



**Texas State Soil and Water Conservation Board
Section 319(h) Nonpoint Source Program
FY 2007 Project 07-12**



NONPOINT SOURCE SUMMARY PAGE for the CWA, Section 319(h) Agricultural/Silvicultural Nonpoint Source Program						
Title of Project:	Assessing Water Quality Management Plan Implementation in the Middle and South Bosque River and Hog Creek Watersheds					
Project Goals/Objectives:	This project will provide storm and routine monitoring of the Middle and South Bosque River and Hog Creek watersheds in order to assess agricultural nonpoint source reductions associated with implementation of water quality management plans (WQMPs) within waterbodies of concern for nitrite-nitrate nitrogen. A secondary objective is to monitor reductions in bacteria concentrations through routine grab sampling. A final report will be developed using historical data collected by TIAER (1995 – 2003) and post implementation data collected under this work plan to assess preexisting and post-WQMP implementation effects.					
Project Tasks:	(1) Perform project administration, (2) Develop and maintain a quality assurance project plan (QAPP), and (3) Conduct stream monitoring and analysis including data management, and (4) Develop final report assessing pre- and post-WQMP implementation effects on water quality.					
Measures of Success:	Demonstrate significant improvement in water quality associated with implementation of WQMPs focused on agricultural row crop operations that apply commercial fertilizers through the evaluation of monitoring data from the South and Middle Bosque River and Hog Creek watersheds comparing pre- and post-WQMP implementation time periods.					
Project Type:	Implementation (); Education (); Watershed Planning (); Assessment (X); Groundwater ()					
Status of Water Body: 2004 Water Quality Inventory and 303(d) List	Segment ID: 1246 (Middle/South Bosque) 1246D (Tonk Creek) 1246E (Wasp Creek) 1225A (Hog Creek) 1225 (Lake Waco)	Parameter: Nitrate+nitrite nitrogen Nitrate+nitrite nitrogen Nitrate+nitrite nitrogen & bacteria None Nitrate+nitrite nitrogen & excessive algal growth	Category: ----- ----- 5c for bacteria ----- -----			
Project Location: (Statewide or County and Watershed Name)	South and Middle Bosque River watersheds and Hog Creek watershed flowing into Lake Waco					
Key Project Activities:	Hire Staff (); Monitoring (X); Regulatory Assistance (); Technical Assistance (); Education (); Implementation (); Demonstration (); Planning (); Other ()					
NPS Management Program Elements:	Milestones from the “2005 Non-Point Source Pollution Assessment Report and Management Program” that will be implemented include: <ul style="list-style-type: none"> a. Coordinating watershed and microwatershed monitoring and modeling for agricultural/silvicultural nonpoint source (NPS) pollution; b. Utilizing data derived from monitoring (both historical and current) and modeling to support NPS pollution abatement and prevention activities in priority watersheds; c. Coordinating with federal, state, and local programs; and d. Committing to technology transfer, technical support, administrative support, and cooperation between agencies and programs for the prevention of NPS pollution. 					
Project Costs:	Federal:	\$308,640	Non-Federal Match:	\$205,760	Total:	\$514,400

Project Management:	Texas Institute of Applied Environmental Research (TIAER) Cooperating Entities: The Texas State Soil and Water Conservation Board (TSSWCB), TSSWCB Dublin Regional Office, and McLennan County SWCD.
Project Period:	October 1, 2007 –March 31, 2011

Part I – Applicant Information

Applicant

Project Lead	Anne McFarland						
Title	Research Scientist						
Organization	Texas Institute for Applied Environmental Research (TIAER), Tarleton State University						
E-mail Address	mcfarla@tiaer.tarleton.edu						
Street Address	Mail Stop T0410						
City	Stephenville	County	Erath	State	Texas	Zip Code	76402
Telephone Number	(254) 968-9581			Fax Number	(254) 968-9790		

Project Partners

Names	Roles & Responsibilities
Texas Institute for Applied Environmental Research – Project Lead	Responsible for 1) submitting quarterly status and financial reports and providing technical oversight, 2) developing data quality objectives and a quality assurance project plan for approval by TSSWCB and USEPA, 3) performing routine and storm stream monitoring, analysis and data management, and 4) compiling and analyzing monitoring data for a final report.
Texas State Soil & Water Conservation Board Temple	Responsible for project management and assisting TIAER in development of final project report.
TSSWCB Dublin Regional Office	Assist TIAER in development of final project report by providing WQMP information.
McLennan County Soil & Water Conservation District	Assist TIAER in development of final project report by providing WQMP information.

Part II – Project Information

Project Type

Surface Water	<input checked="" type="checkbox"/>	Groundwater	<input type="checkbox"/>
Does the project implement recommendations made in a Watershed Protection Plan or TMDL Report or Implementation Plan?			
Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
If yes, identify the document. (Approved or Draft)			
If yes, identify the agency/group that developed and/or approved the document.		Year Developed	

Watershed Information

Watershed Name(s)	Hydrologic Unit Code (8 Digit)	Segment ID	305 (b) Category	Size (Acres)
Middle Bosque/South Bosque River	12060203	1246		185,700
Hog Creek	12060203	1225A		57,300

Project Narrative

Problem/Need Statement

Assessment monitoring is needed in the Middle and South Bosque River and Hog Creek watersheds to evaluate implementation of water quality management plans (WQMPs) in controlling nonpoint source pollution. According to the 2004 Texas Water Quality Inventory, the Middle and South Bosque River (segment 1246) and Hog Creek (segment 1225A) are fully supporting of their designated uses; however, there are nutrient enrichment concerns due to elevated nitrite-nitrate nitrogen concentrations in segment 1246. Subsegments 1246D (Tonk Creek) and 1246E (Wasp Creek) of the Middle and South Bosque River are also listed for concerns with regard to elevated nitrite-nitrate nitrogen. Wasp Creek (1246E) also shows nonsupport of the contact recreation use based on elevated bacteria concentrations, although further data are needed before Wasp Creek is considered for scheduling a total maximum daily load. Lake Waco, the receiving waterbody for the Middle and South Bosque Rivers and Hog Creek, also indicates concerns for elevated nitrite-nitrate nitrogen concentrations. The Middle and South Bosque River and Hog Creek watersheds are predominantly agricultural, containing many row crop and small-scale beef cattle operations. Agriculture is considered one of the primary sources of nitrate-nitrite nitrogen within these watersheds.

Within the Middle and South Bosque River and Hog Creek watersheds, technical and financial assistance is being provided to landowners to aid in the development of WQMPs through the McLennan County Soil and Water Conservation District (SWCD). This technical assistance is occurring under a current 319(h) project (06-9), “WQMP Implementation in the Middle and South Bosque River Watersheds.” A WQMP is a site-specific plan, which includes appropriate land treatment practices, production practices, technologies and combinations thereof, and an implementation schedule. As the lead agency for abating agricultural nonpoint source pollution, TSSWCB works closely with local SWCDs to reduce nonpoint source pollution from various agricultural activities. TSSWCB addresses the prevention or abatement of nonpoint source pollution through the WQMP program. The WQMP program provides agricultural producers in priority areas, such as the Middle and South Bosque River and Hog Creek watersheds, an opportunity to comply with State water quality laws through traditional, voluntary, incentive-based programs. TSSWCB oversees and is responsible for the financial assistance component of the program. Local SWCDs provide or arrange for technical assistance for applicants to develop WQMPs.

Through this project, water quality data will be used to help assess the efficacy of implemented WQMPs in the Middle and South Bosque River and Hog Creek watersheds in reducing nonpoint source pollution, specifically nitrite-nitrate nitrogen. A secondary objective will be to monitor and assess changes in bacteria concentrations.

Project Narrative

General Project Description (Include Project Location Map)

The primary focus of this 319(h) project is to assess the preexisting and post-WQMP implementation effects in the Middle and South Bosque River and Hog Creek watersheds. In this project, TIAER will provide assessment activities at five watershed sites within the Middle and South Bosque River and Hog Creek watersheds (Figure 1). These five sampling stations provide focused monitoring representative of land uses activities within this region (Table 1). Storm monitoring will make use of automated sampling systems purchased through the project to monitor nonpoint source loadings of nutrients and total suspended solids (TSS) associated with rainfall-runoff events. Routine grab sampling will be used to supplement storm event monitoring and will also include analysis of bacteria in addition to nutrients and TSS. The proposed stream sites or nearby sites were monitored extensively by TIAER between October 1995 and April 2003 (Table 2) and some are currently monitored quarterly by the Texas Commission on Environmental Quality (TCEQ) and Brazos River Authority. The historical water quality data available at these sites collected by TIAER will be made available as non-direct data to this project for use in the assessment of water quality improvements. These historical or non-direct data were collected and analyzed by TIAER with TCEQ approved QAPPs. The data collected for this project will be used to determine the reduction of nonpoint source pollution associated with post-WQMP implementation efforts and provide data to inform TSSWCB of areas where more focused reduction efforts are needed.

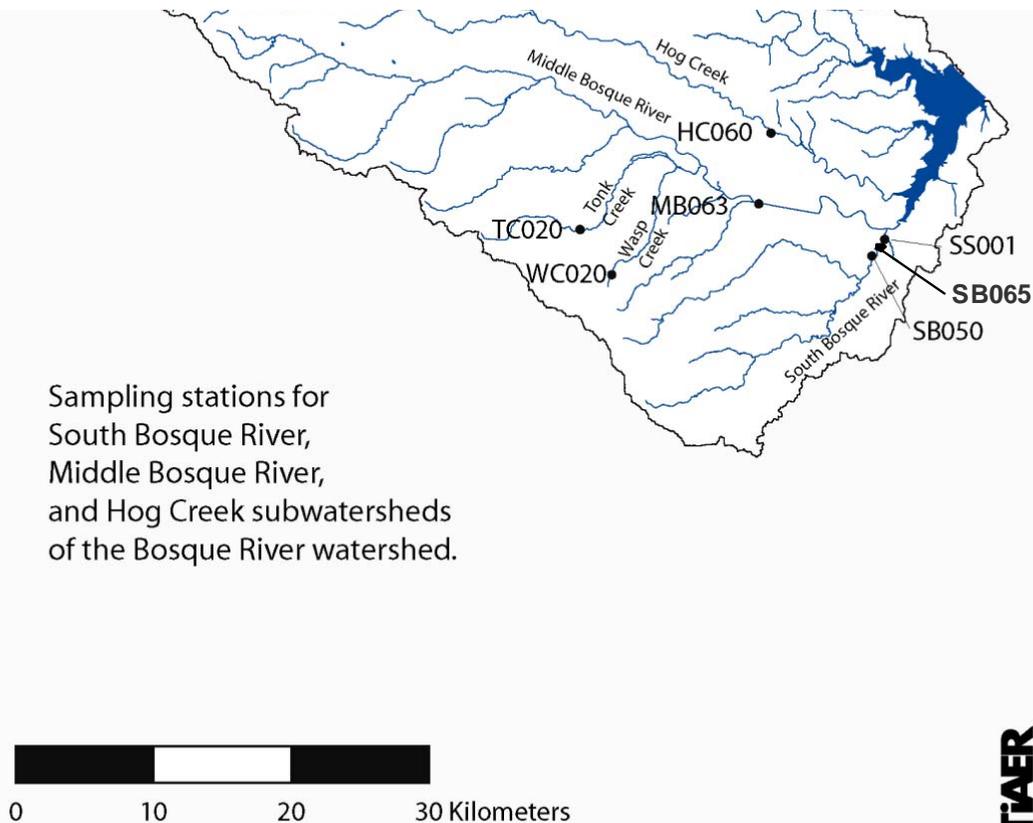


Figure 1. Proposed sampling sites within the Middle and South Bosque River and Hog Creek watersheds. Note, site SB065 added after original work plan was approved as part of the project QAPP.

Table 1. Estimated land use and drainage area above sampling sites.

TIAER Site ID	Wood & Range (%)	Pasture (%)	Cropland (%)	Urban (%)	Other (%)	Total Area (Hectares)
HC060	46.2	19.2	34.1	0.5	0.0	20,500
MB063	51.1	8.1	39.2	1.4	0.2	46,400
SB050	20.9	20.1	49.9	8.4	0.7	22,000
SB065 ^a	32.1	24.0	39.6	4.0	0.3	22,200
SS001	21.0	20.0	49.0	9.0	1.0	23,400
TC020	8.4	17.8	73.5	0.2	0.1	3,030
WC020	8.1	24.0	67.6	0.3	0.0	970

^a Note: Land use for SB065 varies notably from the land use estimates for SB050 and SS001. The land use estimates for SB065 were based on a more updated land use layer than was used in the historical reports estimate for SB050 and SS001, thus, representing some changes in land use over time that will be addressed in the final project report.

Table 2. Location and sampling history of monitoring sites.

TIAER Site ID	TCEQ ID	Watershed and General Location	Date of First Grab Sample	Date of Last Grab Sample Prior to Current Project	Date of First Automatic Storm Sample	Date of Last Automatic Storm Sample Prior to Current Project
HC060	17212	Hog Creek at Farm Road 185	26-Sep-95	18-Mar-03	01-Nov-95	10-Mar-03
MB063 ^a	17612	Middle Bosque at Farm Road 3047	26-Sep-95	18-Mar-03	06-Apr-96	10-Mar-03
SB050 ^b	17229	South Bosque off Church Road	Not applicable	Not applicable	23-Jan-97	26-Mar-03
SS001 ^c	12094	South Bosque at U.S. Hwy 84	05-Nov-96	18-Mar-03	Not applicable	Not applicable
SB065 ^d	20308	South Bosque at Old Lorena Road	22-Apr-08	Not applicable	19-Aug-08	Not applicable
TC020	17232	Tonk Creek at Farm Road 938	26-Sep-95	18-Mar-03	05-Apr-96	06-Mar-03
WC020	17233	Wasp Creek at Farm Road 938	26-Sep-95	18-Mar-03	12-Jul-96	05-Mar-06

^a Initial dates include data from a more upstream site (MB060) that was moved to MB063 in December 1999.

^b Initial dates include data from a more downstream site (SB060) that was moved to SB050 in July 1997 due to backwater impacts from Lake Waco.

^c Initial dates include grab data from at a more upstream site (SB060). Routine grab sampling at SB060 was shifted to SS001 in March 2000.

^d Site SB065 was established instead of using SS001 and SB050 due to problems with access and changes with bridge and road construction. Non-direct data will be used from SS001 and SB050 to represent historical water quality of the South Bosque River.

The monitoring activities of this project will consist of biweekly (once every two weeks) ambient grab sampling at five sites (HC060, MB063, SB065, TC020, and WC020) and automated stormwater sampling and continuous water level measurements at five sites (HC060, MB063, SB065, TC020 and WC020). Project staff will also take required measurements to maintain and update, as needed, existing stage-discharge relationships (rating curves) at all storm sampling stations, so water level recordings can be converted to flow.

Field measurements of dissolved oxygen, water temperature, specific conductance, and pH will occur with all grab sampling. Stormwater samples will be retrieved on a daily basis and flow composited into a single sample. All water samples will be analyzed for various nutrient forms (i.e., total phosphorus, dissolved orthophosphate phosphorus [frequently referred to as soluble reactive phosphorus], total Kjeldahl nitrogen, dissolved ammonia, dissolved nitrite plus nitrate), and total suspended sediments (TSS). In addition, biweekly grab samples will be analyzed for *Escherichia coli*. Although nitrite-nitrate nitrogen is the primary focus of this project, phosphorus and other nitrogen forms of nutrients and TSS are included in the laboratory analyses to provide a more complete indication of water quality conditions. Measurement of these additional constituents is also of value in evaluating whether agricultural best management practices associated with WQMPs are reducing both nutrients (nitrogen and phosphorus) and to ensure that efforts to reduce one nutrient is not inadvertently increasing another.

Water Quality Impairment

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

According to the 2004 Water Quality Inventory nutrient enrichment is a concern due to elevated nitrite-nitrate nitrogen concentrations in segment 1246 (Middle Bosque/South Bosque) and subsegments 1246D (Tonk Creek) and 1246E (Wasp Creek). The 2004 303(d) list includes subsegment 1246E (Wasp Creek) as impaired for not supporting the use of contact recreation due to elevated bacteria concentrations. Impairment category 5c is associated with subsegment 1246E indicating that additional data and information need to be collected before a TMDL is scheduled. Segment 1246 flows into Lake Waco (segment 1225). Concerns for Lake Waco (1225) include algal growth and nutrient enrichment associated with elevated nitrite-nitrate concentrations manifested primarily in its more southern portions. No concerns or impairments are listed for Hog Creek (1225A). Hog Creek is included in the monitoring plan as a major tributary to the southern arm of Lake Waco as well as a focus watershed area for WQMP implementation by TSSWCB.

Project Goals

The goal of this project is to enhance and assess efforts and activities of the Texas State Soil and Water Conservation Board and the McLennan County Soil and Water Conservation District #512 to reduce and/or prevent nonpoint source pollution loadings primarily of nitrite-nitrate nitrogen from cropland within the Middle and South Bosque River and Hog Creek watersheds that flow into the southern arm of Lake Waco. A secondary objective will be to assess bacteria contributions through routine monitoring of *E. coli* concentrations. A final report will be developed using historical data collected by TIAER (1995 – 2003) and post-implementation data collected under this work plan to assess preexisting and post-WQMP implementation effects based on information provided by the McLennan County SWCD.

Tasks, Objectives and Schedules						
Task 1:	Project Administration					
Costs:	Federal:	\$10,730	State:	\$7,239	Total:	\$17,969
Objective:	To effectively coordinate and monitor all work performed under this contract including technical and financial supervision and preparation of status reports. Progress reports shall document all activities performed within a quarter. Quarterly reports are due by the 15th of January, April, July, and October.					
Subtask 1.1:	Internal project kick-off meeting to organize project team. Meeting will include individuals involved with the current and complimentary 319(h) project dealing with WQMP implementation and technical assistance in the project watersheds.					
	Start Date:	Dec. 1, 2007		Completion Date:	March 31, 2011	
Subtask 1.2:	Submit quarterly progress reports, which will include the status of deliverables for each objective and a narrative description of the progress on each task.					
	Start Date:	Oct. 1, 2007		Completion Date:	March 31, 2011	
Subtask 1.3:	Submit appropriate reimbursement forms.					
	Start Date:	Dec. 1, 2007		Completion Date:	March 31, 2011	
Deliverables	<ul style="list-style-type: none"> • Quarterly progress reports • Reimbursement forms 					

Tasks, Objectives and Schedules						
Task 2:	Quality Assurance Project Plan					
Costs:	Federal:	\$5,625	State:	\$3,776	Total:	\$9,401
Objective:	To develop data quality objectives (DQOs), a quality assurance project plan (QAPP), and provide amendments and annual revisions to the QAPP, as needed.					
Subtask 2.1:	Develop data quality objectives and submit a draft QAPP for review by the TSSWCB and EPA at least two months prior to the initiation of monitoring.					
	Start Date:	Dec. 1, 2007		Completion Date:	Jan. 15, 2008	
Subtask 2.2:	Revise QAPP for approval by the TSSWCB and EPA and finalize by the time monitoring is initiated.					
	Start Date:	Jan. 15, 2008		Completion Date:	Feb. 29, 2008	
Subtask 2.3:	Provide annual revisions to the QAPP and amendments, as necessary, to the TSSWCB and EPA.					
	Start Date:	Dec. 1, 2008		Completion Date:	March 31, 2011	
Deliverables	<ul style="list-style-type: none"> • Approved QAPP • QAPP amendments and annual revisions 					

Tasks, Objectives and Schedules						
Task 3:	Conduct Stream Monitoring and Analysis including Data Management					
Costs:	Federal:	\$258,671	State:	\$172,345	Total:	\$431,016
Objective:	To perform routine grab and storm assessment activities at stream sampling sites including collection of flow and associated measurements for maintaining stage-discharge relationships. Direct sampling under this project is planned to start in December 2007, assuming an approved QAPP is in place.					
Subtask 3.1:	TIAER will purchase and install storm water monitoring stations at five locations.					
	Start Date:	Dec. 1, 2007	Completion Date:	Feb. 1, 2008		
Subtask 3.2:	TIAER will perform routine biweekly grab sampling at five stream sites. Water quality samples will be collected only if water is flowing. If water is not flowing when biweekly sampling is scheduled, a water quality sample will not be collected, but it will be documented that the stream was pooled or dry. Based on a biweekly schedule at five stream sampling stations, the total number of grab samples will not exceed 358 samples and should be about 130 grab samples on an annual basis. Routine grab samples will be analyzed for nutrient forms, TSS, and <i>E. coli</i> . In addition, field constituents of dissolved oxygen, pH, specific conductance, and water temperature will be recorded at the time grab samples are collected.					
	Start Date:	Apr. 1, 2008	Completion Date:	March 31, 2011		
Subtask 3.3:	TIAER will maintain and operate automated samplers and water-level recorders at five stream sites. Automated samplers will be set to activate sampling upon a small rise in water level and collect individual samples at sequential time intervals. At each stream site, individual stormwater samples will be collected daily and flow composited into one sample that will be analyzed for nutrient forms and TSS. Based on historical data, on average by site about 70 wet weather samples per year are anticipated. The project is budgeted for a maximum of 965 storm samples for all five sites. However, due to the unpredictable nature of wet weather monitoring, TIAER is not able to guarantee a set number of wet weather samples from each station. In the event of very dry weather conditions, fewer samples may be collected and analyzed. Conversely, if appreciably greater than average rainfall results in more samples than budgeted, corrective measures, such as discarding samples from small runoff events, will be implemented to reduce sample load and yet provide representative sampling over the duration of the project sampling period.					
	Start Date:	Apr. 1, 2008	Completion Date:	March 31, 2011		
Subtask 3.4:	Stage-discharge relationships will be maintained and updated, as necessary, for all stormwater sampling sites. This will include taking flow measurements and re-surveying stream cross-sections, if apparent changes have occurred.					
	Start Date:	Feb. 1, 2008	Completion Date:	March 31, 2011		
Subtask 3.5:	TIAER will conduct routine general maintenance of all automated sampling and water level equipment to help ensure that these instruments will operate properly during storm water conditions.					
	Start Date:	Feb. 1, 2008	Completion Date:	March 31, 2011		
Subtask 3.6	TIAER will manage all databases needed in association with assessment activities.					
	Start Date:	Feb. 1, 2008	Completion Date:	March 31, 2011		
Deliverables	<ul style="list-style-type: none"> • A water quality data summary for each site will be submitted to TSSWCB about once every six months as an update on assessment activities. 					

Tasks, Objectives and Schedules						
Task 4:	Development of Final Report Assessing the Preexisting and Post-WOMP Implementation Effects					
Costs:	Federal:	\$33,614	State:	\$22,400	Total:	\$56,014
Objective:	Develop a report assessing the impact of post-WQMP implementation activities on stream water quality.					
Subtask 4.1:	During the last four months of the project, TIAER will develop a final project report that will evaluate the success of post-WQMP implementation activities on water quality at microwatershed stream sites. A draft of this report will be submitted to the TSSWCB for review at the end of the project. All TSSWCB comments will be considered and addressed before finalizing the report.					
	Start Date:	Jun. 1, 2010		Completion Date:	March 31, 2011	
Deliverables	<ul style="list-style-type: none"> • Draft and final project report 					

Measures of Success
Demonstrate significant improvement in water quality associated with implementation of WQMPs on agricultural row crop operations that apply commercial fertilizers through the evaluation of monitoring data from the South and Middle Bosque River and Hog Creek watersheds comparing pre- and post-WQMP implementation time periods.

2005 Texas Nonpoint Source Management Program Document Reference
Goals &/or Milestone(s)
Coordinating watershed and microwatershed monitoring and modeling for agricultural/silvicultural NPS pollution.
Utilizing data derived from monitoring (both historical and current) and modeling to support NPS pollution abatement and prevention activities in priority watersheds.
Coordinating with federal, state, and local programs.
Committing to technology transfer, technical support, administrative support, and cooperation between agencies and programs for the prevention of NPS pollution.

Part III – Financial Information

Budget Summary			
Federal 319(h)	\$308,640	% of total project	60%
Non-Federal Match	\$205,760	% of total project (at least 40%)	40%
Total \$ Cost	\$514,400	Total project %	100%
Category	Federal	Non-Federal Match	Total
Personnel	\$138,220	\$42,174	\$180,394
Fringe Benefits	\$36,847	\$11,243	\$48,090
Subtotal Personnel & Fringe	\$175,067	\$53,417	\$228,484
Travel	\$5,025	\$3,350	\$8,375
Equipment	\$0	\$0	\$0
Supplies	\$36,376	\$24,251	\$60,627
Contractual			
Construction	\$3,825	\$2,550	\$6,375
Other	\$65,711	\$43,807	\$109,518
Subtotal	\$110,937	\$73,958	\$184,895
Total Direct Costs	\$286,004	\$127,375	\$413,379
Indirect Costs *	\$22,636	\$78,385	\$101,021
Total Project Costs	\$308,640	\$205,760	\$514,400

* Indirect charged federal portion of project is 10% of total federal direct costs minus Cost Center costs associated with the "Other" category. Total indirect is calculated as 56% of personnel (Tarleton State University's indirect rate). Non-federal match for indirect is calculated as the difference between total and federal indirect.

Budget Justification (Federal)		
Category	Total Amount	Justification –
Personnel & Fringe Benefits	\$ 175,067	See budget narrative given below. Federal portion represents about 77% of total category costs.
Travel	\$ 5,025	Travel to and from sampling sites for sample retrieval and general maintenance and three trips to visit with McLennan County SWCD on WQMPs. Federal portion represents 60% of total category costs.
Equipment	\$ 0	Acoustic doppler flow meter for establishing stage-discharge relationships. Federal portion represents 60% of total category costs.
Supplies	\$ 36,376	Five ISCO samplers, level recorders, shelters, solar panels, and other equipment needed to set up storm monitoring sites. Necessary field and laboratory supplies associated with monitoring. Federal portion represents 60% of total category costs.
Contractual	\$ 0	
Construction	\$ 3,825	Construction of metal shelters for protecting sampling equipment. Federal portion represents 60% of total category costs.
Other	\$ 65,711	Other represents costs associated with vehicle and laboratory equipment maintenance, laboratory waste disposal, and miscellaneous charges such as postage and freight. Federal portion represents 60% of total category costs.
Indirect	\$ 22,636	Indirect charged federal portion of project 10% of total federal direct costs.

Budget Justification (Non-Federal)		
Category	Total Amount	Justification
Personnel & Fringe Benefits	\$ 53,417	See budget narrative given below. Non-federal portion represents about 23 percent of total category costs.
Travel	\$ 3,350	Travel to and from sampling sites for sample retrieval and general maintenance and three trips to visit with McLennan County SWCD on WQMPs. Non-federal portion represents 40% of total category costs.
Equipment	\$ 0	Acoustic doppler flow meter for establishing stage-discharge relationships. Non-federal portion represents 40% of total category costs.
Supplies	\$ 24,251	Five ISCO samplers, level recorders, shelters, solar panels, and other equipment needed to set up storm monitoring sites. Necessary field and laboratory supplies associated with monitoring. Non-federal portion represents 40% of total category costs.
Contractual	\$ 0	
Construction	\$ 2,550	Construction of metal shelters for protecting sampling equipment. Non-federal portion represents 40% of total category costs.
Other	\$ 43,807	Other represents costs associated with vehicle and laboratory equipment maintenance, laboratory waste disposal, and miscellaneous charges such as postage and freight. Non-federal portion represents 40% of total category costs. .
Indirect	\$ 78,385	Total indirect calculated as 56% of personnel Tarleton State University's indirect rate). Non-federal match for indirect calculated as the difference between total and federal indirect.

Budget Narrative

Equipment:

Due to the distance that TIAER is located from these sampling sites and the quickness with which storm hydrographs often rise and fall, the field crew will use an acoustic doppler flow meter to help develop stage-discharge relationships. This acoustic doppler flow meter will be moved from site to site and can measure stage-discharge information for water levels up to 16-ft, well above the depth that can safely be measured using manual wading-type measurements. Manual measurements of stage and discharge will also be taken to supplement information supplied by the acoustic doppler flow meter.

Personnel & Fringe Benefits:

Estimated personnel allocations are outlined in the table below and are described as follows. As the project leader Dr. Anne McFarland, Research Scientist, will provide project administration, coordination, and technical oversight as outlined in Task 1. Dr. Larry Hauck, Assistant Director at TIAER, will provide guidance to Dr. McFarland, as needed, for project oversight and will review the final report prior to submittal to the TSSWCB. Data storage and database management under Task 3 will be conducted by Mr. Jim Rogers, Senior Programmer/Analyst, and Mr. Larry Kennedy, Database Manager I. Ms. Nancy Easterling, TIAER's Quality Assurance officer, will be assisting Dr. McFarland in data review under Task 3 and QAPP development under Task 2. A student worker also assists Ms. Easterling with quality assurance data reviews. Dr. McFarland will be the primary author of the final project report under Task 4 with assistance in data analysis provided by Mr. Jimmy Millican, Senior Research Associate, and programming by Mr. Jim Rogers. Mr. Don Gosdin will assist with any needed graphics for the final report.

Name	Title	Estimated Percent Time per Year*
Field Operations		
Tim Jones	Sr Research Associate	14%
Jeff Stroebel	Research Associate	15%
Abel Martinez	Sr Research Assistant	16%
Levi Lewis or David Blankenship	Research Assistant	16%
Student Worker	Student Worker	6%
Analytical Laboratory		
Mark Murphy	Laboratory Manager	10%
James Hunter	Sr Research Assistant	12%
Dovie Reynolds	Research Assistant	12%
Vickie Hunt	Technician	12%
Student Worker	Student Worker	12%
Data Analysis & Technical Assistance		
Larry Hauck	Assistant Director	<1%
Anne McFarland	Research Scientist	14%
Jim Rogers	Sr Programmer/Analyst	6%
Jimmy Millican	Sr Research Associate	6%
Todd Adams	Research Associate	1%
Larry Kennedy	Database Manager I	2%
Nancy Easterling	Research Associate	4%
Don Gosdin	Computer Graphics Specialist	1%
Dianne Swanson	Information Specialist	5%
Student Worker	Student Worker	2%

* Percent time will vary depending on the timing of various tasks and is presented here as a general average for the three years of the project.

TIAER's field operations staff will conduct the assessment monitoring and development of stage-discharge relationships. All samples will be analyzed in TIAER's analytical laboratory under task 3. The budget is based on a maximum of 965 storm samples and 358 grab samples over the duration of the project. Storm samples will be analyzed for ammonia-

nitrogen, nitrite-nitrate nitrogen, total Kjeldahl nitrogen, orthophosphate-phosphorus, total phosphorus, and total suspended solids. Routine grab samples will be analyzed for the same constituents as storm samples but will also include an analysis of *E. coli* and field measurements of dissolved oxygen, specific conductance, water temperature, and pH. Mr. Tim Jones, Senior Research Associate, is the supervisor of field operations and will oversee field efforts for routine and storm monitoring. The field staff includes three full-time employees (Jeff Stroebel, Abel Martinez, and Levi Lewis or David Blankenship) and generally two student workers. As needed, other TIAER staff members who are trained in field techniques (Jimmy Millican and Todd Adams) will be available to assist with routine and storm monitoring. The TIAER analytical laboratory is staffed by a lab manager (Mark Murphy), two chemists (Jeff Hunter and Dovie Reynolds), and a research technician (Vickie Hunt). The analytical laboratory also generally employs two to four student workers. Dianne Swanson is TIAER's information specialist, but also fulfills the role as TIAER's laboratory quality assurance officer.

TIAER Laboratory Cost Center:

As of September 1, 2009, the TIAER analytical laboratory became a Cost Center due to changes needed to meet current accounting documentation requirements. All samples after September 1, 2009 for this project are charged by the Cost Center on a per sample basis under the "Other" category rather than having lab costs separated into salaries, supplies and other categories. The Cost Center includes a 10% indirect as part of its charges, so costs associated with the Cost Center were removed from the total direct costs prior to calculating the federal portion of the indirect.