information resources staff using the backup database.

Archives/Data Retention

Complete original data sets are archived as permanent scanned electronic media and retained on-site by the City of Lockhart (city server) for a retention period specified in Section A9.

Data Verification/Validation

The control mechanisms for detecting and correcting errors and for preventing loss of data during data reduction, data reporting, and data entry are contained in Sections D1, D2, and D3.

Forms and Checklists
See Appendix E for the Field Data Reporting Forms.
See Appendix C for the Data Review Checklist and Summary.

Data Dictionary
Terminology and field descriptions are included in the SWQM DMRG (January 2012 or most recent version). For the purposes of verifying which entity codes are included in this QAPP, a table outlining the entities that will be used when submitting data under this QAPP is included below.

Name of Monitoring Entity	Tag Prefix	Submitting Entity	Collecting Entity	Monitoring Type
City of Lockhart	*LK*	*LK*	*LK*	*BF*

Data Handling

Data are processed using the GBRA Regional Laboratory Information System (LIMS). Data integrity is maintained by the implementation of password protections which control access to the LIMS and by limiting update rights to a select user group. No data from external sources are maintained in the database. The database administrator is responsible for assigning user rights and assuring database integrity.

Hardware and Software Requirements

Hardware configurations are sufficient to run the GBRA LIMS under the Windows NT operating system in a networked environment. Information Resources staff are responsible for assuring hardware configurations meet the requirements for running current and future data management/database software as well as providing technical support. Software development

and database administration are also the responsibility of the information resources department. Information Resources develops applications based on user requests and assures full system compatibility prior to implementation.

Information Resource Management Requirements

Company information technology (IT) policy is contained in IT SOPs which are available for review at GBRA offices.

Quality Assurance/Control

See Sections D and B of this QAPP.

C1 ASSESSMENTS AND RESPONSE ACTIONS

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	City of Lockhart	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TCEQ in Quarterly Report
Monitoring Systems Audit of City of Lockhart	Dates to be determined by TCEQ NPS	TCEQ	Field sampling, handling and measurement; facility review; and data management as they relate to NPS	30 days to respond in writing to the TCEQ to address corrective actions
Laboratory Inspection	Dates to be determined by TCEQ	TCEQ Laboratory Inspector	Analytical and quality control procedures employed at the laboratory and the contract laboratory	30 days to respond in writing to the TCEQ to address corrective actions

Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, SWQM Procedures Manual, SOPs, or TCEQ Surface Water Quality Data Management Reference Guide (January 2012, or most current version). Deficiencies may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff. It is the responsibility of the City of Lockhart Project Manager, in consultation with the City of Lockhart QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be

conveyed to the NPS Project Manager both verbally and in writing in the project progress reports and by completion of a corrective action plan (CAP).

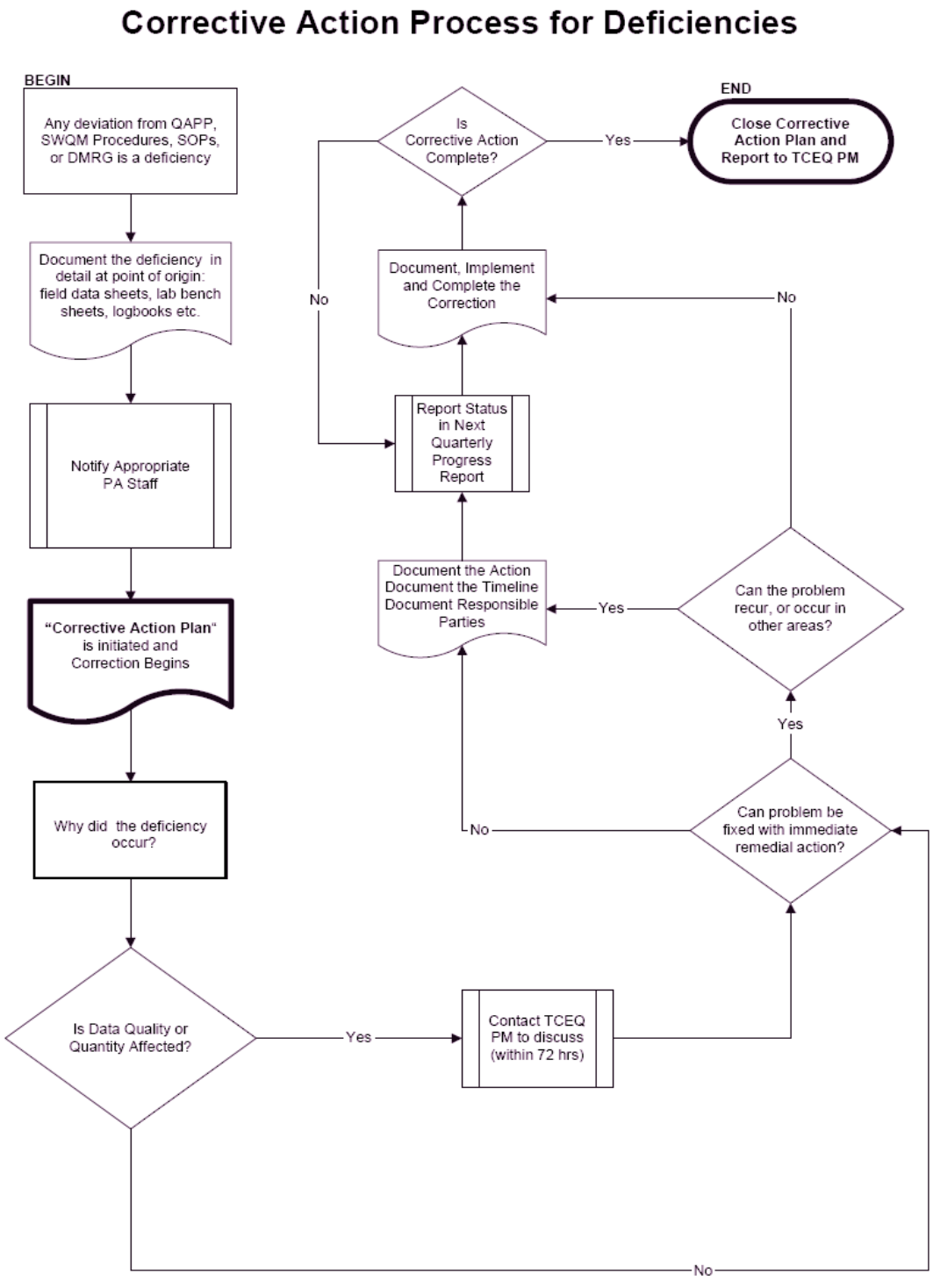
Corrective Action

CAPs should:

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

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

Figure C1.1 Corrective Action Process for Deficiencies



Status of CAPs will be documented on the Corrective Action Status Table (See Appendix L) and 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 TCEQ immediately.

The City of Lockhart Project Manager is responsible for implementing and tracking corrective actions. Corrective action plans will be documented on the Corrective Action Plan Form (See Appendix M) and submitted, when complete, to the TCEQ Project Manager. Records of audit findings and corrective actions are maintained by both the TCEQ and the City of Lockhart QAO. Audit reports and corrective action documentation will be submitted to the TCEQ with the Quarterly Progress Report.

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

C2 REPORTS TO MANAGEMENT

Reports to TCEQ Project Management

Reports to TCEQ Project Management

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

Monitoring Systems Audit Report and Response - Following any audit performed by the City of Lockhart, a report of findings, recommendations and response is sent to the TCEQ in the quarterly progress report.

Quarterly Progress Report - Summarizes the City of Lockhart's activities for each task; reports monitoring status, problems, delays, and corrective actions; and outlines the status of each task's deliverables.

Monitoring System Audit Response - The City of Lockhart will respond in writing to the TCEQ within 30 days upon receipt of a monitoring system audit report to address corrective actions.

City of Lockhart Evaluation - The City of Lockhart participates in a City of Lockhart Evaluation by the TCEQ annually for compliance with administrative and programmatic standards.

Final Project Report - Summarizes the City of Lockhart's activities for the entire project period including a description and documentation of major project activities; evaluation of the project results and environmental benefits; and a conclusion.

Reports to City of Lockhart Project Management

The GBRA Laboratory will send the City of Lockhart written lab reports upon completion of analyses and data review for each sample received. The City of Lockhart Project Manager will report the results of the illicit discharge detection monitoring as required by the project scope of work. The GBRA Laboratory Director/QAO will report as needed on results of assessments (including data), and significant QA issues to the City of Lockhart Project management. The process may include submission of written reports, including but not limited to CAFs, audit reports and findings, requests for QAPP amendments.

Reports by TCEQ Project Management

City of Lockhart Evaluation - The City of Lockhart participates in a City of Lockhart Evaluation by the TCEQ annually for compliance with administrative and programmatic standards. Results of the evaluation are submitted to the TCEQ Financial Administration Division, Procurement and Contracts Section.

D1 DATA REVIEW, VERIFICATION, AND VALIDATION

For the purposes of this document, data verification is a systematic process for evaluating performance and compliance of a set of data to ascertain its completeness, correctness, and consistency using the methods and criteria defined in the QAPP. Validation means those processes taken independently of the data-generation processes to evaluate the technical usability of the verified data with respect to the planned objectives or intention of the project. Additionally, validation can provide a level of overall confidence in the reporting of the data based on the methods used.

All data obtained from field and laboratory measurements will be reviewed and verified for conformance to project requirements, and then validated against the data quality objectives which are listed in Section A7. Only those data which are supported by appropriate quality control data and meet the measurement performance specification defined for this project will be considered acceptable and submitted to the TCEQ for entry into SWQMIS.

The procedures for verification and validation of data are described in Section D2, below. The City of Lockhart Field Supervisor is responsible for ensuring that field data are properly reviewed and verified for integrity. The Laboratory Supervisor is responsible for ensuring that laboratory data are scientifically valid, defensible, of acceptable precision and bias, and reviewed for integrity. The City of Lockhart Data Manager will be responsible for ensuring that all data are properly reviewed and verified, and submitted in the required format to be loaded into SWQMIS. The City of Lockhart QAO is responsible for validating a minimum of 10% of the data produced in each task. Finally, the City of Lockhart Project Manager, with the concurrence of the City of Lockhart QAO, is responsible for validating that all data to be reported meet the objectives of the project and are suitable for reporting to TCEQ.

D2 VERIFICATION AND VALIDATION METHODS

All data will be verified to ensure they are representative of the samples analyzed and locations where measurements were made, and that the data and associated quality control data conform to project specifications. The staff and management of the respective field, laboratory, and data management tasks are responsible for the integrity, validation and verification of the data each task generates or handles throughout each process. The field and laboratory tasks ensure the verification of raw data, electronically generated data, and data on chain-of-custody forms and hard copy output from instruments.

Verification, validation and integrity review of data will be performed using self-assessments and peer review, as appropriate to the project task, followed by technical review by the manager of the task. The data to be verified are evaluated against project performance specifications (Section A7) and are checked for errors, especially errors in transcription, calculations, and data input. 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 electronically or by initialing and dating the associated paperwork. If an issue cannot be corrected, the task manager consults with the higher level project management to establish the appropriate course of action, or the data associated with the issue are rejected and not reported to the TCEQ for storage in SWQMIS. The performance of these tasks is documented by completion of the Data Review Checklist and Summary (Appendix C).

The City of Lockhart Project Manager and QAO are each responsible for validating that the verified data are scientifically valid, defensible, of known precision, bias, integrity, meet the data quality objectives of the project, and are reportable to TCEQ. One element of the validation process involves evaluating the data again for anomalies. Any suspected errors or anomalous data must be addressed by the manager of the task associated with the data, before data validation can be completed.

A second element of the validation process is consideration of any findings identified during the monitoring systems audit conducted by the TCEQ QAS assigned to the project. Any issues requiring corrective action must be addressed, and the potential impact of these issues on previously collected data will be assessed. Finally, the City of Lockhart Project Manager, with the concurrence of the QAO validates that the data meet the data quality objectives of the project and are suitable for reporting to TCEQ.

Table D2.1 Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	Data Manager Task
Sample documentation complete; samples labeled, sites identified	City of Lockhart Field Supervisor	GBRA Laboratory Technicians	GBRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ *SWQM Procedures Manual*	City of Lockhart Field Supervisor		GBRA Data Manager
Standards and reagents traceable		GBRA Lab Director/ QAO	
Chain-of -custody complete/acceptable	City of Lockhart Field Supervisor	GBRA Laboratory Technicians	
NELAP Accreditation is current		GBRA Lab Director/ QAO	
Sample preservation and handling acceptable	City of Lockhart Field Supervisor	GBRA Laboratory Technicians	
Holding times not exceeded	City of Lockhart Field Supervisor	GBRA Laboratory Technicians	GBRA Data Manager
Collection, preparation, and analysis consistent with SOPs and QAPP	City of Lockhart Field Supervisor	GBRA Laboratory Technicians	GBRA Data Manager
Instrument calibration data complete	City of Lockhart Field Supervisor	GBRA Laboratory Technicians	GBRA Data Manager
Bacteriological records complete		GBRA Laboratory Technicians	GBRA Data Manager
QC samples analyzed at required frequency		GBRA Lab Director/ QAO	
QC results meet performance and program specifications		GBRA Laboratory Technicians GBRA Lab Director/ QAO	GBRA Data Manager
Analytical sensitivity (Minimum Analytical Levels/Ambient Water Reporting Limits) consistent with QAPP		GBRA Laboratory Technicians GBRA Lab Director/ QAO	GBRA Data Manager

Table D2.1 Data Review Tasks (cont.)

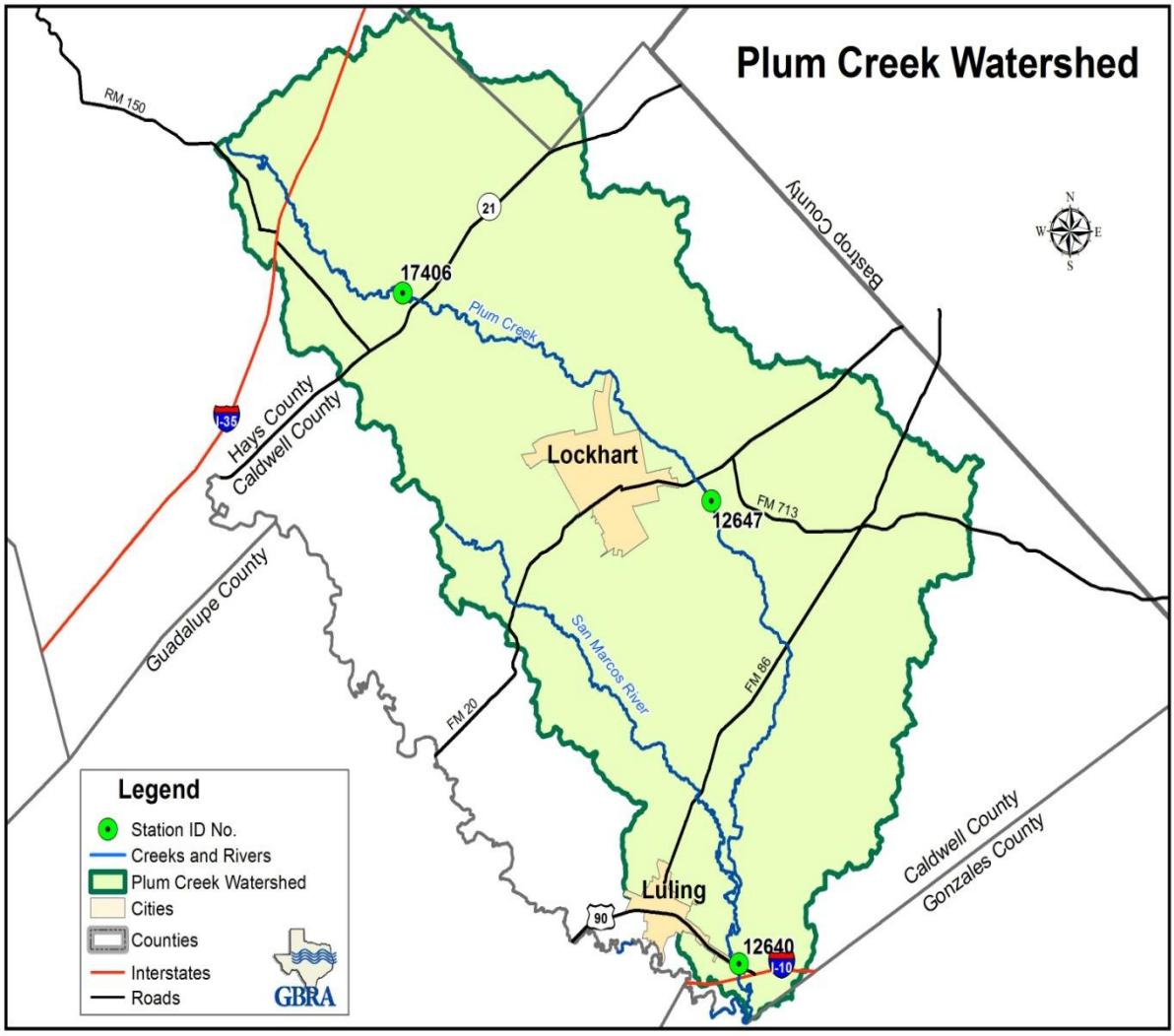
NPS Rev 1.1

Data to be Verified	Field Task	Laboratory Task	Data Manager Task
Results, calculations, transcriptions checked		GBRA Laboratory Technicians GBRA Lab Director/ QAO	GBRA Data Manager
Laboratory bench-level review performed			GBRA Data Manager
All laboratory samples analyzed for all parameters		GBRA Laboratory Technicians GBRA Lab Director/ QAO	GBRA Data Manager
Corollary data agree			GBRA Data Manager
Nonconforming activities documented		GBRA Laboratory Technicians GBRA Lab Director/ QAO	GBRA Data Manager
Outliers confirmed and documented; reasonableness check performed			GBRA Data Manager
Absence of transcription error confirmed			GBRA Data Manager
Absence of electronic errors confirmed			GBRA Data Manager
100% of data manually reviewed			GBRA Data Manager

D3 RECONCILIATION WITH USER REQUIREMENTS

Data collected from this project will be analyzed by the City of Lockhart to report the detection of illicit discharges and concentrations of pollutant of concerns in those discharges. The city will use the location of the detection of illicit discharges to assist in the identification of the source of the discharges. Businesses, homes or activities found upstream and in the proximity of the detection will be isolated and investigated as the possible source. Illicit discharge detection monitoring data that does not meet requirements will not be used in the project or reported to the TCEQ NPS Project Manager. Data generated by this project will be submitted to TCEQ SWQMIS which will act as an historical data reserve for NPS projects.

Appendix A. Area Location Map


Plum Creek Watershed
RM 150
21
17406
Plum Creek
Bastrop County
Hays County
Caldwell County
I-35
Lockhart
FM 713
12647
Guadalupe County
San Marcos River
FM 86
FM 20
Legend
Station ID No.
Creeks and Rivers
Plum Creek Watershed
Cities
Counties
Interstates
Roads
GBRA
Luling
90
12640
I-10
Caldwell County
Gonzales County
N
W
E
S

Appendix B. Work Plan

Texas Commission On Environmental Quality
CWA §319(h) Nonpoint Source Grant Program
FY 2009 Proposal

NONPOINT SOURCE SUMMARY PAGE for the CWA §319(h) Urban Nonpoint Source Grant Program			
Title of Project:	1.06 City of Lockhart – Plum Creek Watershed Protection Plan Implementation		
Project Goals:	To reduce nonpoint source (NPS) pollution entering Plum Creek by implementing the following measures described in the Plum Creek Watershed Protection Plan (WPP): 1) conducting storm water engineering analysis and city-wide assessments to determine placement and selection of structural management measures as described on p. 69 of the Plum Creek WPP; 2) conducting an illicit discharge survey to locate and eliminate illicit discharge sources (p. 149); 3) conducting a storm sewer marking and educational program (p. 149); 4) implementing hazardous waste cleanups (p. 116) as well as fats, oils and grease collection as in support of and as part of education and outreach efforts (pp. 99, 100); 5) maintaining dog waste stations (Table 10.3); 6) removing NPS contributors from city streets through street sweeping and installing "street sweeper friendly" storm drain filters which will reduce street sweeper damage and allow more efficient removal of debris.		
Project Tasks:	(1) Project Administration; (2) Quality Assurance; (3) Creation of storm water system maps; management and control plan; (4) Developing and performing an illicit discharge survey; (5) Storm sewer marking and NPS educational program on water quality; (6) Storm drain filter installation; (7) Household hazardous waste and E-waste cleanup; expand city recycling stations to include fats, oils, and grease; (8) Dog waste collection station maintenance; (9) City housekeeping activities, including street sweeping, and storm drain cleaning		
Measures of Success:	1) Creation of a management plan that will be used by the city to select and install the most effective best management practices (BMPs). 2) Completion of a thorough illicit discharge survey with illicit discharges identified and eliminated. 3) Public participation and outreach achieved through storm sewer marking and hazardous waste cleanups 4) Usage of recycling station oil and fat receptacles; 5) Maintenance and usage of dog waste collection stations; 6) Efficient removal of street debris facilitated by new storm drain filters; 7) Overall loading reductions of NPS pollutants, particularly bacteria and nutrients, observed at the Lockhart monitoring station (12647) upon implementation of control measures developed or implemented through this project and the Plum Creek WPP		
Project Type:	Implementation (X); Education (X); Planning ( ); Assessment (X); Groundwater ( )		
Status of Water Body: 2008 Texas Water Quality Inventory and 303(d) List	Segment ID: Plum Creek 1810	Parameter: Bacteria (*E. coli*) Nutrients	Category: 5c CS
Project Location (Statewide or Watershed and County)	The City of Lockhart, Plum Creek Watershed, Caldwell County		
Key Project Activities:	Hire Staff ( ); Surface Water Quality Monitoring ( ); Technical Assistance (X); Education (X); Implementation (X); BMP Effectiveness Monitoring ( ); Demonstration ( ); Planning ( ); Modeling ( ); Bacterial Source Tracking ( ); Other ( )		

Texas NPS Management Program Elements:	Element One (LTG Objectives 1, 2, 3, 5, 6; STG 2A, STG 2B, STG 2C, STG 2D, STG 3, STG 3 Element 2 Element 3 Element 5					
Project Costs:	Federal:	$275,000	Non-Federal:	$183,333	Total:	$458,333
Project Management:	The City of Lockhart					
Project Period:	January 1, 2010 – August 31, 2013					

Part I – Applicant Information

Applicant							
Project Lead	Vance Rodgers						
Title	City Manager						
Organization	The City of Lockhart						
E-mail Address	vrodgers@lockhart-tx.org						
Street Address	PO Box 239						
City	Lockhart	County	Caldwell	State	TX	Zip Code	78644
Telephone Number	(512)398-3461 ext. 224			Fax Number	(512)398-5301		

Project Partners	
Names	Roles & Responsibilities
Texas Commission On Environmental Quality (TCEQ)	Provide state oversight and management of all project activities and ensure coordination of activities with related projects and Texas State Soil and Water Conservation Board.
City of Lockhart	Provide local oversight and management of all project activities

Part II – Project Information

Project Type							
Surface Water	X	Groundwater					
Does the project implement recommendations made in a completed Watershed Protection Plan or an adopted TMDL or Implementation Plan?				Yes	X	No	
If yes, identify the document.	The Plum Creek Watershed Protection Plan						

If yes, identify the agency/group that developed and/or approved the document.	The Plum Creek Watershed Partnership	Year Developed	2008

Watershed Information				
Watershed Name(s)	Hydrologic Unit Code (8 Digit)	Segment ID	305 (b) Category	Size (Acres)
Plum Creek Watershed	12100203	1810	5c	254,080

Water Quality Impairment

Describe all known causes (pollutants of concern) of water quality impairments from any of the following sources: 2008 Texas Water Quality Inventory and 303(d) List, Clean Rivers Program Basin Summary, Basin Highlights Reports or Other Documented Sources.

IMPAIRMENTS (*2008 Texas Water Quality Inventory and 303(d) List*)

Segment 1810: Plum Creek

	Impairment	Category	Year Listed
1810_01: Confluence with San Marcos River to Approx. 2.5 mi. upstream of the confluence with Clear Fork Plum Creek	bacteria (geomean) *E. coli*	5c	2008
1810_03: From approx. 0.5 mi. upstream of SH 21 to Upper end of segment	bacteria (geomean) *E. coli*	5c	2008

CONCERNS (*2008 Texas Water Quality Inventory*)

		Level of Concern
1810_01	Nitrate	CS (concern for screening levels)
1810_02	Nitrate	CS
	Orthophosphorus	CS
	Total Phosphorus	CS
1810_03	Nitrate	CS
	Total Phosphorus	CS
	Dissolved Oxygen Grab	CS

Project Narrative

Problem/Need Statement

The 2004 through 2008 Texas Water Quality Inventory and 303(d) List identifies the upper reaches of Plum Creek (Segment 1810) as exceeding the contact recreation standard criterion for *E. coli* bacteria. The lower reaches of Plum Creek have concerns for nutrients (ammonia, nitrate + nitrite nitrogen, and total phosphorous).

In December 2005, the TSSWCB Wharton Regional Watershed Coordination Steering Committee selected the Plum Creek Watershed for WPP development from a list of prioritized watersheds within the Wharton Region service area. The result was the formation of the Plum Creek Watershed Partnership (or Partnership). Facilitated by the Texas AgriLife Extension Service (formally known as the Texas Cooperative Extension), the Partnership developed the Plum Creek Watershed Protection Plan (PCWPP).

As one of the PCWPP stakeholders, the City of Lockhart has been working toward improving water quality in Plum Creek. Lockhart, the most populace city in Caldwell County, lies in the middle of the Plum Creek drainage basin. Any improvements made to reduce bacteria or nutrient load will improve the water quality for the rest of the Plum Creek.

For the Lockhart monitoring station (No. 12647), the PCWPP cites a mean annual bacteria load of 4.26 coliform forming units (cfu)/yr and a target annual bacteria load of 3.62E+04 cfu/yr. The mean annual loads for Nitrates, Total Phosphorus, and Ortho Phosphorus, respectively, are 47,295 kilograms (kg)/yr, 12,275, and 4,238 kg/yr, with targeted loads of 9,459 kg/yr, 11,661 kg/yr, and 2,162kg/yr. The PCWPP has identified strategies that will improve water quality in the impaired Plum Creek watershed by focusing on improving urban storm water quality. The plan recommends various measures, including storm water engineering analyses and city-wide assessments, storm sewer stenciling, public education and outreach, dog waste station maintenance, oil and fat recycling, household waste collection days, city street sweeping, and stream cleanup programs.

The PCWPP also explains the need to provide the proper foundation for achieving targeted load reductions. Page 68 of the PCWPP states the following:

A fundamental limiting factor for implementation of both non-structural and structural practices is funding. Accordingly, cities agreed to work in concert with the Partnership to identify potential funding sources to support both public education programs on storm water quality and management, and the installation of structural controls. However, it was determined that to effectively define and guide structural control implementation efforts, detailed engineering analyses are needed for each city to properly locate and design these storm water management practices. Thus, an initial goal of the implementation plan will be to seek funding to support the needed engineering analyses. Results of these analyses will be used by the cities to ensure selection and installation of the most effective structural control measures. To make significant water quality improvements, the City of Lockhart must first properly evaluate improvement and upgrade needs. Detailed maps, including inlet locations, flow paths, and drainage types, will characterize the storm water management system and allow greater confidence in prioritizing system improvements.

The city will also implement storm sewer stenciling, education and awareness; dog waste station maintenance in parks; recycling center expansion; household hazardous waste collection days; city street sweeping, and stream cleanup programs. *The Plum Creek Watershed Protection Plan* can be viewed at http://pcwp.tamu.edu.

Project Narrative

General Project Description (Include Project Location Map)

The WPP in the Plum Creek Watershed has identified control measures and compliance strategies that will improve the water quality in the impaired Plum Creek Watershed by focusing on improving urban storm water quality. The City of Lockhart's implementation project will include mapping and evaluating the existing storm water system and identifying and prioritizing upgrades to the city's storm water management system, including cleaning out and installing storm drain filters. The project will also include information initiatives, stenciling of storm sewer inlets, maintaining a newly implemented dog waste collection station program in the parks, and coordinating city "housekeeping activities (street

sweeping, creek cleanup days, household hazardous and electronic waste collection days, etc.). All of these activities were designed to improve water quality.

An illicit discharge survey will be conducted in the city using resources such as EPA guidance "Illicit Discharge and Detection; A Guidance Manual for Program Development and Technical Assistance," http://cfpub.epa.gov/npdes/, and methods such as those described in Center for Watershed Protection's "Methods for detecting Illicit Discharges in the Field," by Julie Tasillo and Ted Brown, www.cwp.org/RR_photos/PA_SW_Symposium_IDDE.pdf. Sampling will be conducted at locations identified during the survey to measure constituents of concern. Subsequent, regular sampling at the same locations will detect the reduction/elimination of illicit discharges.

In addition, although not a part of this project, the GBRA monitoring sites located at CR 202 (Station 12647), downstream of the project area, will be used for data analysis. This project's goal is to improve water quality in the Plum Creek Watershed by facilitating removal of *E. coli* contributors as well as potential NPS pollution.

The outreach and education portion of the plan identifies several measures in its "Outreach and Education Strategy" section. Expanding the recycling center to include oils, fats, and grease will support the city's outreach efforts while providing proper containment for potential environmental pollutants. The project will also include other information initiatives, including stenciling of storm sewer inlets, a dog waste informational program, creek cleanup days, household hazardous and electronic waste collection days, etc.

Finally, the project will employ identified housekeeping measures such as maintaining new dog waste collection stations in the parks, and coordinating city street sweeping.

Under this work plan, the City of Lockhart will provide oversight of the project in the Plum Creek Watershed. The project will start on the date of execution of the associated contract between the TCEQ and the City of Lockhart. The project is scheduled to be completed not later than three years after the date of the final funding agreement between the EPA and the TCEQ.

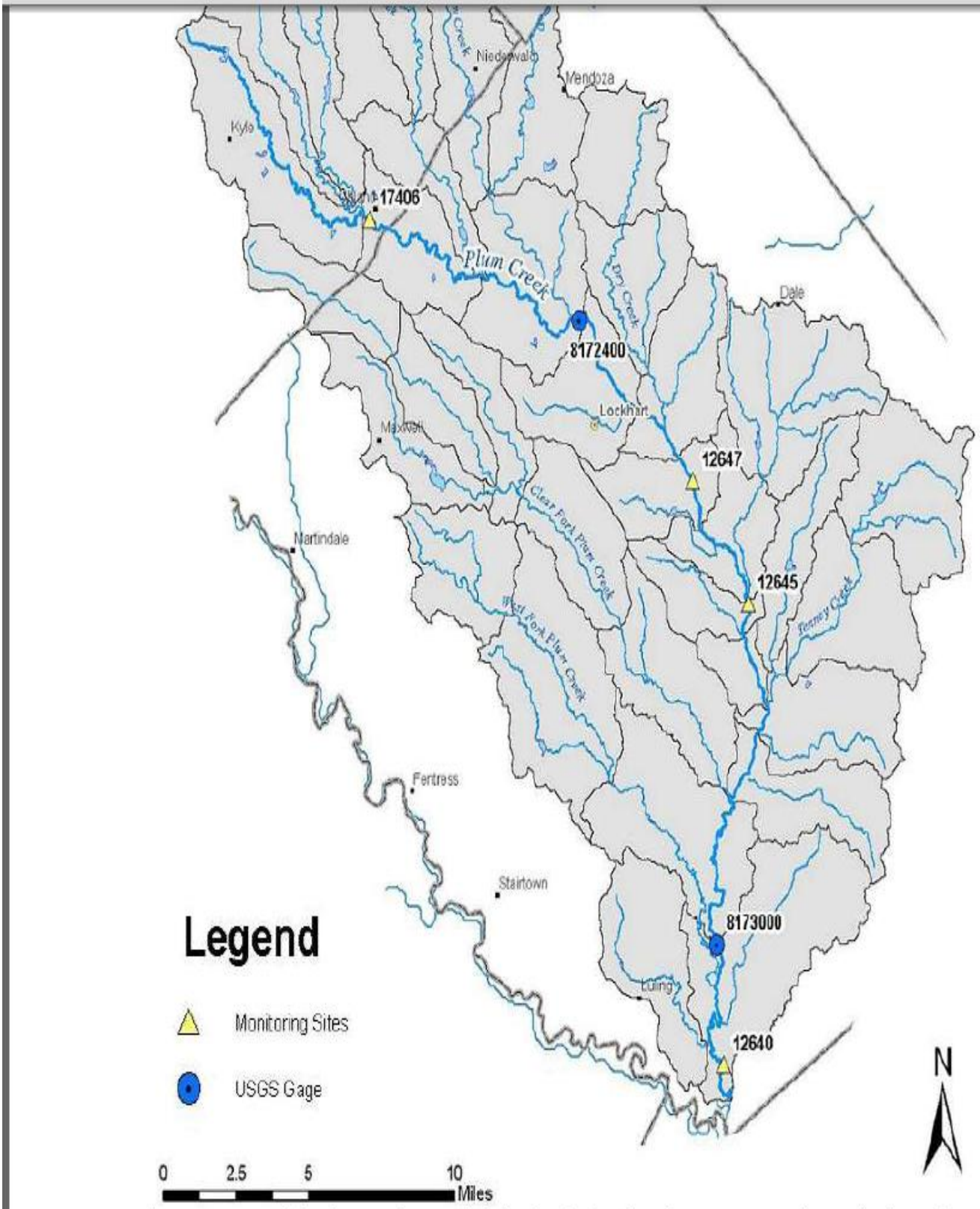


Figure 2.10. Map of the Plum Creek Watershed showing the location of current water quality monitoring stations and USGS flow gages.

<table>
<tr><th colspan="7">Tasks, Objectives and Schedules (Replicate or modify table as needed)</th></tr>
<tr><td>Task 1:</td><td colspan="6">Project Administration</td></tr>
<tr><td>Costs:</td><td>Federal:</td><td>$9,169.09</td><td>Non-Federal:</td><td>$6,112.72</td><td>Total:</td><td>$15,281.81</td></tr>
<tr><td>Objective:</td><td colspan="6">To effectively administer, coordinate and monitor all work performed under this project including technical and financial supervision and preparation of status reports.</td></tr>
<tr><td rowspan="2">Subtask 1.1:</td><td colspan="6">The City of Lockhart will provide technical and fiscal oversight of the staff and/or subgrantee(s)/ subcontractor(s) to ensure Tasks and Deliverables are acceptable and completed as scheduled and within budget. With the TCEQ Project Lead authorization, the City of Lockhart may secure the services of subgrantee(s)/subcontractor(s) as necessary for technical support, repairs and training. Project oversight status will be provided to the TCEQ with the Quarterly Progress Reports (QPRs).</td></tr>
<tr><td>Start Date:</td><td colspan="2">January 1, 2010</td><td>Completion Date:</td><td colspan="2">August 31,2013</td></tr>
<tr><td rowspan="2">Subtask 1.2:</td><td colspan="6">Progress will be reported to the TCEQ by the 15th of the month following each state fiscal quarter for incorporation into the Grant Reporting and Tracking System (GRTS). The Reports are to include the following:
• Status of deliverables for each Task
• Narrative description in Progress Report format</td></tr>
<tr><td>Start Date:</td><td colspan="2">March 15, 2010</td><td>Completion Date:</td><td colspan="2">August 31,2013</td></tr>
<tr><td rowspan="2">Subtask 1.3:</td><td colspan="6">Reimbursement forms will be submitted to the TCEQ by the last day of the month following each state fiscal quarter. For the last reporting period of the project, Reimbursement Forms are required on a monthly basis, specifically for the months of June, July, and August.</td></tr>
<tr><td>Start Date:</td><td colspan="2">March 31, 2010</td><td>Completion Date</td><td colspan="2">August 31,2013</td></tr>
<tr><td rowspan="2">Subtask 1.4:</td><td colspan="6">Participation in an annual Contractor Evaluation at the end of each state fiscal year.</td></tr>
<tr><td>Start Date:</td><td colspan="2">September 15, 2010</td><td>Completion Date</td><td colspan="2">August 31,2013</td></tr>
<tr><td rowspan="2">Subtask 1.5:</td><td colspan="6">The City of Lockhart will develop a one-page fact sheet of the project using the TCEQ NPS Projects Template. The fact sheet will briefly describe what the project is going to accomplish, and it will provide background information on why the project is being conducted, the current status of the project, and who is involved in the project. The project fact sheet will be submitted to the TCEQ within 60 days after contract initiation. The fact sheet will be updated annually and submitted with the fourth QPR. The fact sheet will be updated more often as the project status changes. The fact sheet will be published on the City of Lockhart's website after approval from the TCEQ Project Manager.</td></tr>
<tr><td>Start Date:</td><td colspan="2">January 1, 2010</td><td>Completion Date:</td><td colspan="2">March 2, 2013</td></tr>
<tr><td rowspan="2">Subtask 1.6</td><td colspan="6">The City of Lockhart will provide an article for the Nonpoint Source Annual Report upon request by the TCEQ. This report is produced annually in accordance with Section 319(h) of the Clean Water Act (CWA), and it is used to report implementing strategies as defined in the Texas Nonpoint Source Management Program. The article will include a brief summary of the project and describe the activities of the past fiscal year.</td></tr>
<tr><td>Start Date:</td><td colspan="2">July 15, 2010</td><td>Completion Date:</td><td colspan="2">August 31, 2013</td></tr>
<tr><td>Deliverables</td><td colspan="6">• QPRs
• Reimbursement Forms
• Annual Contractor Evaluation
• Annual Report Article</td></tr>
</table>

***If project includes an environmental data collection component use Task 2 text, if not delete Task 2 text.**

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 2:	Quality Assurance					
Costs:	Federal:	$5,520.00	Non-Federal:	$3,680.00	Total:	$9,200.00
Objective:	To develop data quality objectives (DQOs) and quality assurance/control (QA/QC) activities to ensure data of known and acceptable quality are generated through this project.					
Subtask 2.1:	The City of Lockhart will schedule Quality Assurance Project Plan (QAPP) planning meetings with the TCEQ Project Manager, Quality Assurance staff, technical staff, management, and contractors, to implement a systematic planning process, based on the elements of the TCEQ NPS QAPP Shell. The information developed during the planning meetings will be incorporated into a QAPP. Additional planning meetings may also be conducted to determine if any changes need to be made to an existing QAPP.					
	Start Date:	January 1, 2010	Completion Date:	Month 2		
Subtask 2.2:	The City of Lockhart will develop and submit to the TCEQ a QAPP with project specific DQOs consistent with the EPA Requirements for Quality Assurance Project Plans (QA/R5) format and the TCEQ NPS QAPP Shell 120 days prior to the initiation of any data collection. All of the monitoring procedures and methods prescribed in the QAPP will be consistent with the guidelines detailed in the TCEQ Surface Water Quality Monitoring Procedures, Volumes 1 and 2. The QAPP will be developed by the City of Lockhart with technical assistance from the TCEQ Project Manager, Quality Assurance staff, technical staff, management, and contractors.					
	Start Date:	January 1, 2010	Completion Date:	October 1, 2010		
Subtask 2.3:	The City of Lockhart will develop a monitoring program and conduct monitoring, as outlined in the QAPP, to achieve DQOs					
	Start Date:	January 1, 2010	Completion Date:	October 1, 2012		
Subtask 2.4:	Annually throughout the project period, the City of Lockhart will provide input to TCEQ 60 days prior to the end of the effective period of the QAPP, and will develop annual QAPP revisions no less than 45 days prior to the end of the effective period of the QAPP.					
	Start Date:	August 1, 2011	Completion Date:	May 30,2012		
Subtask 2.5:	Amendments to the QAPP and the reasons for the changes will be documented, and revised pages will be forwarded to all persons on the QAPP distribution list by the Contractor QAO. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process or within 120 days of the initial approval in cases of significant changes.					
	Start Date:	October 1, 2010	Completion Date:	May 30, 2012		
Subtask 2.6	The City of Lockhart will review, verify, and validate water quality monitoring data before it is submitted to the TCEQ. Data will be submitted to TCEQ quarterly and at least 1 month prior to use, or prior to presenting to stakeholders. A semi-annual report of water quality data consistent with TCEQ formatting requirements will be submitted for upload into the Surface Water Quality Monitoring Information System (SWQMIS).					
	Start Date	October 1, 2010	Completion Date	May 30, 2012		

Subtask 2.7	The City of Lockhart will submit a report analyzing water quality data collected under this project. The data will be analyzed to determine if reductions of *E. coli* and nutrient loadings are detected in order to measure effectiveness of BMPs implemented under this project.			
	Start Date	January 1, 2012	Completion Date	May 30, 2012
Deliverables	• QAPP Planning Meeting • Draft and Final QAPP • Draft and Final QAPP Annual Updates • Draft and Final QAPP Amendments • Data Submittals • Water quality non-conformances will be reported to TCEQ Project Manager and included in quarterly progress reports • Draft and Final Water Quality Monitoring Report			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 3:	Creation of Storm Water Mapping, Illicit Discharge Survey, and Management and Control Plan					
Costs:	Federal:	$98,280.00	Non-Federal:	$65,520.00	Total:	$163,800.00
Objective:	To actively map and manage the City of Lockhart and surrounding area storm water system, including location of inlets, flow paths, and differentiating between open ditches and enclosed drainage allowing better decision making in planning efforts and response to NPS pollution issues or emergencies.					
Subtask 3.1:	Use GPS and GIS equipment to locate storm water drain inlets and outfalls and create a map with GIS tools					
	Start Date:	January 1, 2010	Completion Date:	November 15, 2012		
Subtask 3.2:	An illicit discharge survey will be conducted in the city using EPA guidance "Illicit Discharge and Detection; A Guidance Manual for Program Development and Technical Assistance" **http://cfpub.epa.gov/npdes/** and methods such as those described in CWP "Methods for detecting Illicit Discharges in the Field," by Julie Tasillo and Ted Brown, **www.cwp.org/RR_photos/PA_SW_Symposium_IDDE.pdf**. **S**ampling will be conducted to test for constituents of concern.					
	Start Date:	January 1, 2010	Completion Date:	May 30, 2012		
Subtask 3.3:	Utilize map information to develop a storm water/drainage management plan. The plan will enable the city to make improvements that will reduce pollution entering the streams.					
	Start Date:	November 15, 2010	Completion Date:	December 1, 2012		
Subtask 3.4:	Identify and prioritize storm system improvements that are needed to improve the system for reducing NPS pollution and water quality treatment. Determine cost estimates for improvements and upgrades.					
	Start Date:	January 1, 2010	Completion Date:	December 1, 2012		
Subtask 3.5:	Cleanout and install new storm drain filters in approximately 80 storm drain inlets in the city.					

	Start Date:	January 1, 2010	Completion Date:	November 15, 2011
Deliverables	• Electronic and paper copy of the storm water sewer system plan and maps • Copy of the storm water/drainage management plan • Table of potential storm system improvements, upgrade projects, and cost estimates • Report regarding storm drain inlet cleaning and installation of inlet filters on approximately 80 inlets • Report on illicit discharge survey conducted by the City			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 4:	NPS Educational Programs and Storm Sewer Marking					
Costs:	Federal:	$35,775.67	Non-Federal:	$23,850.44	Total:	$59,626.11
Objective:	To raise awareness of the storm sewer system, the implications of improper disposal of waste in this system, and to decrease yard waste deposited into the streets and ultimately into the Plum Creek through the storm sewer system					
Subtask 4.1:	A storm sewer education program will be developed and disseminated through various outlets – including the City of Lockhart webpage, City of Lockhart newsletter, signage and utility bill inserts – with the intent of educating homeowners and the public on how improper disposal of materials (HHW, E-waste, and kitchen fats/oils), washing vehicles, and even blowing of grass clippings into the street can negatively affect water quality. Supportive ordinances may be developed.					
	Start Date:	January 1, 2010	Completion Date:	May 15, 2012		
Subtask 4.2:	A storm sewer marking program will be adopted and implemented that will mark existing storm sewer inlets with advisory tiles in order to remind the public that the inlets lead directly to the creeks and rivers.					
	Start Date:	January 1, 2011	Completion Date:	April 31, 2011		

Tasks, Objec	• Report on development of the storm sewer education program • Reports on the production and dissemination of at least 4 informational pieces a year for three years • Draft and Final copies of informational pieces • Stenciling or tiling of existing storm sewer inlet
Task 5:	
Costs:	
Objective:	
Subtask 5.1:	
Subtask 5.2:	
Deliverables	
Deliverables	

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 6:	Dog Waste Collection Stations and Education					
Costs:	Federal:	$1,277.89	Non-Federal:	$851.93	Total:	$2,129.82
Objective:	To decrease potential contributors of *E. coli* and nutrient loads in and around the Plum Creek as it passes through the park system in the City of Lockhart.					
Subtask 6.1:	Develop a dog waste informational program including new ordinances, signage, water bill inserts, and mailers targeting pet owners in order to decrease the amount of pet waste contributing to the Plum Creek Watershed.					
	Start Date:	January 1, 2010	Completion Date:	June 1, 2013		
Subtask 6.2:	Maintain newly purchased and installed dog waste stations within City Parks that are immediately adjacent to the Plum Creek and Town Branch, a direct drainage area.					
	Start Date:	January 1, 2010	Completion Date:	June 1, 2012		

Deliverables	• Report that includes a summary of the dog waste informational program, including new ordinances, signage, water bill inserts, and mailings • Draft and Final copies of ordinances, signage, inserts, and mailings • Report of usage data (average number of bags used per quarter) including calculations of load reductions

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 7:	City Housekeeping Activities					
Costs:	Federal:	$74,070	Non-Federal:	$49,380.52	Total:	$123,451.30
Objective:	To prevent NPS runoff from city streets and to remove debris from the Plum Creek Drainage Area					
Subtask 7.1:	Coordinate regularly scheduled street cleaning and sweeping program that would result in each street in the city limits being cleaned monthly, with targeted streets to be cleaned as often as 3 times a week. Cleaning includes debris removal and automobile deposit removal.					
	Start Date:	January 1, 2012	Completion Date:	August 31, 2013		
	City personnel and volunteers will conduct a yearly trash creek cleanup day and environmental fair on the Plum Creek Town Branch pocket parks in the city. The event fosters community awareness about water quality in Plum Creek.					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 8:	Final Report					
Costs:	Federal:	$482.59	Non-Federal:	$321.74	Total:	$804.31
Objective:	To provide the TCEQ with a comprehensive report on the activities and success of the pilot project conducted by the City of Lockhart during the course of this project. The City of Lockhart will also conduct an assessment of the data for this report.					
Subtask 8.1:	Draft of Final Report summarizing all project activities, findings, and the contents of all previous deliverables, referencing and/or attaching them as web links or appendices. This comprehensive, technical report will provide analysis of all activities and deliverables under this scope of work. The report will include the following information: Title Table of Contents Executive Summary Introduction Project Significance and Background Methods Results and Observations Discussion Summary References Appendices					

Subtask 7.2:	Start Date:	September 1, 2010	Completion Date:	June 1, 2013
Deliverables	• Itemized work schedules of street sweeper • Volunteer list with the amount of volunteer time and amount of trash and recyclables collected annually • Yearly report on creek cleanup and environmental fair			

Project Goals (Expand from NPS Summary Page)
To reduce NPS pollution entering Plum Creek by implementing the following measures described in the PCWPP: 1) conducting storm water engineering analysis and city-wide assessments to determine placement and selection of structural management measures as described on p. 69 of the PCWPP; 2) Conducting an illicit discharge survey to locate and eliminate illicit discharge sources (p. 149); 3) Conducting a storm sewer marking and educational program (p. 149); 4) implementing hazardous waste cleanups as well as fats, oils and grease collection in support of and as part of education and outreach efforts (pgs. 99 - 100); 5) maintaining dog waste stations (Table 10.3); 6) street sweeping (table 10.3) as match, and installing "street sweeper friendly" storm drain filters such as those found at **www.theinletprotection.com** which will reduce street sweeper damage and allow more efficient removal of debris.

Measures of Success (Expand from NPS Summary Page)
1) Engineering analysis and city-wide assessment that allows the city to prioritize and select the most effective BMPs and use of the engineering analyses to select and install the most effective structural control measures; 2) Completion of a thorough illicit discharge survey with illicit discharges identified, tested, and subsequently eliminated; 3) Storm sewers marked and outreach materials, programs implemented 4) Hazardous waste cleanup participation and use of newly installed oil and fat collection stations; 6) Proper maintenance and usage of dog waste stations; 5) Overall loading reductions of NPS pollutants, particularly bacteria and nutrients, observed at the Lockhart monitoring station (12647) upon implementation of control measures developed or implemented through this project and the PCWPP. Annual loadings and target loadings for bacteria and nutrients are listed in the PCWPP. Monitoring station 12640 data will be used to assess load reductions of these constituents throughout the project.

2005 Texas Nonpoint Source Management Program Reference (Expand from NPS Summary Page)
Goals and/or Milestone(s)

Element One – Explicit short- and long-term goals, objectives and strategies that protect surface … water.

LTG Objectives

- 1 – Focus NPS …available resources in watersheds identified as impacted by NPS pollution in the latest state approved *Texas Water Quality Inventory and 303(d) List.*
- 2 – Support the implementation of state, regional and local programs to prevent NPS pollution through assessment… and education.
- 5 – Develop partnerships, relationships… to facilitate collective, cooperative approaches to manage NPS pollution.
- 6 – Increase overall public awareness of NPS issues and prevention activities.
- 7 – Enhance public participation and outreach by providing forums for citizens and industry to contribute their ideas and concerns about the water quality management process.

Short-term Goals

Goal One – Data Collection and Assessment: Coordinate with appropriate federal, state, regional and local entities, private sector groups, and citizen groups and target CWA §319(h) grant funds toward water quality assessment activities in high priority, NPS-impacted watersheds…

- Objective B – Ensure that monitoring procedures meet quality assurance requirements and are in compliance with EPA-approved TCEQ and/or TSSWCB Quality Management Plans.
- Objective C – Conduct special studies to determine sources of NPS pollution and gain information to target TMDS activities and BMP implementation.
- Objective E – Conduct monitoring to determine effectiveness of TMDS Implementation Plans, Watershed Protection Plans, and BMP implementation as appropriate.

Goal Two – Implementation: Coordinate and administer the NPS program to support the implementation of TMDL Implementation Plans and/or Watershed Protection Plans and other state, regional, and local plans/programs to reduce NPS pollution. Manage all CWA 319 grant funds efficiently and reduce effectively to target implementation…

- Objective A – Work with local entities to determine priority areas and develop and implement strategies to address NPS pollution.
- Objective B – Develop and implement BMPs to address constituents of concern or water bodies identified as impacted by NPS pollution.
- Objective C – Develop and implement BMPs to address NPS constituents of concern or water bodies not meeting water quality standards in aquifers identified with impacts or as vulnerable in the latest state approved Texas Water Quality Inventory and 303(d) List or in Chapter 5 of this document.
- Objective D – Implement state-approved TMDL Implementation Plans and Watershed Protection Plans developed to restore and maintain water quality in water bodies identified as impacted by nonpoint source pollution.

Goal Three – Education: Conduct education… activities to help increase awareness of NPS pollution and prevent activities contributing to the degradation of water bodies… by NPS pollution.

- Objective A – Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of NPS education.
- Objective B – Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
- Objective D – Conduct outreach through CRP, Extension, SWCDs and others to facilitate broader participation and partnerships [that] enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.

Element Two – Working partnerships and linkages to appropriate state, interstate, tribal, regional and local entities, private sector groups, and Federal agencies.
Element Three – Balanced approach that emphasizes both state-wide nonpoint source programs and on-the-ground management of individual watersheds.
Element Five – The state program identifies waters and their watersheds impaired by nonpoint source pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the state establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed implementation plans, and then by implementing the plans.
Milestone A: Employ or develop a local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process Milestone C: Complete water quality monitoring. Analyze data, assess loadings and determine the origin and distribution of pollutants.

Estimated Load Reductions Expected (Only applicable to implementation projects)

Overall loads and target loads for impairments and constituents of concern (pp 36-44 and table 10.3 of PCWPP)

Bacteria p. 38
Mean Annual Load: 4.26E +05 (cfu/yr)
Target Load: 3.62E+04 (cfu/yr)

Nitrates p.43
Mean Annual Load: 47, 295 (kg/yr)
Target Load: 9, 459 (kg/yr)

Total Phosphorus p.43
Mean Annual Load: 12,275(kg/yr)
Target Load: 11,661 (kg/yr)

Ortho Phosphorus p.43
Mean Annual Load: 4,238 (kg/yr)
Target Annual Load: 2,162 (kg/yr)

Expected load reduction upon full implementation of the Plum Creek WPP

- Pet Waste Collection Stations

E. coli: 7.3E+12 (cfu/yr)
Nitrogen: 158.5 (kg/yr)
Phosphours: 17.9 (kg/yr)

- Urban Storm Water Management Measures (including Comprehensive Urban Stormwater Assessment, Retrofit

of Storm water Basins, Street Sweeping and other management measures)
E.coli: 1.9E+13
Nitrogen: 929..6 (kg/yr)
Phosphorus: 32.5 (kg/yr)

Street Sweeping

- The EPA National Management Measures to Control NPS from Urban Areas, Publication Number EPA 841-B-05-004, November 2005, lists street sweeping as a BMP for phosphorus and nitrogen. Section 7.3.5.1 states the following:

Curb systems act as traps for particulates and other pollutants. The advantage of well maintained, traditional curbs is that they trap pollutants on the paved surface, and when combined with regular vacuum street sweeping, they can be effective at removing pollutants prior to mobilization in runoff. However, if they are not properly maintained, pollutants build up and are washed out by storm water.

Street sweeping is a common practice in many communities. Street sweeping programs can be optimized to significantly reduce trash and other pollutants on urban streets. Study results suggest that reductions of up to 80 percent in annual TSS and associated pollutants could be achieved by using bimonthly to weekly sweepings.

- Table 7 of the EPA National Management Measures to Control NPS from Urban Areas, Publication Number EPA 841-B-05-004, November 2005, shows the estimated mass of various constituents in street dirt:

Street dirt chemical quality (Bannerman et al., 1983; Pitt, 1979; Pitt, 1985; Pitt, 2001) -- [Constituent , Mass of Constituent in Street Dirt (mg constituent / kg total solids)]
Phosphorus 400–1,500; Total Kjeldahl Nitrogen 290–4,300 Chemical Oxygen Demand 65,000–340,000
Copper 110–420 Lead 530–7,500 Zinc 260–1,200 Cadmium <3–5 Chromium 31–180

Appendix C. Data Review Checklist and Summary

NPS DATA REVIEW CHECKLIST AND SUMMARY

A completed checklist must accompany all data sets submitted to the TCEQ by the City of Lockhart.

QAPP Title: _____

Effective Date of QAPP: _____

Data Format and Structure		**Y, N, or N/A**
A.	Are there any duplicate *Tag Id* numbers in the Events file?	
B.	Do the *Tag* prefixes correctly represent the entity providing the data?	
C.	Have any *Tag Id* numbers been used in previous data submissions?	
D.	Are TCEQ station location (SLOC) numbers assigned?	
E.	Are sampling *Dates* in the correct format, MM/DD/YYYY with leading zeros?	
F.	Are the sampling *Times* based on the 24 hour clock (e.g. 13:04) with leading zeros?	
G.	Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?	
H.	*Submitting Entity, Collecting Entity, and Monitoring Type* codes used correctly?	
I.	Are the sampling dates in the *Results* file the same as the one in the *Events* file for each Tag Id?	
J.	Are values represented by a valid parameter code with the correct units?	
K.	Are there any duplicate parameter codes for the same *Tag Id*?	
L.	Are there any invalid symbols in the *Greater Than/Less Than* (*GT/LT*) field?	
M.	Are there any *Tag Ids* in the *Results* file that are not in the *Events* file or vice versa?	
Data Quality Review		**Y, N, or N/A**
A.	Are all the "less-than" values reported at the LOQ? **If no, explain on next page**.	
B.	Have the outliers been verified and a "1" placed in the *Verify_flg* field?	
C.	Have checks on correctness of analysis or data reasonableness been performed? e.g.: Is ortho-phosphorus less than total phosphorus? Are dissolved metal concentrations less than or equal to total metals?	
D.	Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?	
E.	Are all parameter codes in the data set listed in the QAPP?	
F.	Are all stations in the data set listed in the QAPP?	
Documentation Review		**Y, N, or N/A**
A.	Are blank results acceptable as specified in the QAPP?	
B.	Were control charts used to determine the acceptability of field duplicates?	
C.	Was documentation of any unusual occurrences that may affect water quality included in the *Event* table's *Comments* field?	
D.	Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? **If yes, explain on next page**.	
E.	Were there any failures in field and/or laboratory measurement systems that were not resolvable and resulted in unreportable data? **If yes, explain on next page.**	
F.	Was the laboratory's NELAC Accreditation current for analysis conducted?	

Data Set Information

Data Source:

Date Submitted:

Tag_ID Range:

Date Range:

Comments:

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

- Inconsistencies with AWRL specifications or LOQs
- Failures in sampling methods and/or laboratory procedures that resulted in data that could not be reported to the TCEQ
- Include completed Corrective Action Reports with the applicable Progress Report

_____
_____
_____
_____
_____
_____
_____
_____

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

□ This data set has been reviewed using the Data Review Checklist.

City of Lockhart Data Manager:_____

Date:_____

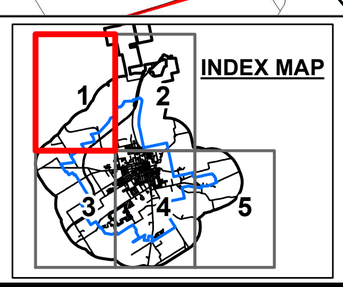
Appendix D. Detailed Site Location Map

LEGEND

- Inlet (IN)
- Bridge (BRDG)
- Culvert (CUL)
- Ditch End Point (DTC)
- Inflow (IFL)
- Manhole
- Other Structures (OS)
- Outfall (OF)
- Outflow (OFL)
- Channel
- Culverts
- Stormwater Line
- Stream
- Water Body
- Detention Pond
- Parcels
- Lockhart ETJ
- Lockhart City Limits

NOTES:

1. Data associated with point features is included in the tables.



CITY OF Lockhart

STORM DRAINAGE MAP

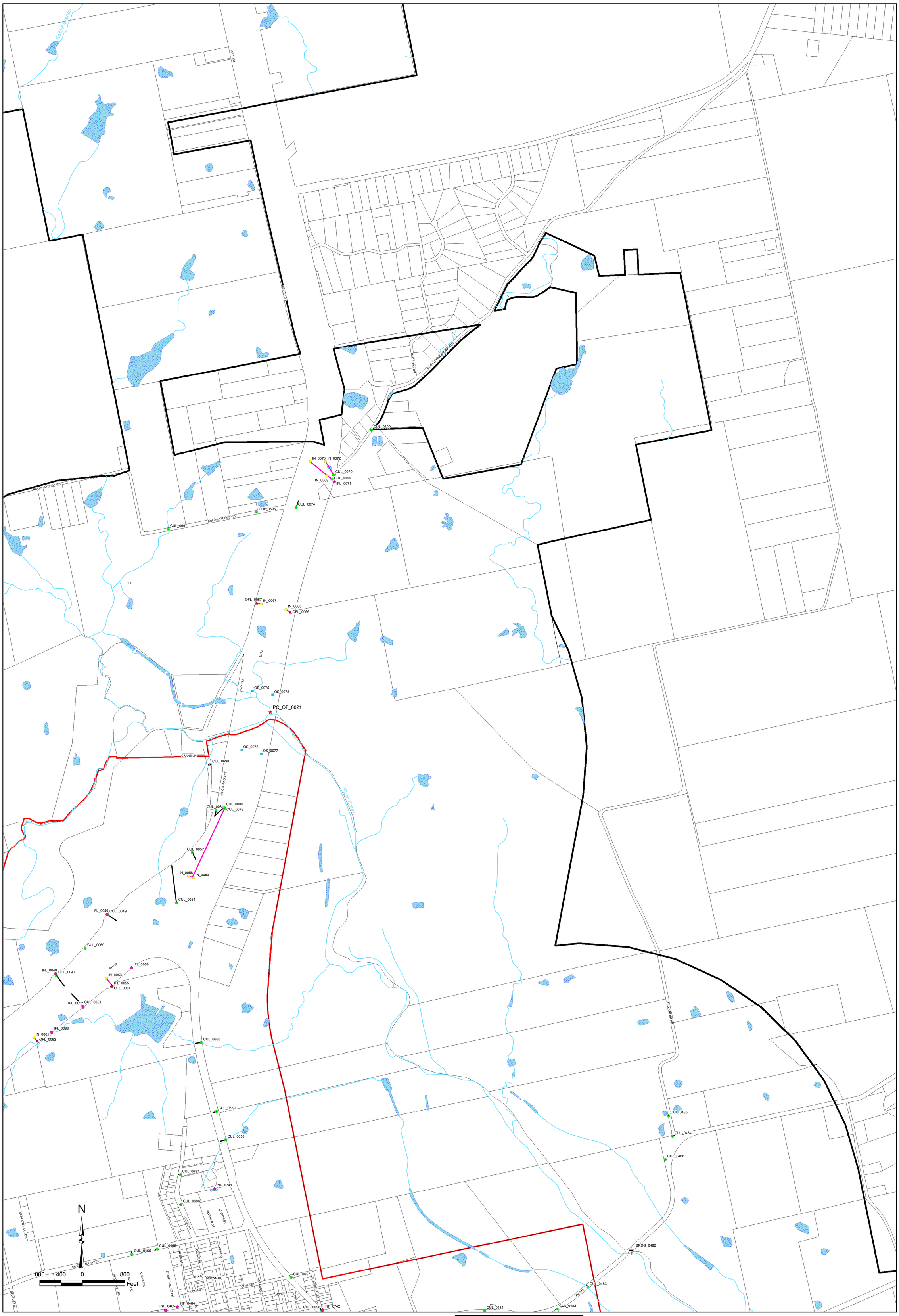
STORMWATER MANAGEMENT PLAN
LOCKHART, TEXAS

PROJECT NO.: 186870

DATE: 02/17/2012

TRC
505 EAST HUNTLAND DRIVE
SUITE 250
AUSTIN, TEXAS 78752
512-329-6080
T.B.P.E. FIRM REGISTRATION # F-8632

SHEET 1



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CITY OF Lockhart

STORM DRAINAGE MAP

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LOCKHART, TEXAS

PROJECT NO.: 186870 | DATE: 02/17/2012

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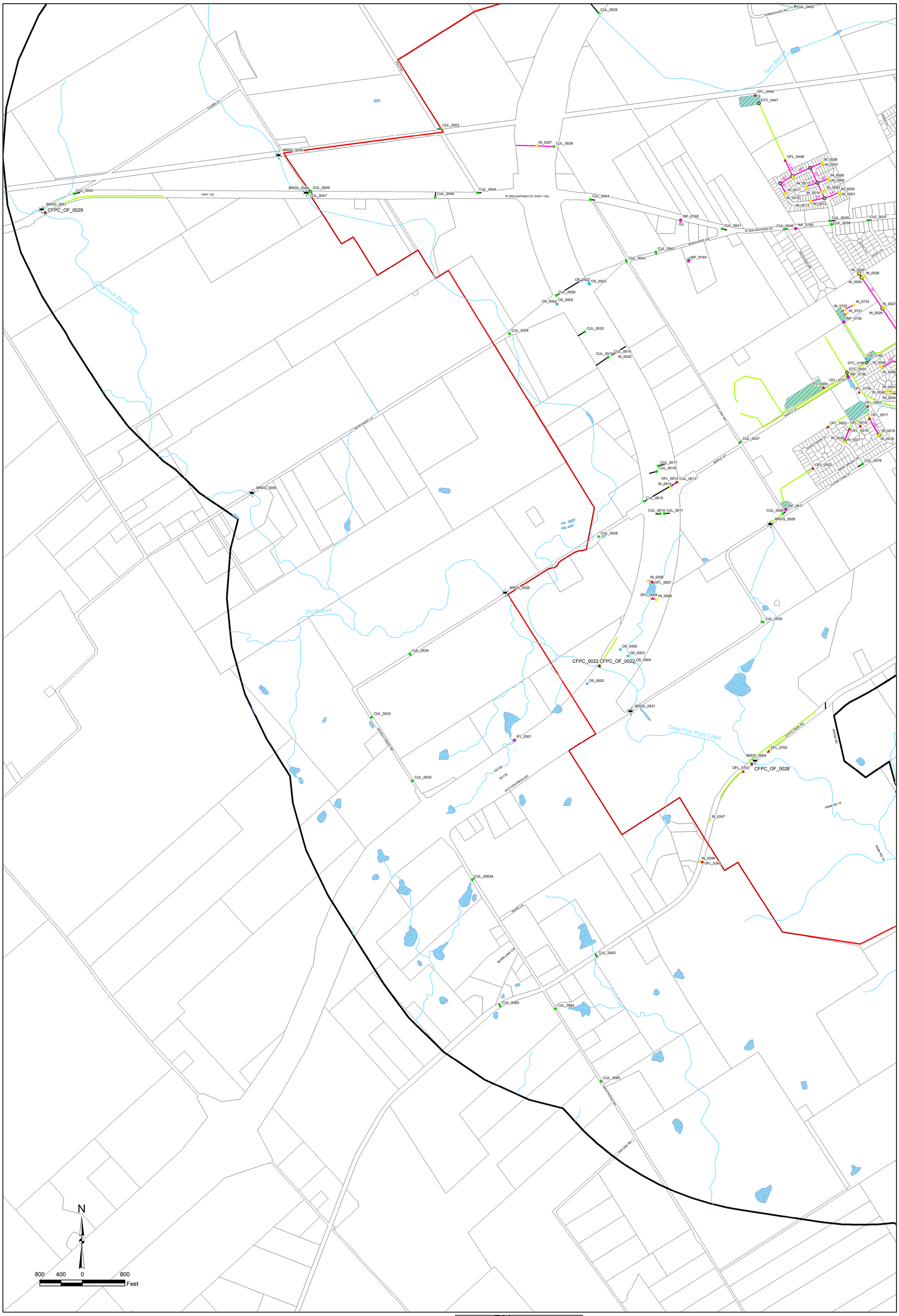
SHEET 2



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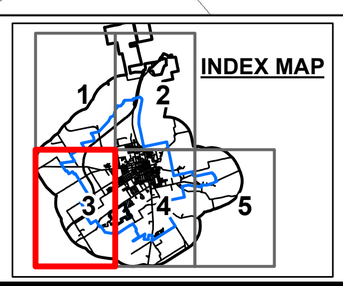

CITY OF Lockhart

STORM DRAINAGE MAP

STORMWATER MANAGEMENT PLAN
LOCKHART, TEXAS

PROJECT NO.: 186870 | DATE: 02/17/2012

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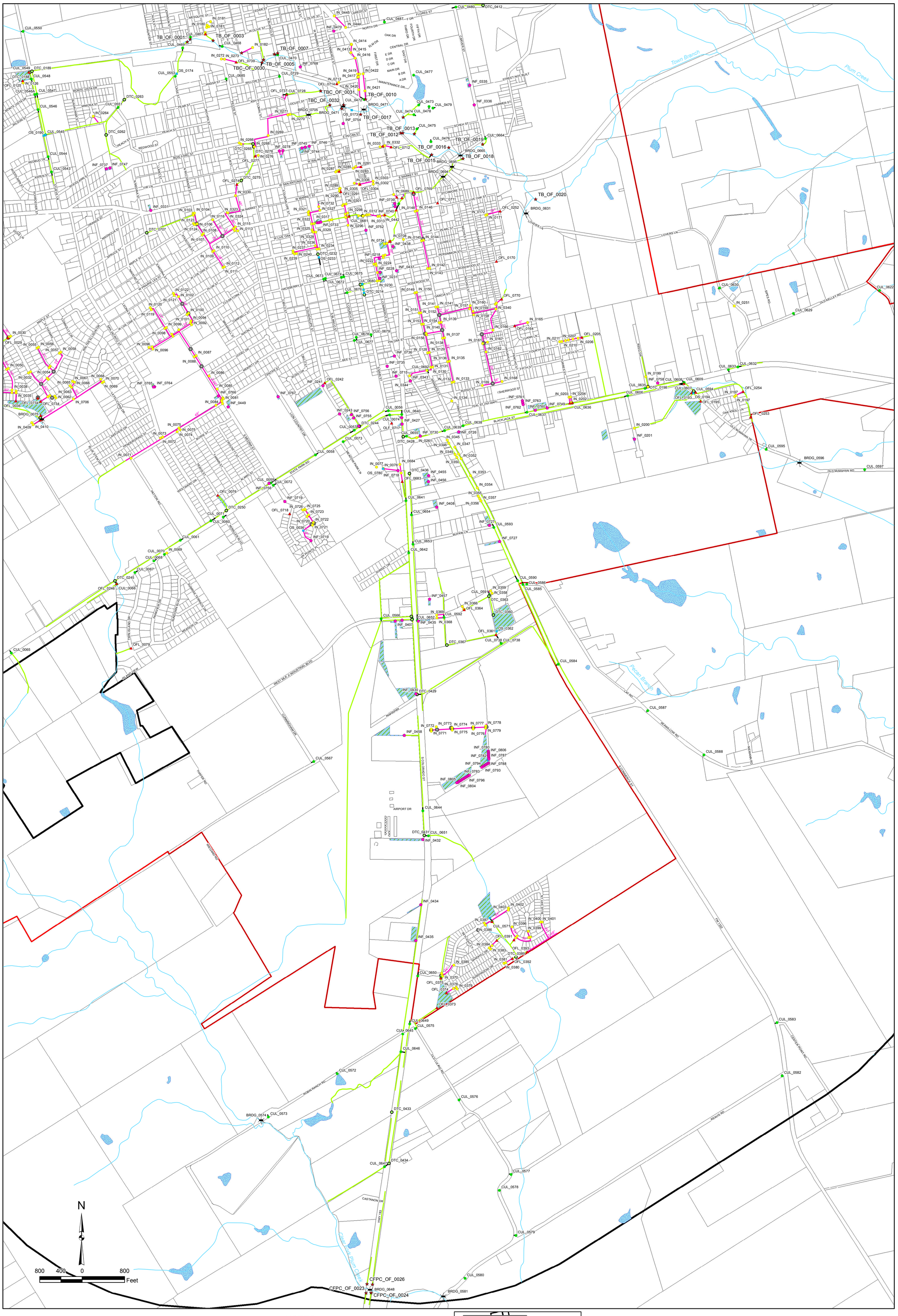
SHEET 3



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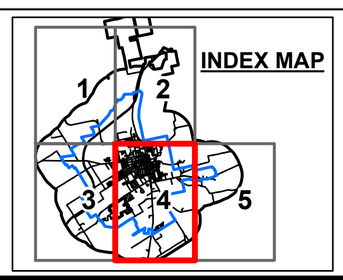

CITY OF Lockhart

STORM DRAINAGE MAP

STORMWATER MANAGEMENT PLAN
LOCKHART, TEXAS

PROJECT NO.: 186870 | DATE: 02/17/2012

TRC
505 EAST HUNTLAND DRIVE
SUITE 250
AUSTIN, TEXAS 78752
512-329-6080
T.B.P.E. FIRM REGISTRATION # F-8632

SHEET 4

CUL_0628
OLD KELLEY RD
CUL_0627
CUL_0626
CUL_0625
BRDG_0624
CUL_0623
Plum Creek
CUL_0617
CUL_0616
CUL_0615
FM 20
CUL_0621
SMITH LN
OFL_0700
OFL_0701
BRDG_0614
PC_OF_0027
BLACKJACK ST
CUL_0612
CUL_0609
CUL_0610
CUL_0619
CUL_0611
CUL_0618
CUL_0613
COWAN LN
CREEKVIEW LN
CUL_0620
CUL_0598
CUL_0599
CUL_0602
CUL_0603
BRDG_0604
CUL_0601
CUL_0600
OLD MCMAHAN RD
CR 234
Pecan Branch
Pecan Branch
SEAWILLOW RD
BRDG_0589

N

800 400 0 800
Feet

LEGEND

- Inlet (IN)
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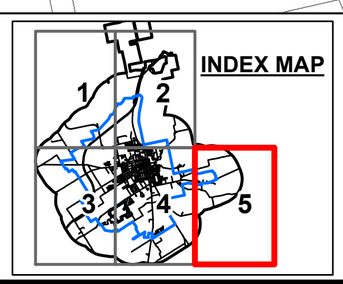


CITY OF Lockhart

STORM DRAINAGE MAP

STORMWATER MANAGEMENT PLAN
LOCKHART, TEXAS

PROJECT NO.: 186870 | DATE: 02/17/2012

TRC
505 EAST HUNTLAND DRIVE
SUITE 250
AUSTIN, TEXAS 78752
512-329-6080
T.B.P.E. FIRM REGISTRATION # F-8632

SHEET 5

Appendix E. Field Data Reporting Form

Field Data Reporting Form

Location Description

_____

Latitude _____
Longitude _____

Date _____ **Time** _____

Number of samples bottles filled _____

Chlorine Residual _____

Observational Data

Describe field conditions at the time of sample collection (weather, flow estimate and severity, missing samples or parameters, unusual odors, days since last significant rainfall, water appearance, etc.)

_____
_____
_____
_____
_____
_____
_____
_____

_____ _____
Signature of Field Staff **Date**

Appendix F. Chain-of-Custody Form

GBRA REGIONAL LABORATORY

GBRA Doc. # 3019-C

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

Chain of Custody

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

ACCREDITED IN ACCORDANCE WITH nelac

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: _____

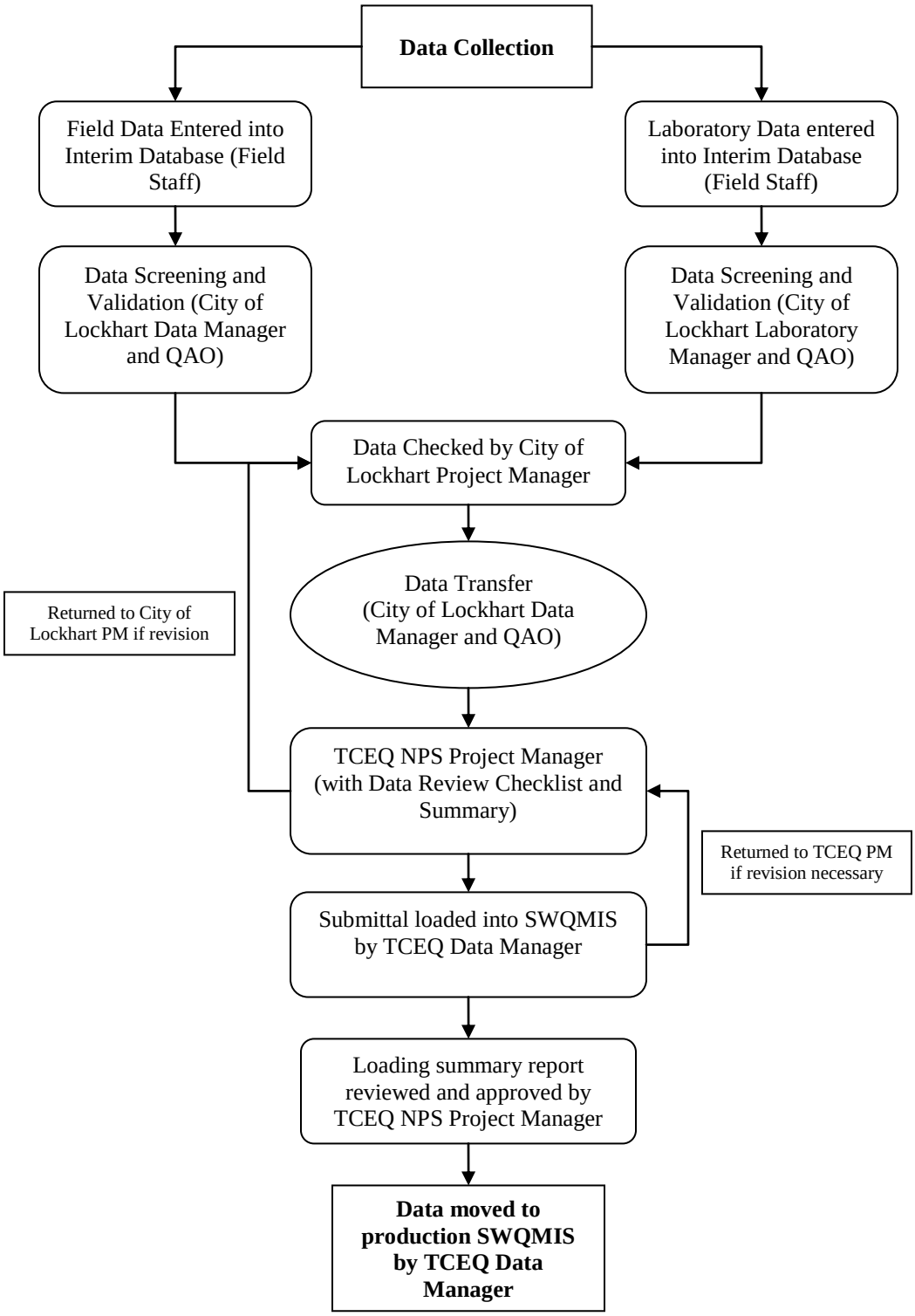
NPS R

**Special Notes/Ship to: _____
_____

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

Appendix G. Data Management Flow Chart

Draft NPS Data Management Process Flow Chart



Appendix H: Corrective Action Status Table

Appendix H - Corrective Action Status Table

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

Appendix I: Corrective Action Plan Form

Appendix I - Corrective Action Plan Form

Corrective Action Plan
Issued by:_____ Date Issued_____ Report No._____
Description of deficiency
Root Cause of deficiency
Programmatic Impact of deficiency
Does the seriousness of the deficiency require immediate reporting to the TCEQ? If so, when was it?
Corrective Action to address the deficiency and prevent its recurrence
Proposed Completion Date for Each Action
Individual(s) Responsible for Each Action
Method of Verification
Date Corrective Action Plan Closed?

ATTACHMENT 1
Example Letter to Document Adherence to the QAPP

TO: (name)
(organization)

FROM: (name)
(organization)

RE: Plum Creek Watershed Protection Plan – City of Lockhart Illicit Discharge Detection Monitoring, Data Collection and Validation Quality Assurance Project Plan, Revision 0.

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

(address)

I acknowledge receipt of the *Plum Creek Watershed Protection Plan – City of Lockhart Illicit Discharge Detection Monitoring, Data Collection and Validation Quality Assurance Project Plan, Revision 0.* I understand that the document describes quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria.

My signature on this document signifies that I have read and approved the document contents. Furthermore, I will ensure that all staff members participating in activities covered under this QAPP will be required to familiarize themselves with the document contents and adhere to the contents as well.

_____

Signature Date

Copies of the signed forms should be sent by the City of Lockhart to the TCEQ NPS Project Manager within 60 days of TCEQ approval of the QAPP.