Texas State Soil and Water Conservation Board
Clean Water Act §319(h) Nonpoint Source Grant Program
FY2010 Project Workplan 10-08

SUMMARY PAGE			
Title of Project	Development of a Watershed Protection Plan for Cedar Bayou		
Project Goals	To develop a nine element Watershed Protection Plan (WPP) for the Cedar Bayou watershed by 1) targeted water quality sampling and analysis, 2) conducting a watershed source survey and developing a comprehensive GIS inventory, 3) analyze water quality data using Load Duration Curves and spatially explicit modeling, 4) establish and provide direction for a stakeholder group that will serve as a decision making body.		
Project Tasks	(1) Project Administration; (2) Quality Assurance; (3) Public Participation and Stakeholder Coordination; (4) Watershed Survey, LULC and GIS Inventory ; (5) Surface Water Quality Monitoring; (6) Modeling and Data Analysis; (7) Watershed Protection Plan Development		
Measures of Success	(1) Coordination and engagement of a watershed stakeholder committee; (2) Completed GIS Inventory and LULC update; (3) Water quality data of known and acceptable quality; (4) Watershed modeling to identify needed load reductions and targeting BMP implementation; (5) Stakeholder approved WPP that satisfies EPA's nine elements		
Project Type	Implementation ( ); Education ( ); Planning (X); Assessment (X); Groundwater ( )		
Status of Waterbody on *2008 Texas Water Quality Inventory and 303(d) List*	Segment ID	Parameter	Category
	0901 – Cedar Bayou Tidal	Bacteria	5c
	0902 – Cedar Bayou Above Tidal	Macrobenthic communities	5c
Project Location (Statewide or Watershed and County)	Cedar Bayou Watershed located in Harris, Chambers and Liberty Counties		
Key Project Activities	Hire Staff (X); Surface Water Quality Monitoring (X); Technical Assistance ( ); Education (X); Implementation ( ); BMP Effectiveness Monitoring ( ); Demonstration ( ); Planning (X); Modeling (X); Bacterial Source Tracking ( ); Other ( )		
Texas NPS Management Program Elements	• Element One – LTG Objectives 1, 2, 5, 6, & 7 • Element One – STGs 1B, 1C, 3A, 3B, 3D • Elements Two, Five		

Project Costs	Federal	$709,000	Non-Federal	$318,537	Total	$1,027,537

Project Management	Houston-Galveston Area Council
Project Period	November 1, 2010 – August 31, 2015

Part I – Applicant Information

Applicant							
Project Lead	Todd Running						
Title	Clean Rivers Program Manager						
Organization	Houston-Galveston Area Council						
E-mail Address	todd.running@h-gac.com						
Street Address	3555 Timmons Lane, Suite 120						
City	Houston	County	Harris	State	TX	Zip Code	77027
Telephone Number	713-993-4549			Fax Number	713-993-4503		

Project Partners	
Names	Roles & Responsibilities
Texas State Soil and Water Conservation Board (TSSWCB)	Provide state oversight and management of all project activities and ensure coordination of activities with related projects and TCEQ
Houston-Galveston Area Council (H-GAC)	Provide project management and oversight. Facilitate watershed planning process and stakeholder group. Conduct water quality monitoring and analysis efforts. Conduct LDC, SELECT and SWAT modeling and analysis efforts. Develop Watershed Protection Plan
Texas AgriLife Extension Service – Department of Soil and Crop Sciences (Mark McFarland)	Deliver TWSP workshop (Subtask 3.6) through TSSWCB project 07-09
TBD Contracted Entity	Conduct tidal segment watershed modeling (Task 6)
Texas Stream Team	Provide water quality sampling support as a screening tool (not official data) and public outreach opportunities
Texas Conservation Fund	Provide oversight and assistance with Trash Bash activities in the watershed, an effective public outreach and education tool for generating involvement and awareness
Clean Rivers Program	Provide water quality sampling and analysis for testing sites. Assist in coordinating water quality sampling efforts. Provide QAPP development and support. (H-GAC CRP Program, not TCEQ CRP Program staff)
Galveston Bay Estuary Program	Provide financial support, outreach efforts, coordination with local stakeholder groups, staff support and water quality testing
Environmental Institute of Houston (EIH)	Conduct contracted water quality sampling under the Cedar Bayou Monitoring QAPP.
Eastex	Conduct contracted laboratory testing under the Cedar Bayou monitoring QAPP.

Part II – Project Information

Project Type							
Surface Water	X	Groundwater					
Does the project implement recommendations made in a completed WPP or an adopted TMDL or approved I-Plan?				Yes		No	X
If yes, identify the document.							
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)
Cedar Bayou	12040203	0901, 0902	0901:5a 0902:5c	110,754

Water Quality Impairment
Describe all known causes (pollutants of concern) of water quality impairments or concerns from any of the following sources: *2008 Texas Water Quality Inventory and 303(d) List*, Clean Rivers Program Basin Summary/Highlights Reports or other documented sources.
Cedar Bayou currently faces a variety of water quality impairments. Segment 0901, Cedar Bayou Tidal, is listed on the 2008 303(d) list as being impaired for bacteria, PCB in edible tissue, and Dioxins in edible tissue. Segment 0902, Cedar Bayou Above Tidal, is listed for Impaired Macrobenthic Community. Additionally, continuing development in the area has raised concern about nutrients, dissolved oxygen (DO) and sediment issues. Cedar Bayou is a tributary to the Galveston Bay system, thus these sources of contamination potentially impact a wide range of economic and ecological interests even beyond their watershed of origin. The following is a discussion of the known and potential sources of these contaminants (This information is summarized from the 2008 Texas Water Quality Inventory and 303(d) List, regional priorities detailed in the 2009 Clean Rivers Program Basin Highlights Report prepared by the H-GAC, and the Galveston Bay Plan.) – Bacteria: Sanitary sewer contributions, aging septic systems/on-site sewage facilities (OSSFs), legacy agricultural activity, abundant avian and terrestrial wildlife, and domestic animal/pet waste from developing areas are all known or potential sources in the area. As development continues in this watershed, it is expected that these issues will be exacerbated. Estuary breeding grounds for large numbers of migratory and resident birds and wildlife may be a significant contributor to local bacteria levels in the Tidal portion. – Impaired Macrobenthic Community: Macrobenthics are indicators of aquatic ecosystem health, and impaired communities reflect problems with the waterway sustaining a given aquatic use. In Cedar Bayou, this impairment is likely a result of sediment/flow issues, developmental pressures, and related concerns for aquatic use attainability. – Nutrients: Nutrient loading from agricultural activity, the primary activity in the watershed, is the primary known source. As suburban development increases in the watershed, nutrient loading from fertilizers and other human generated sources are anticipated to increase. – Dissolved Oxygen: While the bayou is not currently impaired for DO, existing issues with aquatic ecosystem health and the potential for increased nutrient and bacterial loading with future development raise concerns over the ability of the waterway to sustain its current DO levels. – Sediment: As development/population increases, increased sediment loads may result as part of altered drainage patterns.

Project Narrative

Problem/Need Statement

Over the next 30 years the population in the H-GAC service area is projected to increase by an additional 3.5 million people. This growth will increase the stress on water resources in terms of both quantity and quality. New pollutant sources, increased impervious cover, and aging wastewater infrastructure will produce new challenges faced by water quality managers and decision-makers.

Areas that are currently undeveloped or lightly developed within the H-GAC region provide the most promise in helping to sustain healthy water quality for the entire region. Watershed planning plays an integral role in ensuring good water quality in the future. The Cedar Bayou Watershed, which forms the border between urban Harris County and a primarily rural section of Chambers County, is largely undeveloped and agricultural lands. However, development is occurring at an appreciable pace in this and other local rural watersheds. Smart planning which encourages conservation of undeveloped areas, particularly in riparian and other sensitive areas, along with the use of appropriate water quality best management practices (BMP) in areas that are being developed, will be necessary to continue to have high quality waters.

The Cedar Bayou Watershed covers approximately 173 square miles and drains into the Galveston Bay system. The Galveston Bay system is a major economic asset for the City of Houston and the surrounding metropolitan area, as well as being a vital ecological component of the Gulf Coast area. Oyster production, recreational activities, and commercial fishing are significant economic assets of the area. Additionally, the estuaries of Cedar Bayou and surrounding areas are considered a critical wildlife habitat area for migratory birds and other wildlife by the Texas Parks and Wildlife Department, and a large portion of the watershed is considered an environmentally sensitive area in general.

While the majority of the area is undeveloped or agricultural land, there are a few incorporated areas within the Cedar Bayou Watershed. The City of Baytown is the largest of the developments along the waterway, and is located close to the end of the Tidal section, thus having a large potential impact on the sensitive estuarine environments near the Bayou's mouth. There are several large industrial facilities along the waterway, and a range of industrial activity (primarily related to the petrochemical industry) has occurred on or near Cedar Bayou in the past.

Industrial and agricultural activity, in conjunction with increasing developmental pressures as the Houston area expands have lead to the contaminants and indicators of concern listed in the previous section. As the area is at the nexus of developmental transition, it is experiencing contamination from both legacy and current sources. The current state of the waterway is negatively impacting the economic and environmental interests within its own boundary, as well as the greater Galveston Bay System. Given the need to address appreciable impairments, protect critical wildlife areas, and protect economic and recreational interests in the watershed and adjoining water bodies, Cedar Bayou is uniquely poised to be an area where intervention can yield significant, tangible results. The current impairments are expected to increase as development of the area continues, providing impetus to address water contamination concerns in advance of exacerbating conditions.

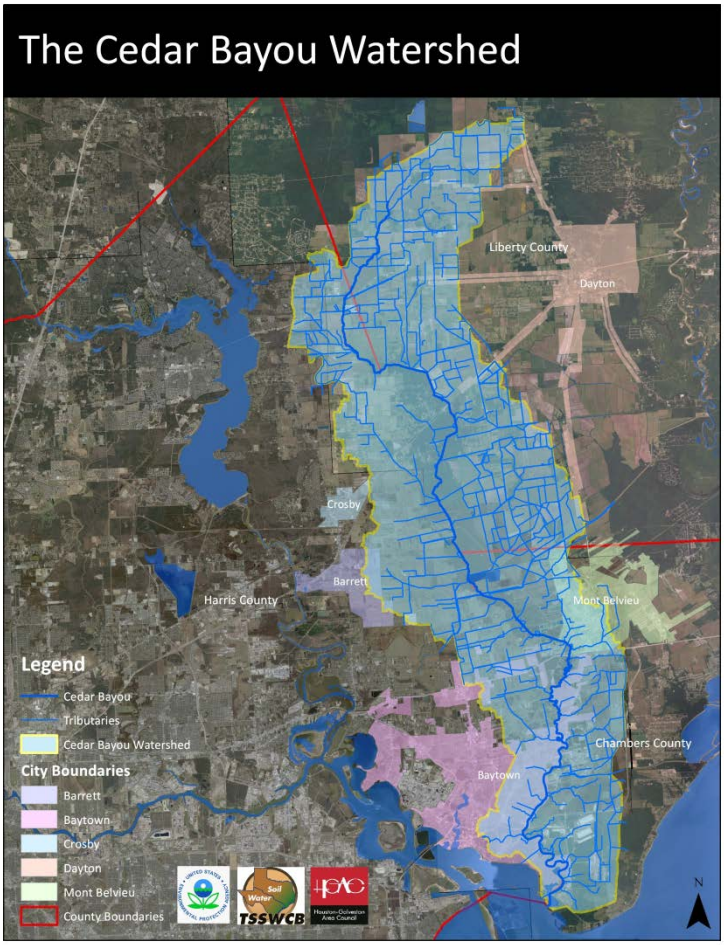
There are several efforts in the area that are currently seeking to address these trends and issues. Chambers County has adopted and devised an Action Plan to implement the Chambers County Greenprint, a project to evaluate and address changing land use patterns. Its primary goals are to protect habitat and water quality and to target restorable habitat, while maintaining rural character, restoring natural drainage, and enhancing nature-based recreational opportunities. The Galveston Bay Plan, maintained by the Galveston Bay Estuary Program of the TCEQ, is an ongoing effort to address sources of contamination to the Galveston Bay System, to which Cedar Bayou (Tidal) is a direct input. Many of the concerns for the Bay are based on non-point source contamination from area land uses and activities on tributary water bodies. . The Friends of Cedar Bayou United is an existing stakeholder group who has worked to raise concern and foster education regarding water quality issues in the Cedar Bayou watershed. The goals of these groups are compatible and complementary to the aims of a comprehensive Watershed Protection Plan effort, demonstrate the need for a coordinated watershed approach, and suggest there is existing resident concern and interest in watershed protection.

Project Narrative

General Project Description (Include Project Location Map)

This project will give water quality managers the tools to help their decision-making in regard to maintaining and improving water quality within the Cedar Bayou Watershed. This project will result in:

- Analysis of NPS problems with the use of powerful GIS that will provide data to water quality managers to strengthen watershed modeling efforts.
- A Watershed Protection Plan for the Cedar Bayou Watershed that will provide a basis for a largely rural but developing watershed to prepare for anticipated growth and urbanization, address current impairments, and protect the significant economic and environmental interests threatened by current and future contamination.
- Help to local governments in incorporating appropriate BMPs in their jurisdictions, thereby ensuring that resources are not wasted on BMPs that will not work for their area.



H-GAC will accomplish those overall objectives by working with local stakeholders (including Harris, Chambers and Liberty Counties, the Coastal, Harris County, and Trinity Soil and Water Conservation Districts, and the Galveston Bay Foundation, in conjunction with the project partners listed in Section I) the Clean Rivers Program and the TSSWCB to address current and future monitoring needs for watershed characterization, modeling for NPS loadings, and projecting load reductions.

H-GAC will also develop an overall stakeholder process that engages local citizens and landowners, local elected officials, local agency staff, state and federal agencies, and local non-governmental organizations. Components of this process will include the development of a stakeholder group, water quality monitoring, participation in the annual Rivers, Lakes, Streams, Bays and Bayous Trash Bash, educational development through the Texas Watershed Steward Program, and a series of workshops through H-GACs Clean Waters Initiative Program. These workshops will address the use of appropriate BMPs for the various NPS issues that the Cedar Bayou Watershed faces.

A watershed characterization will be developed to identify sources and causes of pollution as well as a prioritization process to effectively implement appropriate BMPs.

Existing data sets will also be used for modeling purposes. Through the characterization process, gaps in existing data will be identified. H-GAC will endeavor to fill those data gaps by finding other sources of data that have not been obtained or will partner with local agencies to collect the required information. H-GAC with the help of the TSSWCB and its stakeholder group will select the most appropriate model for determining pollutant loads and potential load reduction. There are a number of available models that could be selected (i.e. HSPF, SWAT, SELECT) for this WPP.

Tasks, Objectives and Schedules						
Task 1	Project Administration					
Costs	Federal	$26,455	Non-Federal	$21,753	Total	$48,208
Objective	To effectively administer, coordinate and monitor all work performed under this project including technical and financial supervision, and preparation of status reports.					
Subtask 1.1	H-GAC will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 15th of January, April, July and October. QPRs shall be distributed to all project partners and posted on the project website.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 1.2	H-GAC will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 1.3	H-GAC will host coordination meetings or conference calls, at least quarterly, with project partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. H-GAC will develop lists of action items needed following each project coordination meeting and distribute to project personnel.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 1.4	H-GAC will develop (Months 1-3), host and maintain (Months 4-58) a website to serve as a public clearinghouse for all project- and watershed- related information. All presentations, documents and results will be posted to this website. The website will serve as a means to disseminate information to stakeholders and the general public.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 1.5	H-GAC will develop and disseminate general project informational materials, including, but not limited to, flyers, brochures, letters, news releases, and other appropriate promotional publications. H-GAC will include information about the project in H-GAC newsletters and Clean Rivers Program publications. TSSWCB must approve all project-related content in any informational materials and promotional publications prior to distribution.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 1.6	H-GAC will designate and oversee a Cedar Bayou Watershed Coordinator (Project Manager). This designated employee will be responsible for the general oversight and coordination of all project activities, be responsible for reporting requirements and directing educational activities, and serve as the primary conduit for interaction with landowners, citizens, and entities to facilitate the development of the WPP. The Watershed Coordinator shall successfully complete (or have already completed) the Texas Watershed Planning Short Course (http://watershedplanning.tamu.edu/). The Watershed Coordinator shall participate in Texas Watershed Coordinator Roundtables (http://watershedplanning.tamu.edu/roundtable).					
	Start Date	Month 1	Completion Date	Month 58		
Deliverables	• Quarterly progress reports in electronic format • Reimbursement Forms and necessary documentation in hard copy format • Lists of action items from project coordination meetings • Project webpage • Promotional materials, as developed and disseminated					

Tasks, Objectives and Schedules						
Task 2	Quality Assurance					
Costs	Federal	$22,046	Non-Federal	$21,753	Total	$43,799
Objective	To develop and implement 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	H-GAC will develop a QAPP for water quality monitoring activities in Task 5 and a QAPP for watershed modeling activities in Task 6 consistent with *EPA Requirements for Quality Assurance Project Plans (QA/R-5)* and the *TSSWCB Environmental Data Quality Management Plan*. Consistency with Title 30, Chapter 25 of the Texas Administrative Code, *Environmental Testing Laboratory Accreditation and Certification*, which describes Texas' approach to implementing the National Environmental Laboratory Accreditation Conference standards, shall be required. All monitoring procedures and methods prescribed in the QAPP shall be consistent with the guidelines detailed in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue (RG-415)* and *Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG-416)*.					
	Start Date	Month 1	Completion Date	Month 3		
Subtask 2.2	H-GAC will implement the approved QAPPs. H-GAC will submit revisions and necessary amendments to the QAPPs as needed.					
	Start Date	Month 4	Completion Date	Month 58		
Deliverables	• Monitoring QAPP approved by TSSWCB and EPA in both electronic and hard copy formats • Modeling QAPP approved by TSSWCB and EPA in both electronic and hard copy formats • Approved revisions and amendments to QAPPs, as needed • Data of known and acceptable quality as reported through Tasks 5 and 6					

Tasks, Objectives and Schedules						
Task 3	Public Participation and Stakeholder Coordination					
Costs	Federal	$52,910	Non-Federal	$166,696	Total	$219,606
Objective	To coordinate and facilitate public involvement in a watershed planning process that will enable local decision making for the Cedar Bayou watershed.					
Subtask 3.1	H-GAC will develop a Public Participation Plan (PPP) which details the strategy for engaging the public and stakeholders in the watershed planning process for Cedar Bayou. The PPP shall, at a minimum, include 1) stakeholder group ground rules, 2) stakeholder group structure (i.e., steering committee, work groups) and membership, 3) stakeholder meetings topic/purpose and tentative schedule, and 4) a targeted outreach plan to increase public participation in the process. The PPP shall be designed to guide the stakeholders through the watershed planning process as described in the EPA *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*.					
	Start Date	Month 1	Completion Date	Month 3		
Subtask 3.2	H-GAC will compile (Months 1-3) and maintain (Months 4-58) a database of watershed stakeholders and affected parties for use in engaging the public in the watershed planning process. A stakeholder group will be established from this list. The database and stakeholder group will represent a diverse cross section of Cedar Bayou including landowners, citizens, local businesses, religious institutions, local and regional governmental entities and elected officials, state and federal agencies, and environmental and special interest groups.					
	Start Date	Month 1	Completion Date	Month 58		

Tasks, Objectives and Schedules				
Task 3	Public Participation and Stakeholder Coordination			
Subtask 3.3	H-GAC will facilitate communication with stakeholders in order to engage the public and affected entities in the watershed planning process. H-GAC will utilize all appropriate communication mechanisms including direct mail, e-mail, the project website, and mass media (print, radio, television). H-GAC will develop and utilize an online discussion group to facilitate direct discussion between stakeholders. H-GAC will explore the appropriate use of social media (i.e., Facebook, Twitter) as a stakeholder communication mechanism for this watershed. H-GAC will develop, publish, and distribute 5 quarterly newsletters (1 in year 4, and 4 in year 5) that highlight Cedar Bayou watershed activities; the newsletter shall be distributed as most appropriate to individual landowners and entities in the watershed. TSSWCB must approve all project-related content in any educational materials and publications prior to distribution.			
	Start Date	Month 1	Completion Date	Month 58
Subtask 3.4	H-GAC will facilitate public participation and stakeholder involvement in the watershed planning process, specifically project meetings and activities. H-GAC will coordinate meetings, secure meeting locations, prepare and disseminate meeting notices and agendas. Meeting summaries will be prepared and posted to the project website. It is anticipated that at a minimum, quarterly public meetings will be sufficient; however, if more meetings are deemed necessary as described in the PPP, they will be scheduled accordingly. Meeting frequency may be adjusted throughout the course of the project to accomplish project goals. TSSWCB will review and approve all meeting notices, agendas, and meeting summaries prior to public dissemination.			
	Start Date	Month 1	Completion Date	Month 58
Subtask 3.5	H-GAC will attend and participate in other public meetings as appropriate in order to communicate project goals, activities and accomplishments to affected parties. Such meetings may include, but are not limited to, city councils, county commissioners' courts, regional water supply planning, environmental flows, Clean Rivers Program Basin Steering Committee and Coordinated Monitoring, local soil and water conservation districts (SWCDs), Galveston Bay Council and subcommittee meetings, and other appropriate meetings of critical watershed stakeholder groups.			
	Start Date	Month 1	Completion Date	Month 58
Subtask 3.6	H-GAC will coordinate with AgriLife Extension to host a Texas Watershed Steward Program workshop focused on Cedar Bayou through TSSWCB project 07-09, *Statewide Implementation of the Texas Watershed Steward Program*.			
	Start Date	Month 1	Completion Date	Month 12
Deliverables	• Public Participation Plan • Stakeholder contact list, updated as needed • Stakeholder listserv • 5 Quarterly Newsletters, as developed and distributed • Meeting notices, materials, agendas, attendance lists, and summaries			

Tasks, Objectives and Schedules						
Task 4	Watershed Survey, LULC, and GIS Inventory					
Costs	Federal	$52,910	Non-Federal	$21,754	Total	$74,664
Objective	To develop a comprehensive GIS inventory of the watershed including a survey of potential pollutant contributing areas and an updated LULC dataset.					
Subtask 4.1	H-GAC, in collaboration with other project partners, will develop a comprehensive GIS inventory of the Cedar Bayou watershed. This GIS will include the most recent information available on land use, elevation, soils, stream networks, reservoirs, roads, municipalities and satellite imagery or aerial photography. Locations of SWQM stations, USGS gages, public access points to the water bodies, floodwater-retarding structures, wetlands, TPDES permittees (including WWTFs, CAFOs and MS4s), and subdivisions should also be included. Locations of possible bacteria sources, identified in Subtask 4.3, should be incorporated.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 4.2	H-GAC will compile existing Land Use/Land Cover datasets for the watershed from existing 2008 data and update them as appropriate, when new data becomes available. While the existing data is deemed current and accurate, H-GAC will work with local stakeholders to assess the degree to which existing datasets represent current watershed conditions on the local level. If existing LULC datasets do not represent current conditions on the local level, H-GAC will make localized updates utilizing the most current satellite or aerial imagery. Individual LULC classes will be comparable to NLCD and delineated in shapefile or ArcGIS grid format. LULC classification will be verified through field reconnaissance visits by qualified staff. H-GAC will provide an analysis of LULC changes and trends over time for use in watershed planning.					
	Start Date	Month 4	Completion Date	Month 58		
Subtask 4.3	H-GAC will work with local stakeholders and technical experts to develop a source survey (also known as a sanitary survey) that characterizes the possible sources of pollutant loadings. The source survey should be developed so that it represents warm and cool seasons and low and high flow conditions. The source survey should evaluate sources like WWTFs, central sewage collection systems, OSSFs, and MS4s. TPDES compliance issues should be examined. Wildlife, livestock and non-domestic animal populations should be examined. H-GAC will conduct the source survey as designed.					
	Start Date	Month 4	Completion Date	Month 58		
Subtask 4.4	H-GAC will retrieve all historic data in SWQMIS for the watershed. H-GAC will assess historic data for trends and variability, both spatially and temporally.					
	Start Date	Month 20	Completion Date	Month 58		
Deliverables	• Comprehensive GIS inventory of watershed, including compilation of existing LULC datasets • If warranted, newly developed LULC classification for the watershed in shapefile or ArcGIS grid format • Technical Report describing results from the source survey, analysis of LULC trends, and details of the GIS inventory • Technical Report characterizing trends and variability in historical water quality monitoring data					

Tasks, Objectives and Schedules						
Task 5	Surface Water Quality Monitoring					
Costs	Federal	$245,594	Non-Federal	$43,073	Total	$288,667
Objective	To collect additional surface water quality data to characterize pollutant loadings across varying flow regimes and temporal periods.					
Subtask 5.1	H-GAC, in conjunction with a contracted entity, will conduct routine ambient monitoring at 6 sites monthly and at 4 sites twice per quarter year, collecting field, conventional, flow, and bacteria parameter groups. Sampling period extends over 24 months. Total number of sample events scheduled for collection through this subtask is 208. Currently, routine ambient monitoring is conducted quarterly at 4 stations by H-GAC (11111, 11117, 11120, and 11123) through the Clean Rivers Program. Sampling through this subtask will complement existing routine ambient monitoring regimes such that routine water quality monitoring is conducted monthly at 10 sites in the Cedar Bayou watershed. H-GAC will contract with Eastex who will conduct sample analysis. Following the initial 24 month sampling period H-GAC will engage EIH to sample, on a quarterly basis, the 6 sites in Subtask 5.1 not currently sampled by CRP. This monitoring will take place during months 49-58, and monitoring parameters will remain the same. The total number of events scheduled for this period is 24. A report will be generated following the conclusion of this subtask monitoring effort. Field parameters are pH, temperature, conductivity, and dissolved oxygen. Conventional parameters are total suspended solids, turbidity, sulfate, chloride, nitrate + nitrite nitrogen, ammonia nitrogen, total kjeldahl nitrogen, chlorophyll-a, total hardness, orthophosphorus and total phosphorus. Flow parameters are flow collected by gage, electric, mechanical or Doppler. Bacteria parameters are *E. coli* and Enterococcus.					
	Start Date	Month 7	Completion Date	Month 58		
Subtask 5.2	H-GAC will conduct automated storm flow monitoring at two locations during 4 storm events annually collecting field, conventional, flow and bacteria parameter groups (same as subtask 5.1, with the exception of chlorophyll-a). Depending on meteorological conditions and funds availability, additional sites may be identified for storm flow monitoring. Sampling period extends up to 24 months. Total number of storm events budgeted for collection through this subtask is 4 per site per year, resulting in up to 16 sampling events. Depending on meteorological conditions, seasonal variation in storm events will be captured. H-GAC will contract with Eastex who will conduct sample analysis.					
	Start Date	Month 7	Completion Date	Month 48		
Subtask 5.3	H-GAC will compile (Months 1-6) the last 5 years of self-reported effluent discharge data from TPDES permittees in the watershed, and update the analysis as appropriate. H-GAC will assess the value of this data with respect to the pollutants of interest in this project. If self-reported data from TPDES permittees is not sufficient to characterize the point source contribution to pollutant loading for the water body, H-GAC will engage a contractor to conduct effluent monitoring (Months 7-30) at selected WWTFs collecting field, conventional, flow, bacteria and effluent parameter groups (same as subtask 5.1). Effluent parameters are BOD, CBOD and COD. Sampling period extends over 24 months. Total number of sample events budgeted for collection through this subtask is 16. H-GAC will contract with an accredited laboratory who will conduct sample analysis. Coordination between TPDES permittees and the TCEQ Regional Office will be required. Neither H-GAC nor TSSWCB shall submit WWTF data to TCEQ for use in permit compliance and enforcement; rather, WWTF data will only be used to estimate pollutant loadings from wastewater discharges and to assist TPDES permittees in improving management and operations.					
	Start Date	Month 1	Completion Date	Month 48		
Subtask 5.4	H-GAC will engage EIH to conduct 24-hour DO monitoring at 4 mainstem sites monthly during the index period collecting field and flow parameter groups (same as subtask 5.1). Sampling period extends over 8 months during the index period between March 15 and October 15.Total number of sample events scheduled for collection through this subtask is 64. Field parameters are pH, temperature, conductivity and dissolved oxygen. Flow parameters are flow collected by gage, electric, mechanical or Doppler, including severity.					
	Start Date	Month 7	Completion Date	Month 48		

Tasks, Objectives and Schedules				
Task 5	Surface Water Quality Monitoring			
Subtask 5.5	H-GAC will engage EIH to conduct biological monitoring [benthic macroinvertebrate and habitat assessment] at 2 mainstem sites twice per year for 2 years to assess the cumulative impact of pollutant loading on stream health and biological communities.			
	Start Date	Month 7	Completion Date	Month 48
Subtask 5.6	H-GAC will transfer monitoring data from activities in Task 5 to TCEQ for inclusion in the SWQMIS at least quarterly. Data will be transferred in the correct format using the TCEQ file structure, along with a completed Data Summary, as described in the most recent version of *TCEQ Surface Water Quality Monitoring Data Management Reference Guide*. H-GAC will submit Station Location Requests as needed to obtain TCEQ station numbers for new monitoring sites. H-GAC will input monitoring regime, as detailed in the QAPP, into the TCEQ CMS. Data Correction Request Forms will be submitted to TCEQ and TSSWCB whenever errors are discovered in data already reported.			
	Start Date	Month 49	Completion Date	Month 58
Deliverables	• Station Location Request Forms (as needed) in electronic format • Monitoring data files and Data Summary in electronic format • Data Correction Request Forms (as needed) in electronic format • Technical Report characterizing trends and variability in collected water quality monitoring data • Technical Report characterizing trends and variability in collected biological data • Technical Report characterizing trends and variability in TPDES self-reported data • Technical Report summarizing Subtask 5.1 monitoring for the period of months 49-58.			

Tasks, Objectives and Schedules						
Task 6	Modeling and Data Analysis					
Costs	Federal	$219,137	Non-Federal	$21,754	Total	$240,891
Objective	To analyze water quality data using LDCs, SELECT, SWAT and a Tidal-based model to determine needed pollutant load reductions to achieve environmental goals established by stakeholders and to estimate potential loadings from identified pollutant sources.					
Subtask 6.1	H-GAC will conduct a LDC analysis of all historic and existing water quality data for the non-tidal portion of the watershed. LDCs will be developed for at least one critical index site per assessment unit to determine load reductions needed to achieve water quality standards. Using water quality data collected through Task 5, H-GAC will refine LDCs developed with historic data. LDCs shall be consistent with 1) EPA's *An Approach for Using Load Duration Curves in the Development of TMDLs*, 2) EPA's *Options for Expressing Daily Loads in TMDLs*, and 3) EPA's *Development of Duration-Curve Based Methods for Quantifying Variability and Change in Watershed Hydrology and Water Quality*.					
	Start Date	Month 7	Completion Date	Month 48		
Subtask 6.2	H-GAC will utilize SELECT and SWAT to model pollutant loadings from across the watershed. Utilizing information from the GIS inventory (Subtask 4.1) and the source survey (Subtask 4.3); SELECT will be developed for the entire watershed, tidal and non-tidal portions. H-GAC will conduct SWAT modeling in the above tidal portion of the watershed. Modeling will be used to estimate loadings from various sources, identify critical loading areas within the subwatersheds, and evaluate impacts of BMPs.					
	Start Date	Month 7	Completion Date	Month 58		

Tasks, Objectives and Schedules				
Task 6	Modeling and Data Analysis			
Subtask 6.3	H-GAC will contract with CDM Smith who will employ the SWMM5 to quantify pollutant loadings and needed load reductions in the tidal portion of the watershed. The model will perform a quantitative analysis of the tidal mixing processes between Cedar Bayou and the Galveston Bay system. The model will be used to understand the exchange of pollutant loads each tidal cycle and the rate at which tidal mixing removes pollutants from the bayou. Available bathymetric, tidal, and water quality data will be used for model calibration and validation; no additional in-field data collection beyond Task 5 is planned. Soil and Water Assessment Tool (SWAT) modeling results will serve as tidal prism model inputs as necessary.			
	Start Date	Month 7	Completion Date	Month 58
Subtask 6.4	H-GAC will contract with CDM Smith to employ EPA's Causal Analysis/Diagnosis Decision Information System (CADDIS) to conduct a causal evaluation of the macrobenthic invertebrate impairment in the non-tidal portion of the watershed. CADDIS, an online application, provides a pragmatic guide for determining the causes of detrimental changes and undesirable biological conditions observed in aquatic systems. CADDIS supports defensible causal analyses of the mechanisms, symptoms, and stressor-response relationships for various specific stressors in order to draw appropriate conclusions.			
	Start Date	Month 7	Completion Date	Month 58
Deliverables	• Technical Report detailing the results of the LDC, SELECT, SWAT, and tidal-based model analyses • Technical Report detailing the results of CADDIS			

Tasks, Objectives and Schedules						
Task 7	Watershed Protection Plan Development					
Costs	Federal	$89,948	State	$21,754	Total	$111,702
Objective	H-GAC will facilitate the development of a WPP for the Cedar Bayou watershed through a stakeholder driven process. The WPP will contain the nine elements fundamental to a potentially successful WPP.					
Subtask 7.1	H-GAC, in collaboration with project partners, will develop a WPP for the Cedar Bayou watershed that is consistent with and satisfies the expectations of the nine elements fundamental to watershed-based plans as described in EPA's *2004 Nonpoint Source Program and Grants Guidelines for States and Territories* [68 Fed. Reg. 60653-60674 (October 23, 2003)]. The WPP shall be founded on decisions made by stakeholders through the watershed planning process (Task 3) and incorporate findings from project Technical Reports (Tasks 4-6). H-GAC will facilitate public review and stakeholder approval of the WPP.					
	Start Date	Month 1	Completion Date	Month 58		
Subtask 7.2	H-GAC will develop an "executive summary" style document, based on the WPP, which will serve as a public outreach tool to garner support for the implementation of the WPP and achieve long term sustainability.					
	Start Date	Month 34	Completion Date	Month 58		
Subtask 7.3	H-GAC will facilitate revisions to the WPP based on stakeholder, TSSWCB, and EPA comments subsequent to submission of the WPP. After EPA has completed a satisfactory nine element consistency review of the WPP, H-GAC will publish, print, and distribute to stakeholders the WPP and "executive summary" style document.					
	Start Date	Month 48	Completion Date	Month 58		
Deliverables	• Draft nine element Watershed Protection Plan to TSSWCB • Final stakeholder-approved nine element Watershed Protection Plan • "Executive summary" style public outreach document based on WPP					

Project Goals (Expand from Summary Page)
To develop a nine element Watershed Protection Plan (WPP) for the Cedar Bayou watershed by 1) targeted water quality sampling and analysis, 2) conducting a watershed source survey and developing a comprehensive GIS inventory, 3) analyze water quality data using Load Duration Curves and spatially explicit modeling, 4) establish and provide direction for a stakeholder group that will serve as a decision making body.

Measures of Success (Expand from Summary Page)
• Coordination and engagement of a watershed stakeholder committee; this committee will be established so that it equally represents all stakeholder groups in the watershed and gives them a platform for decision making regarding management of their water resources • Completed GIS and LULC update of the watershed: this information will provide the most up-to-date source of watershed characteristics to be utilized in watershed modeling, load reduction estimates, needed management strategies and WPP development • Water quality data of known and acceptable quality generated for watershed sampling sites • Completion of LDC, SELECT, SWAT and Tidal-based model analysis to be used to develop needed pollutant load reductions and aid in identifying key areas in the watershed where management should be focused • Stakeholder approved WPP that satisfies EPA's nine elements; the WPP will outline the voluntary management approach desired by Cedar Bayou watershed landowners and stakeholders

***2005 Texas Nonpoint Source Management Program* Reference (Expand from 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 – Conduct special studies to determine sources of NPS pollution and gain information to target BMP implementation activities. • Objective C – Develop WPPs for watersheds identified as impacted by NPS pollution on the latest state approved CWA §303(d) List. 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 with appropriate state, regional, and local entities, private sector groups and Federal agencies.
Element Five – The state program identifies waters and their watersheds impaired by NPS pollution and establishes a process to progressively address these identified waters by conducting more detailed watershed assessments…

Part III – Financial Information

Budget Summary			
Federal	$ 709,000	% of total project	69%
Non-Federal	$ 318,536	% of total project (≥ 40%)	31%
Total	$ 1,027,536	Total	100%

Category	Federal	Non-Federal	Total
Personnel	$244,524	$196,763	$441,287
Fringe Benefits	$106,261	$10,900	$117,161
Travel	$8,956	$540	$9,496
Equipment	$0	$450	$450
Supplies	$2,572	$2,000	$4,572
Contractual	$192,285	$79,271	$271,556
Construction	$0	$0	$0
Other	$111,160	$23,602	$134,762
Total Direct Costs	$665,758	$313,525	$979,283
Indirect Costs (≤ 15%)	$43,242	$5,011	$48,253
Total Project Costs	$709,000	$318,537	$1,027,537

Budget Justification (Federal)		
Category	Total Amount	Justification
Personnel	$244,524	Staff time for 1.3 FTEs
Fringe Benefits[1]	$106,261	TX Workforce Commission approved rate of 42.39%
Travel	$8,956	Mileage from H-GAC office to meeting locations. Travel to Austin and Temple.
Equipment	$0	N/A
Supplies	$2,572	Office supplies, plotter supplies, printed materials.
Contractual	$192,285	Water Quality Monitoring and Modeling services for load calculations (Task 6)
Construction	$0	N/A
Other	$111,160	Salary-based allocations for Rent, Personnel, Communications, Purchasing, Print Shop, Facility, Network, and GIS services. Other qualified expenses, i.e. Auditing Costs, Maintenance and Repair, Software and Development, Expendable Equipment.
Indirect[2]	$43,242	Calculated at 11.92% of Personnel and Fringe.

Budget Justification (Non-Federal)		
Category	Total Amount	Justification
Personnel	$196,763	H-GAC local funds, GBEP matching grant(s), volunteer hours for Trash Bash and TX Stream Team (state funding); in-kind hours from Clean Rivers Program, local organizations and residents, and City and County Officials.
Fringe Benefits	$10,900	Calculated from 42.39% from the salary portion of the GBEP matching grant(s), H-GAC local funds, and CRP match.
Travel	$540	In-kind travel from CRP and SW staff.
Equipment	$450	In-kind donation of flow and sampling equipment housed at H-GAC.
Supplies	$2,000	Sample bottles, chemicals for monitoring kits, TX Stream Team kits and incubators, Bacteria brochures.
Contractual	$79,271	Clean Rivers Program Laboratory Costs
Construction	$0	N/A
Other	$23,602	Salary-based allocations for Rent, Personnel, Communications, Purchasing, Print Shop, Facility, Network, and GIS services... Allocation amounts are based on salary hours paid by H-GAC local funds, GBEP matching grant funds, and CRP match time.
Indirect	$5,011	Calculated from 11.92% of the total of the GBEP, H-GAC Local, and CRP salary and related fringe benefits.

[1] The Fringe rate for H-GAC, as a Council of Governments, changes on a yearly basis. The rate noted is the current rate for FY2014. However, the total for Fringe benefits includes salary projected at the current rate, as well as costs already expended at previous years' rates.

[2] The Indirect rate for H-GAC, as a Council of Governments, changes on a yearly basis. The rate noted is the current rate for FY2014. However, the total for Indirect costs includes salary projected at the current rate, as well as costs already expended at previous years' rates.