**Progress Report**

**on**

**Mapping and Analysis of Wastewater Spills in the Barton Springs and Southern Segments of the Edwards Aquifer**



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 October 31, 2012
To: Annalisa Peace
Executive Director, Greater Edwards Aquifer Alliance (GEAA)
San Antonio, TX 78212

From: Aquifer Resource Innovators (ARI)

CC: Dr. Yongmei Lu
Department of Geography, Texas State University
San Marcos, TX 78666

Dear. Ms. Peace,

We are writing to inform you on the progress of our research project “Mapping and Analysis of Wastewater Spills in the Southern and Barton Springs Segments of the Edwards Aquifer.” Immediately after presenting you our project proposal on October 3, 2012, our team began work on the initial steps of data acquisition and processing, which has hereby been completed.

We write to inform you of our completed work and results, work we are currently executing, and work we have for the future. There has been some revision of our timetable and goals due to some unforeseen complications, which we will address in full throughout the document. Nonetheless ARI will be presenting you with our final report and deliverables as scheduled on December 10, 2012.

The last part of the progress report is an overall assessment of our project and what we look forward to working on in the second half.

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Background
Purpose
The purpose of our project is to map and analyze wastewater spills that have occurred in Texas Commission on Environmental Quality (TCEQ) Region 11 within the last five years. The geovisualization of this data is expected to enhance GEAA’s understanding of the distribution, gallon amount, frequency, and causes of wastewater spills that may be a hazard to aquifer health. Additionally, the interactive mapping portion of the project is aimed at enhancing the public’s understanding and concern for wastewater spills that may affect their health by polluting groundwater reserves.
Scope
Besides the spatial and temporal limitations of our project, ARI is also only obtaining spill data from TCEQ, and therefore only mapping and analyzing spills amounting in over 500 gallons. We have been looking predominantly at the first priority counties in the Request for Proposal (RFP), Hays and Travis. At the end of the project, ARI will provide the following:
- Static maps of wastewater spills in each county with aggregated volumes
- Static, categorical maps of wastewater spill causes
- Sequential maps for Travis county showing the increase in spills throughout five years (2007-2012)
- Integration of data with interactive mapping software, possibly Manifold and/or Google Earth
- An analysis on the cause of spills, including a categorical map as well as more in-depth analysis of population growth and development in areas with a high density of spills
- A website with all of our project documents and Final Deliverables
- A professional display poster of select maps and findings
- A CD with all of our project documents and metadata

Work Completed
Data acquisition & processing
ARI acquired a table from TCEQ of over 1,800 wastewater spill records in Region 11 and processed all spills between 2007-2012 for Hays and Travis County. We created new columns in Excel with a full street address, city, zip code, cause of spill and action that was taken. In total we processed 537 records. Some of these were eventually left out due to unspecified or nonexistent locations. In our final maps we matched 93 spills for Hays and 344 for Travis, totaling in 437 spill records mapped.
Data analysis & interpretation
We are looking into the patterns characterizing our data, but have found that our original hypothesis of finding more spills in certain Municipal Utility Districts (MUDs) is incorrect. There seems to be a stronger correlation between spills and population. In addition, there are not very many spill records located on the recharge or contributing zone of the aquifer. We have therefore decided to combine our analyses and give a general assessment of the impact of population growth and development on wastewater spills.
Interactive mapping
We have not yet done any integration with interactive mapping software. Now that our spill records are complete shapefiles, we assume the transferring of our data won’t be very time consuming.
Website publication
We have not completed publishing our website, and intend to have it done by the end of Week 9. The initial construction started in Week 4 and the initial template has been created.
Final Deliverables
We have created some of our static maps, but will not be creating final versions of our deliverables until Week 8.

Current Work
Data acquisition & processing
Hays and Travis County spills are complete, but due to prior communications and analysis complications we will continue to geocode Williamson County. This shouldn’t take more than a couple of days.
Data analysis & interpretation
Our spill data showed an obvious correlation to population and development, with most of the spills being in the Austin and San Marcos area. These two cities are the largest cities in Travis and Hays County. We are beginning to put together a general assessment of the impacts of population growth and development on wastewater spills. We are also going to make a map of spill causes by category.
Interactive mapping
We are currently cleaning up the attribute tables of the spill data in ArcMap so that when displayed in the interactive map software, the location, duration, volume, and causes will be easier to read. We are going to explore options such as Manifold, Google Earth, and potentially Open Source softwares to create our interactive map.
Website publication
We are in the process of making a website using Dreamweaver. So far we are in the exploratory phase of website publication since none of us have previous website making experience. Looking at tutorials will help us navigate through Dreamweaver and produce a well-drawn out website that clearly states our goals and outcomes.
Final Deliverables
We are working on efficiently displaying our spill data on our static maps and the creation of time-lapse maps for Travis County.

Future Work
Data acquisition & processing
As previously stated we will be geocoding the spill records in Williamson County within the next week. We will then promptly move on to the following portions of our project.
Data analysis & interpretation
We will put together a general analysis of population growth and development on wastewater spills in Hays, Travis, and Williamson County. As these areas are all experiencing much growth, we feel we can make an effective discussion of our data. With the completion of Williamson County we will have a fuller picture of the recharge zone of the Edwards Aquifer, which is of upmost importance in our analysis.
Interactive mapping
Within the next couple of weeks we will be deciding which software we will be using for our interactive map. Considering the format of our data, it shouldn’t take us too long to create an interactive map with appropriate attributes.
Website publication
We will continue to work on publishing our website until Week 10 of our project. It is a slow but steady progression due to our unfamiliarity with Dreamweaver, but we expect to have a well-designed finished product.
Final Deliverables
In this last half of our project span we will be integrating our data into an interactive map software, perfecting our static maps, finishing up our website, putting together our final report, designing and printing our professional poster, and creating a CD of all our documents as well as our data and metadata for GEAA’s future use.

Schedule Revisions
Adjustments to our timetable are shown below.

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| --- |
| **ARI Revised Timetable** |
|   | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** | **Week 6** | **Week 7** | **Week 8** | **Week 9** | **Week 10\*** |
| *Start date* | *Oct. 1* | *Oct. 8* | *Oct. 15* | *Oct. 22* | *Oct. 29* | *Nov. 5* | *Nov. 12* | *Nov. 19* | *Nov. 26* | *Dec. 3 - Dec. 10* |
| **Data Acquisition & Processing** |   |   |   |   |   |   |   |   |   |   |
| **Data Analysis & Interpretation** |   |   |   |   |   |   |   |   |   |   |
| **Interactive Mapping** |   |   |   |   |   |   |   |   |   |   |
| **Website Publication** |   |   |   |   |   |   |   |   |   |   |
| **Final Deliverables** |   |   |   |   |   |   |   |   |   |   |

We extended our Data Acquisition & Processing by one week due to challenges we had processing the data and formatting it appropriately for geocoding in ArcMap. This also led to moving our Data Interpretation & Analysis back one week. We moved the Website Publication up by one week in order to make up for lost time, and extended its span to create a more desirable product. We moved back our Interactive Mapping to Week 6 due to uncertainties with the server at Texas State, and are currently awaiting more information on possible open source options. Lastly, we left ourselves three instead of four weeks to prepare our Final Deliverables. Considering this will mainly involve putting together the pieces we will have already created, we believe this will be sufficient enough time.

Conclusion

Overall our project is going well despite some unsuspected changes and challenges. We hope that our above discussion of the background and scope of our project, completed, current, and future work, and schedule changes has assured you of our past and continued progress with this project. We are looking forward to getting a fuller picture of the recharge and contributing zones of the aquifer with the addition of Williamson County to our project. Although we had hoped that the correlation between utility providers (such as MUDs) and wastewater spills would be stronger, we have not lost hope in finding a correlation between the spill records and an external factor such as population growth and development, or perhaps outdated infrastructure. We will have our Final Deliverables ready on time, and are confident of our success at improving the context of spills in the Barton Springs and southern segments of the Edwards Aquifer.