

**Harris-Galveston Subsidence District
1999 Regulatory Plan Evaluation
Preliminary Scope of Work**

I. General Activities

- A. Identify potential cooperators and stakeholders
- B. Formulate project approach and work plan
- C. Conduct introductory planning meeting with cooperators and stakeholders
- D. Identify critical issues and ideas for inclusion in development of methodologies
- E. Review technical, permitting, and administrative provisions of Regulatory Plan
- F. Meet with staff and Planning Committee of the Board, as needed
- G. Assist and coordinate with staff, consultants, cooperators, and stakeholders
- H. Prepare reports of evaluations and recommendations
 - 1. Population Projections
 - 2. Water Demand Projections
 - 3. Groundwater Model Report and Results
 - 4. Subsidence Models Reports and Results
 - 5. Scenario Development and Evaluation Reports
 - 6. Recommendations for changes to Regulatory Plan (modeling related)
 - 7. Recommendations for changes to Regulatory Plan (permitting/exemption related)
 - 8. Update to Disincentive Fee Report and Results

II. Population & Water Demand Projections

- A. Develop Baseline Projection Information
 - 1. Develop Geographic Shapefile / Overlay Information
 - a) GAM Grid
 - b) Water Well Location(s)
 - c) Entity Boundaries (Water Authorities, Water Districts, Municipalities, etc.)
 - d) Subsidence District Regulatory Boundaries
 - 2. Obtain and Incorporate Aerial Photography

3. Obtain and Incorporate Land Use Information
 - a) Roadways
 - b) Drainage Ditches
 - c) Floodplains
 - d) Detention Ponds
 - e) Utility Easements
 - f) Open Space
 - g) Parks
 - h) Cemeteries
4. Evaluate and Assess 2009 Water Usage Information
 - a) 2009 Well Pumpage Data
 - i. Municipal
 - ii. Industrial / Manufacturing
 - iii. Irrigation
 - iv. Mining
 - v. Livestock
 - vi. Exempt Usage
 - b) 2009 Surface Water Use
 - i. Municipal
 - ii. Industrial / Manufacturing
 - iii. Irrigation
 - iv. Mining
 - v. Livestock
 - vi. Exempt Usage

B. Develop Baseline Data Management System, GIS, and Programming Tools

1. Shapefile / grid cell rectification
 - a) WUG's / Districts
 - b) Census Tracts
 - c) GAM grids
2. Allocation of population by cell / regulatory boundary
3. Land use / build-out limitations
4. Per capita water usage allocation by cell / regulatory boundary
5. Future well / demand distribution

C. Develop Baseline Projection Methodology Information

1. Texas Water Development Board (TWDB) / Regional Water Planning
2. University of Houston Center for Public Policy (CPP)
3. Houston Galveston Area Council (HGAC)

4. Municipal Information Systems (MIS)
5. Population and Survey Analysts (PASA)
6. American Metro Study Corporation (AMS)

D. Develop Baseline Water Usage and Trends Information

1. Groundwater Pumpage
2. Surface Water Usage
3. Per Capita Water Usage
4. Water Conservation Trends
5. Regional Water Planning Outlook
6. Exempt Usage
7. Surrounding County Water Usage Estimates

III. Groundwater Model

E. Update Northern Gulf Coast Groundwater Availability Model (NGC-GAM)

1. Distribute all data into the GAM's 1 square mile grid cells
2. Collect and distribute historical groundwater data (2009) by grid cell
3. Estimate historical and current exempt groundwater pumpage from within the District's boundaries
4. Collect historical and existing groundwater pumpage from surrounding counties with groundwater districts
5. Estimate historical and current groundwater pumpage from surrounding counties without groundwater districts
6. Distribute all collected groundwater data by model layers (by aquifer)
7. Collect available historical water-level change data (1st quarter 2010) for the aquifers within the area of interest within the GAM, including surrounding counties
8. Collect and evaluate recent recharge studies and data and incorporate as updated parameters
9. Collect and evaluate any recent studies or data related to other parameters with the GAM (i.e. transmissivity, porosity, etc.)
10. Produce modeled vs. actual water-level change maps through 2010, based on groundwater pumpages through December 2009.
11. Produce modeled vs. actual subsidence maps through 2010, based on the Interbed Storage Package (IBS)
12. Incorporate known 2010 conversion plans for existing Groundwater Reduction Plan (GRP) owners/managers

F. Calibrate NGC-GAM parameters using updated data

- G. Provide calibrated NGC-GAM and reports and coordinate with TWDB to update the official NGC-GAM
- H. Run developed groundwater pumpage scenarios and report model results
- I. Provide developed groundwater pumpage scenario model results for input into subsidence models)
- J. Compare IBS Package subsidence results with PRESS model subsidence results

IV. Subsidence Model

- K. Collect historical subsidence data and hydrographs for 26 subsidence models (PRESS sites)
- L. Recalibrate the 26 PRESS models using updated data
- M. Run developed groundwater model results through PRESS model and report results
- N. Compare PRESS model results with IBS Package subsidence results

V. Scenario Development

- O. Develop baseline groundwater use scenarios using actual pumpage through 2009, known amounts and areas of surface-water conversions for 2010, and updated 2020 and 2030 conversions
- P. Assist in distributing projected groundwater pumpage into GAM grid cells based on various regulatory scenarios
- Q. Compare results of scenario runs to evaluate effectiveness of existing and potential regulations
- R. Incorporate existing conversion credit concepts into scenario development

VI. Disincentive Fee Update

- A. Review, summarize, and update existing costs for surface water conversion available from North Harris County RWA, West Harris County RWA, Central Harris County RWA, North Fort Bend WA, City of Houston, and other GRP owners/managers.
- B. Review, summarize, and update existing groundwater supply costs for region.
- C. Assist District in establishing an updated Disincentive Fee.