Structure Maps and Stratigraphy Dataset for District Online Applications

Prepared for:

Trinity-Glen Rose Groundwater Conservation District

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Introduction

As requested, LBG-Guyton Associates (LBG-Guyton) has prepared a stratigraphic dataset and two structure maps for the Trinity Glen Rose Groundwater Conservation District (TGRGCD) in northern Bexar County, Texas. Primary tasks for this project include 1) compilation of geophysical logs and/or stratigraphic data from numerous sources, 2) determination of the tops of the Lower Glen Rose and the Cow Creek Formations, 3) compilation of mapped fault data, 4) simplification of mapped fault data (for contouring purposes) and 5) processing the structure data to create contoured surfaces.

Included with this report are wall-sized hard copies of maps, spreadsheets and ArcGIS shapefiles as requested by TGRGCD.

Data Compilation

The structure mapping is based on geophysical data compiled from the following sources: 1) GeoCam electronic geophysical logs (both as WellCAD files and in a pdf format) provided by the District, 2) paper files provided by the District, 3) a report prepared for the Edwards Underground Water District (EUWD) by W.E. Simpson and LBG-Guyton in September, 1993 titled "Northern Bexar County Water Resources Study", 4) stratigraphic data from geophysical logs compiled for the original Trinity Hill Country GAM, 4) TCEQ groundwater files (state well reports filed prior to initiation of online filing system), and 5) geophysical logs compiled for a preliminary groundwater investigation at the Camp Stanley Storage Area.

Additional sources that were searched for geophysical data (with no results) include: 1) Railroad Commission of Texas Groundwater Advisory Unit (formerly the Texas Commission on Environmental Quality's Surface Casing Division) geophysical log library, 2) LBG-Guyton's geophysical log library, 3) Railroad Commission of Texas online well viewer (oil and gas records), 4) two private geophysical data vendors (TGS and IHS), and 5) the Bureau of Economic Geology IGOR geophysical database.

A total of 135 data locations in and proximal to the District were found for this project. Of those 135 data locations, only 125 were ultimately utilized (119 of these were located within the District). Four data locations (derived from the GAM) are not in Bexar County but are located nearby in surrounding counties. Some geophysical logs (i.e. Edwards wells) were not drilled deep enough to penetrate the target formations; some of the logs were of poor quality, and contacts between units could not be picked with any degree of confidence on some logs. Table 1 lists data by source and provides a summary of data counts for each. A map of these data is included as Figure 1.

Table 1. Data Locations by Source

Data Source	Data Locations	Data Locations Used
TGRGCD	93	80
EUWD Report	25	25
GAM (Bexar County)	13	13
GAM (Other Counties)	numerous	4
Camp Stanley Report	3	2
TCEQ Well Reports	1	1
Total Data Locations	**135**	**119 (in District) plus 6**

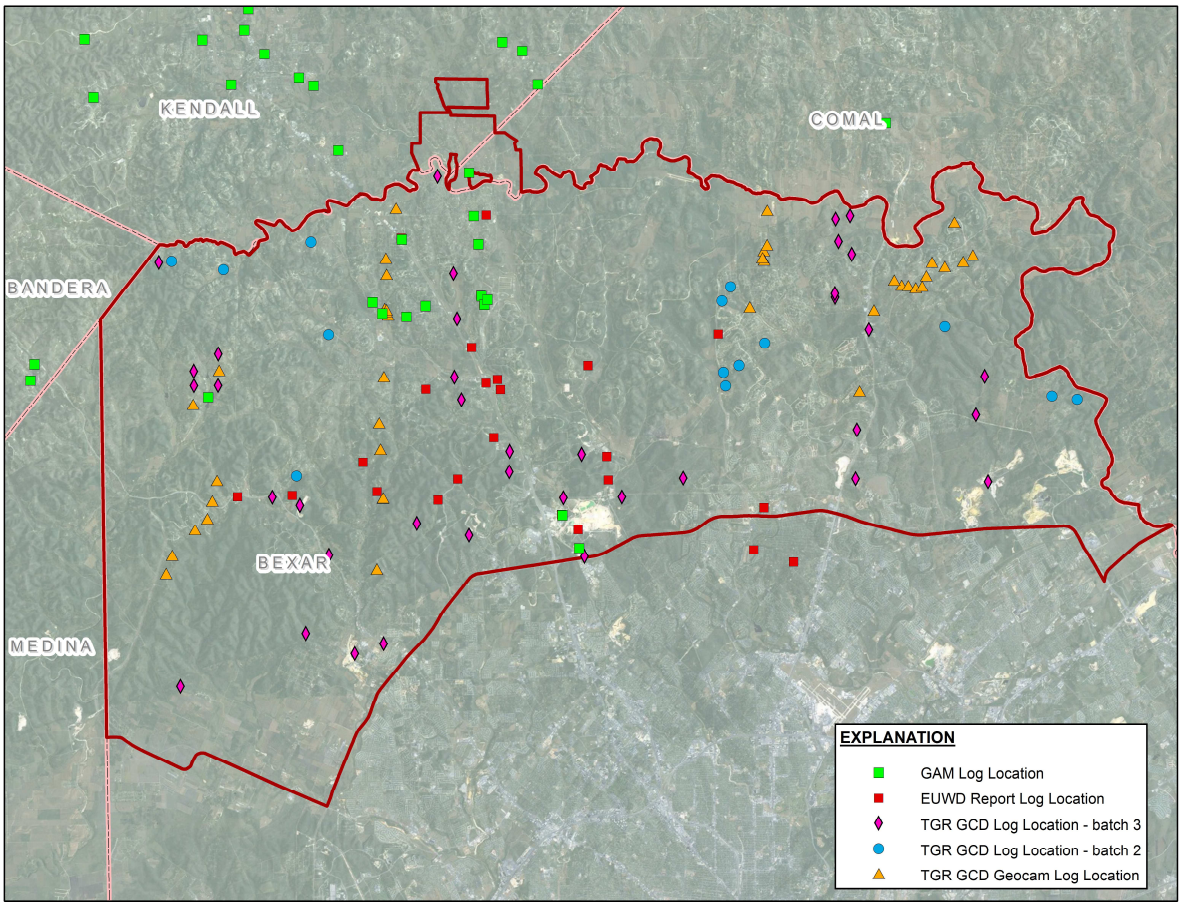

Figure 1. Data Locations by Source

Stratigraphic Picks

To determine the tops of the Lower Glen Rose and the Cow Creek Formations, the geophysical logs were first mapped on top of the surface geology in order to note what formation occurs at the surface for each data location. This task is critical to determining what section of the Edwards and/or Trinity Groups is represented in the log, especially in logs where the top of the Lower Glen Rose or Cow Creek were either not penetrated or not easily discerned on the log. In cases when the top of the Cow Creek was either missing or uncertain, it was necessary to work from the surface down to find the top of the Lower Glen Rose and/or the top of the Cow Creek Formations. In the event that the top of the Cow Creek was apparent in the log, it was preferable to work from

the bottom up to determine the top of the Lower Glen Rose Formation. These picks were then verified by continuing to work toward the surface, to ensure that the picks made sense with the surface geology. Since no cross sections were constructed to verify picks laterally, the process of picking the entire section was considered necessary to maintain consistency.

Surface geology sources include: U.S. Geological Survey (USGS) Open-File Report 2009-1008 for the northernmost portion of the District, USGS Scientific Investigations Map 2873 for the middle portion of the District, and The Geologic Atlas of Texas, San Antonio Sheet for the southernmost portion of the District. Primary references for formation and member thicknesses include: USGS WRI Report 03-4081, Geologic Framework and Hydrologic Features of the Glen Rose Limestone, Camp Bullis Training Site, and the USGS WRI 95-486 Geology and Hydrology of the Edwards Aquifer in the San Antonio Area, Texas. A complete list of references is included at the end of this report.

QA/QC Process

Once all of the stratigraphic picks were compiled from all sources, missing land surface elevations were calculated using a Digital Elevation Model (DEM). Top of formation elevations were then calculated for the two surfaces. The elevation data were mapped for both surfaces, and carefully reviewed for data consistency. These data were also contoured without the faults in order to help identify data points that could potentially have erroneous latitude/ longitude or stratigraphic picks. Any data point location with a structural elevation that looked inconsistent with surrounding data point locations was checked thoroughly. Several data points had incorrect latitude/longitudes but could be relocated to approximate location based on the street address for the well. A couple of points could not be resolved by double-checking x, y and z data and were eliminated.

Faults and Structure

The Balcones Fault Zone generally trends southwest to northeast through northern Bexar County. Predominant faults are termed “en echelon” and define the trend of the fault zone (southwest to northeast). Several other fault sets with various orientations are also present, thus the project area is complexly faulted.

The mapped faults were derived from three different sources that cover different portions of the District. The same sources that were used for the surface geology were also used for the faults. The three mapped fault sources were combined in order to eliminate overlaps and present a more comprehensive assessment of faulting instead of three different maps. The fault density in northern Bexar County is relatively high. In addition, the data density in some areas is relatively low. It was necessary to judiciously assess where there was enough data between faults to develop structure surfaces. In some cases, there is not enough data to develop structure surfaces between each fault, and contours had to be interpreted across mapped faults. Only the most predominant faults were used to help contour the structure surfaces. The predominant faults were selected from each map referenced above and a new shapefile was created that included only major faults that affected the structure interpretation. This task was completed for contouring purposed only, but is included as a separate layer in the final maps.

Contouring within individual fault blocks (breaking contours at the faults) was only possible in areas of greater data density (primarily to the northwest). Contours were not broken at faults in the southeastern portion of the District because there is not enough data to warrant that level of detail.

An attempt to contour the structure data using Surfer contouring software was unsuccessful. A fault set was prepared that Surfer could incorporate; however, no contouring method which honored faults was able to contour the data meaningfully due to a lack of data density between faults. The data was contoured manually in areas with relatively high data density. In areas with relatively low data density, surface contours generated via Surfer (using no fault break lines) were utilized for guidance. On Plates 1 and 2, only major faults that are not normal faults (downthrown to the southeast) are labelled with a D for down and a U for up. Very few reverse faults were indicated on published maps.

The elevation of the Lower Glen Rose Formation ranges from 1,385 ft above mean sea level (msl) in the northwest Bexar County to 29 ft below msl to the east of Government Canyon State Natural Area (Plate 1). The elevation of the Cow Creek Limestone ranges from 1,087 ft amsl in northwest Bexar County to 469 ft below msl to the east of Government Canyon State Natural Area (Plate 2).

Recommendations

More data point locations are needed to provide more robust structure maps, especially in the southeast portion of the District. There is enough data to provide general elevation data; however, greater data density would help define the local deviations that likely occur within most of the fault blocks.

We recommend that the District continue to diligently work toward acquiring geophysical data immediately upon completion of each new well. Historical geophysical data within Bexar County is sparse; therefore, acquisition of current and future geophysical data is critical to refining geological structure data within the District.

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