

Item #5 - Improvements to the Central Queen City-Sparta/Carrizo-Wilcox GAM

In January, 2015, the Board approved up to \$100,000 for use in the updating of the Central Queen City-Sparta/Carrizo-Wilcox Groundwater Availability Model (GAM) proposed by the Texas Water Development Board. The original GAM included three improvements:

- Effects of faulting on groundwater movement
- Necessary revisions to the top and bottom of the various stratas
- Updates to pumping across the model

One further aspect was proposed by the districts in GMA 12;

- Attempt to better model the groundwater/surface water interaction along both the Colorado and Brazos river basins

The originally proposed model improvement has been bid and a contract signed with Intera Geosciences and Engineering Solutions (Intera). We are now in the negotiation stage on the groundwater/surface water layer of the model. Some of the background information is:

- The original proposal was using a ½ mile x ½ mile grid along each of the rivers.
- In order to get information that is meaningful, it has been recommended that the grid be reduced to ¼ mile x ¼ mile. This significantly increases the cost of the project but brings more meaningful results.
- Intera has approached Environmental Stewardship (ES), the Lower Colorado River Authority (LCRA), and the Brazos River Authority (BRA) for assistance in funding the project.
- To date, LCRA has committed \$20,000, BRA is close to committing \$20,000, and ES is committing to raise \$35,000.
- Lost Pines Groundwater Conservation District (LPGCD) had committed \$50,000 of in-kind services to the model improvement. It appears there are no avenues of in-kind services that will meet the parameters of the project. **Because of the preceding explanation, LPGCD is no longer contributing any funding to the model improvement.**

Steve Young, Intera hydrologist, will be at the Board meeting to discuss the project and total cost. With LPGCD dropping out and the increased detail of the model, Brazos Valley GCD and Post Oak Savannah GCD will be asked to contribute additional funding to the project.

Following is a letter requesting additional funds.

September 4, 2015

Mr. Alan Day, General Manager
Bravos Valley Groundwater Conservation District
112 West 3rd Street
Hearne, Texas 77859

Re: Additional Funding Request for GMA 12 Model Update

Dear Alan:

This letter is to request additional funding to improve the Sparta/Queen City/Carrizo/Wilcox Groundwater Availability Model's (GAM) capability to model groundwater surface water (GW-SW) interaction. The funding will become a part of a project managed by the Texas Water Development Board (TWDB). The TWDB GAM project is currently funded at \$520,000. An expanded TWDB project to improve GW-SW interaction is estimated to cost about \$750,000.

Table 1 provide a chronology of the evolution of the GAM project SOW and funding beginning in 2009 when GMA 12 submitted a plan to TWDB to improve the GAM. In December 2014, TWDB issued an RFP to improve the GAM by incorporating more hydrogeological data into the GAM and improving the representation of the faults in the model. This RFP was in response to a plan submitted to the TWDB in 2009 to improve the GAM. In April 2015, TWDB announced that they would award INTERA the GAM contract by August 31, 2015. The funding for this contract is \$520,000 and consists of \$320,000 from TWDB's and \$200,000 from POSGCD. TWDB stated that additional funding and the scope-of-work for an improved GW-SW capability needed to be developed and coordinated among INTERA and the sources of funding.

Since April 2015, INTERA has worked on developing a plan to improve the GW-SW interaction component of the GAM. The plan consists of two phases. Phase 1 is to convert the GAM from its current MODFLOW 96 format(which is no longer supported by the USGS and is technology that is about 20 years old) to a MODFLOW-USG format, to include additional model layers to create a shallow groundwater flow zone, and to reduce the size of the grid cells to 0.5-miles immediate adjacent to Colorado and Brazos rivers. Phase 2 is to expand the increasing the area of the grid refinement to include the major tributaries of the Colorado and Brazos river and, if possible, decrease the grid cell refinement immediate adjacent to the Colorado Brazos river from 0.5-mile to 0.25 mile spacing.

INTERA estimates that Part 1 will cost about \$160,000, which is about \$58,000 more than the \$102,500 already committed to by the GMA 12 districts. INTERA had planned to obtain the additional funding for Phase 1 by having Lost Pines GCD change their committed in-kind funding of \$50,000 (see Table 1) to \$50,000 of direct project funding and to have the remaining districts contribute \$10,000. Exhibit B is a request from INTERA (dated May 2015) to LPGCD for \$50,000 of direct funding. In June 2015, LPGCD voted not to provide any direct funding for the TWDB project.

For Phase 2, INTERA has requested funding from entities other than districts that have a vested interested in improving the GAM. During the last two months, INTERA has obtained favorable responses for funding from Lower Colorado River Authority (LCRA), the Brazos River Authority (BRA), and Environmental Stewardship (ES) in exchange for expanding the refined grid spacing coverage to include the major tributaries of the Colorado and Brazos rivers. Currently, it appears that between \$40,000 and \$75,000 will be contributed by these three entities for Phase 2 of the study.

However, at this time Phase 1 of the GW-SW project is not funded. To fund Phase 1, INTERA is asking BVGCD and POSCD to each contribute and additional \$30,000. Exhibit B is the request to POSGCD for additional funding. If both districts provide this contribution, the total financial commitment by POSGCD and BVGCD will be approximately \$230,000 and \$130,000, respectively. All funding for this project would need to be submitted to TWDB by early 2018. In order to properly manage this project, INTERA would appreciate a reply before October 30, 2015.

INTERA appreciates BVGCD willingness to consider INTERA's request. Please direct any question to me.

Sincerely,



Steve Young, PG, PE, Ph.D
Principal Hydrogeologist

Table 1. Chronology of the TWDB Project to Improve the Sparta/Queen City/Carrizo/Wilcox Groundwater Availability Model (GAM)

Date	Event
June 2009	GMA 12 votes to pursue co-funding a project with TWDB to improve Sparta/Queen City/Carrizo/Wilcox GAM (GAM). The three major areas of improvement are; 1) to improve the hydrogeological characterization of the Simsboro aquifer; 2) to improve the representation and modeling of the Mexia-Talco fault system; and 3) to improve the capability to simulate GW-SW interaction.
October 2009	GMA 12 submits a proposal to TWDB for co-funding of the Sparta/Queen City/Carrizo/Wilcox GAM
December 2009	POSGCD approves \$200,000 to support a joint TWDB project with GMA 12 to improve the GAM
2010 to 2014	POSGCD continues discussions with TWDB on a potential GMA 12 project to improve the GAM but but not all districts have agreed to support the project. Because of a lack of consensus TWDB will consider funding the GAM project with GMA-12 as a sole-source project.
March 2014	POSCD begins discussions with TWDB for TWDB to used POSGCD \$200,000 to competitively bid an project to improve the GMA without additional support from GMA 12 districts
December 2014	TWDB issues a \$520,000 (\$320,000 from TWDB & \$200,000 from POSGCD) RFP to update GAM but not include an improved SW-GW capability because of insufficient funding
January 2015	GMA 12 districts meet at POSGCD offices to discuss an expanded TWDB project. BVGCD commits \$100,000. METGCD commits \$2,500. Fayette commits \$0.0. LPGCD states that they have already set budget for next year but would contribute \$50,000 in-kind services with possibility of contributing direct funding in future. Districts agree to fund improvement of SW-GW interaction with available funding. INTERA and LBG Guyton state that sufficient funding available to make an improvement by adding model layers at shallow depths but there may not be sufficient funding to make improvements by decreasing size of grid cells around the Colorado and Brazos River. INTERA mentions that to achieve small grid sizes around the rivers, the entire model would need to be redone with a small grid size and based on previous experiences, process of re-gridding the entire GAM would cost much more than the available budget. However, INTERA states that if the GAM was convert from MODFLOW 96 to MODFLOW USG, a refined grid just around the Colorado and Brazos rivers may be possible with \$150,000.
April 2015	TWDB awards GAM contract to INTERA
May 2015	INTERA investigates approaches for improving the GAM capability to simulated GW-SW interactions. INTERA determines that most cost effective approach to decreasing size of grid cells is to convert GAM to MODFLOW-USG format. INTERA develop a phased approach for improving the GAM and obtaining additional funding.
May-July 2015	INTERA discusses options with LPGCD for direct funding for TWDB project. LPGCD decides not to provide any direct funding for the TWDB GAM project.
June –August 2015	INTERA asks the general managers of POSGCD and BVGCD to approach their boards for additional funding after TWDB signs a contract with INTERA . INTERA asks Lower Colorado River Authority, the Brazos River Authority, and Environmental Stewardship to consider funding an updated GAM in return for improving the GAM's ability to simulate GW-SW interactions.
August 31, 2015	TWDB awards the GAM contract to INTERA.
August – September 2015	Environmental Stewardship is asking for \$35,000 of funding form the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Basin and Bay Stakeholder Committee (BBASC) to reduced the grid cell size from 0.5-miles to 0.25 miles in the vicinity of the Colorado and Brazos rivers contingent of the GAM being converted to a MODFLOW-USG format. .
September 2015	Lower Colorado River Authority tentatively commits to contributing \$20,000 to expand the project scope to include smaller grid cell sizes in vicinity of Colorado rivers major tributaries
September 2015	Brazos River Authority tentatively commits to contributing \$20,000 to expand the project scope to include smaller grid cell sizes in vicinity of Brazos rivers major tributaries
September 2015	INTERA is requesting \$60,000 from POGCD and BVGCD for Phase 1 work.