EXHIBIT B

SCOPE OF WORK

Task 1 Project Management and Monitoring:
Our approach to project Task 1 is provided below, and our approach and deliverables for the remaining tasks are presented in sequence. The project schedule and percent effort table are provided in the Exhibit A. As indicated on the project team organizational chart, the DBS&A Project Manager, will be the primary point of contact for the TWDB contract.

Formal meetings with appropriate TWDB staff will occur as described under Task 2. Detailed monthly progress reports will be submitted to the TWDB outlining progress of the project, anticipated problems or issues to be resolved, and proposed solutions. Issues of concern will be reported to the TWDB Project Manager by phone or in-person meeting as soon as they are recognized.

Task 1 Deliverables:
A monthly progress report that includes the overall project progress, detailed progress by task, and an updated schedule. See Exhibit E, TWDB Guidelines for a Progress Report.

Task 2 Meetings and Stakeholder Communications:
As required in the RFQ, a minimum of four meetings will be held with the TWDB at project initiation, for approval of project technical methodology, for discussion of potential production areas and prioritization for production calculations, and at project completion. Other meetings will be held as needed.

Representatives of the team will attend both required meetings and make a presentation at the second stakeholder meeting as required in the RFQ. If other stakeholder meetings are required, we will assist TWDB as needed. In addition, we anticipate contacting certain stakeholders in the region that may have useful information for completion of the study.

Task 2 Deliverables:

- Stakeholder Meeting 1: Already held on October 26, 2015 in Austin, TX to explain TWDB's approach in implementing House Bill 30, solicit feedback on what constitutes "significant impact", and receive general comments concerning implementation of the legislation.

- TWDB Meeting 1: Project Initiation Meeting

- TWDB Meeting 2: Discussion and approval of Project methodology; date to be determined by the Contractor

- Stakeholder Meeting 2: Presentation and discussion of Potential Production Areas with stakeholder in the morning; date to be determined by the Contractor. The Contractor will set the date and provide a minimum of one-month advance notice to TWDB. TWDB staff will organize the meeting and invite stakeholders.

- TWDB Meeting 3: Discuss prioritization areas for production calculations with TWDB staff in the afternoon on the same day of the stakeholder meeting.

- TWDB Meeting 4: Project completion; formal presentation at the end of the Project.

- Additional technical meetings may be scheduled either in person, through a webinar, or teleconference venue to discuss project progress and issues. TWDB staff may periodically visit the Contractor's work premises to assess progress on the project.

Task 3 Delineation of Groundwater Quality Zones and Volume Computations:
Our proposed approach for the delineation of fresh, brackish and saline groundwater vertically and horizontally is based on standard principals of applied hydrogeology and our understanding of the Blaine Aquifer system. Our general approach is as follows:

1. Use the best available data to define the Blaine Aquifer system extent, both horizontally and vertically.
2. Develop a database of existing water quality observations representative of the aquifer system framework, including TWDB data not previously assigned an aquifer code.
3. Identify water quality data gap areas from the compiled water quality database. Use interpretation of available geophysical logs to estimate groundwater salinity for data-gap areas.
4. Delineate groundwater quality zones as specified in the RFQ, and calculate volumes of fresh, brackish, and saline groundwater within those zones.

Each of these steps is presented in greater detail in the following subsections.

<u>Definition of Blaine Aquifer System Extent</u>
The Project Area in the RFQ is defined as the Blaine Aquifer extent as delineated by the TWDB. We believe that the project area extent can be expanded in accordance with existing data to better fulfill the RFQ requirements and the intent of HB30. We propose to lead a technical discussion at the kickoff meeting to propose our suggested project area extent and our justification, with particular focus on the western boundary and overlying, hydraulically connected Permian formations. Defining the horizontal and vertical extent of the Blaine Aquifer, and obtaining consensus for the technical approach with the TWDB, is critical for successful completion of the remainder of the project. Development of the aquifer framework will help us assign historical water quality data an aquifer code for wells with producing intervals, and will also identify the depth interval for evaluation of geophysical logs for interpretation of groundwater salinity. The following is an outline of our proposed approach for defining the aquifer geometry.

1. All project-generated GIS shapefiles and raster files will follow the Second Edition of the BRACS data dictionary recommended file naming format.
2. The raster files for Layer 2 in the Seymour GAM will be used as the starting point for defining the top and bottom of the Blaine Aquifer.

3. Cross sections from existing published reports will be georeferenced and used to adjust the Blaine top and bottom elevations.
4. Available driller's reports and geophysical logs will be compiled, evaluated and compared to the working Blaine framework, and the Blaine top and base raster surfaces will be modified in accordance with this new data. Data sources will include driller logs from published reports and TLDR well reports, logs from the BRACS database, geophysical logs and cable tool driller's reports from the BEG, and supplementary geophysical logs from the Texas Railroad Commission online database.
5. These GIS Blaine raster surfaces will be used to determine Blaine production intervals on TDLR well logs and BEG cable tool driller's reports in areas with sparse well control, and to provide guidance to identify the Blaine interval on each geophysical log used to determine TDS.

Groundwater Quality Data Compilation and Analysis

Our approach to the compilation of groundwater quality data is as follows.

1. Compile TWDB groundwater quality data for the TWDB defined Blaine Aquifer area and extent of Blaine Aquifer system with less than (<) 35,000 mg/L TDS. This includes TWDB database and data from wells in TWDB historical reports that are identified representative of the Blaine Aquifer system.
2. Compile TWDB most recent groundwater quality data for TWDB Blaine Aquifer system. Based on proposal screening, there are 563 Blaine Aquifer system TWDB wells with water quality (see Figure above). Only 323 of these TWDB wells with water quality are reported to be solely in the Blaine Formation.
3. Research additional water quality data sources from Texas Water Commission, TWDB, and USGS reports, particularly from Burnilt (1963), Stevens and Hardt (1965), Smith (1970), Cronin (1972), Maderak (1972), Maderak (1973), Popkin (1973), Popkin (1973a), and Smith (1973). Where there is supporting water quality data without an aquifer code, the Blaine top and bottom raster surfaces will be used to determine the Blaine's top and bottom interval for the water quality sample location (without as assigned aquifer code) to determine if the analyses is representative of the Blaine. As approved by the TWDB Project Manager, the DBS&A team will contact the Panhandle, Mesquite, and Gateway GCDs for additional water-quality information.
4. Create Blaine groundwater chemistry tables using the compiled Blaine groundwater quality dataset plotting TDS ranges and selected cation and anions to develop water quality parameters with depth as described in Meyer, 2012 and 2014.
5. The work by Stevens and Hardt (1965) to define the brackish-brine groundwater interface and brackish groundwater thickness for parts of Dickens, King, Kent, and Stonewall counties will be georeferenced, digitized, and incorporated into the 3D model to assist in defining water quality zones.
6. The goals of this task will be to create a composite measured Blaine Aquifer groundwater quality GIS shapefile, and to identify water quality data gap areas.

Geophysical Log Analysis

For identified water-quality data gap areas, we propose to use the Resistivity Water

Apparent (RWA) Minimum Method as described by Estepp (1998, 2010) and Meyer and others (2012 and 2014) to determine varying TDS concentrations within the aquifer from available geophysical logs. The RWA method requires application of a water quality correction factor to account for varying mixed mineral content such as elevated bicarbonate or sulfate concentrations. Several of the parameters needed to apply this method can be obtained from the logs themselves (formation depths, temperature gradient, deep resistivity and porosity, if available), while others will be developed using the BRACS database. This method is based on application of Archie's equation (Archie, 1942) that relates formation water resistivity to formation resistivity values measured by resistivity logging tools. The analysis of water-quality characteristics from geophysical logs will be calibrated to known water quality data, if data points with both water quality analysis and geophysical logs can be identified.

The first step in the geophysical log analysis will be to identify potentially usable logs from the BRACS database. The DBS&A team will create a GIS shapefile with a 1-mile buffer zone to the northeast, east, and southeast of the TWDB Blaine Aquifer extent and review geophysical logs with resistivity curves within that extent. Based on current screening of BRACS database, there are approximately 230 geophysical logs in the proposed region (out of 339 resistivity logs) that have resistivity curves that start within 200 feet of land surface. Next, using the Blaine top and base raster surfaces, we will determine which geophysical logs provide useful information within the Blaine interval. Other items, such as quality of the log header information, curve signature (definition and amplitude) and curve scale header values will also be reviewed. Based on this information and analysis, the best resistivity logs with the best geographic distribution to cover data gap areas will be selected for further analysis.

If needed, the BRACS database will be supplemented using additional subsurface data, including publicly available geophysical logs from the BEG or the Texas Railroad Commission. These supplemental logs, if any, will also be screened as described above and will be incorporated into the BRACs database and Elog TDS shapefile. Water quality data will be entered into the BRACS database (Microsoft Access) form used to calculate water quality correction factor, Rwe_Rw_cor (Meyer 2012 and Meyer and others, 2014). Water quality correction factors will be developed for brackish water and fresh water formations as appropriate by determining average concentrations for each constituent within the TDS ranges of <1,000; 1,000 to 3,000; 3,000 to 10,000 and 10,000 to 35,000 mg/L. Conversion charts from Schlumberger (1986) will be applied to complete this task. This approach allows for the extrapolation of water quality parameters without a nearby water quality sample (Meyer and others, 2014). The approach will be as follows:

1. Determine CT conversion factor as described in Meyer and others (2012 and 2014).
2. Determine and enter remaining required correction factors (Dt, Df, Ts, Tbh, Ro, porosity, and m) into the BRACS database to calculate an interpreted TDS value for a given geophysical log interval.
3. Using an iterative approach, the results of TDS values calculated with the RWA equations will be compared to TDS values from the compiled Blaine Aquifer water quality database, and the Ct and sodium chloride correction factors will be adjusted until a good match is obtained to determine appropriate input parameters for the defined ranges of

TDS.

4. Water quality correction factors will be developed for brackish water and fresh water formations as appropriate by determining average concentrations for each constituent within defined ranges of TDS. Weighting multipliers developed by Schlumberger (1979, 1985) to cation and anion concentrations will be applied. All of the required correction parameters will be used with the RWA equations to extrapolate corrected specific conductance and interpreted TDS values from the measured formation resistivity values obtained from the resistivity logging data.
5. Using an iterative approach, the results of TDS values calculated with the RWA equations will be compared to measured TDS values from the database, and the Ct and sodium chloride correction factors will be adjusted until a good match with the BRACS data is obtained to determine appropriate input parameters for the various defined ranges of TDS.
6. Calculate an average estimated TDS concentration between the Blaine top and base surface for each geophysical log and update the Elog_TDS shapefile from with the estimated TDS. The location of the brine interface will be considered in the analysis.

Once these steps are complete, the measured Blaine Aquifer water quality shapefile will be joined with the Elog TDS shapefile to create a composite Blaine TDS shapefile. All database entries, GIS surfaces and related information will be used and stored in accordance with the BRACS database and RFQ requirements. Once the geophysical log analysis and data entry are complete, water quality zones based on the TDS concentration ranges specified in the RFP will be created in GIS for the Blaine study area and the BRACS database and 3D model will be updated.

<u>Volume Computations</u>

The volume of available fresh, brackish and saline groundwater for each groundwater quality zone will be estimated using the 3D geologic model. A composite 2014-2015 regional water level surface raster will be created using TWDB and TDLR water level measurements, and it will be imported into the BRACS database and the 3D geologic model. A three-dimensional thickness isopach grid will be developed for each delineated groundwater quality zone, so that the volumes can be readily calculated using the refined Blaine top and bottom raster surfaces. Published or estimated storage coefficients representative of the aquifer system will be used, and the calculation will consider confined and unconfined storage using the storage calculation methods commonly employed by the TWDB.

Task 3 Deliverables:

1. All well reports, geophysical well logs, and other well information used in a project shall be provided to TWDB. The methods and values (computational, empirical) used to interpret total dissolved solids (TDS) concentration from geophysical well logs will be fully documented in the final report.Digital formats: well reports, PDF; geophysical well logs, TIFF or LAS (if available).
2. All GIS files used in a project shall be provided to TWDB.
3. All GIS files will be summarized in an appendix in the technical report listing file names, type, and folder structure. See TWDB Report 383 for examples.

4. All GIS files will have descriptive metadata documenting the content, data structure, source(s), date(s), quality and other pertinent characteristics of the data using the Federal Geographic Data Committee (FGDC) metadata editor within ESRI's ArcCatalog.
5. All GIS file creation techniques will be described either in the technical report appendix for GIS files or in the section on a particular topic, such as net sand.
6. All volume computation and interpolation techniques will be described either in an appendix of the technical report for or in a section on a particular topic.
7. A draft report documenting the technique(s) and approaches for geophysical well log interpretation of aquifer total dissolved solids concentration. The report shall:
    - Identify types of geophysical well logs available in the area,
    - Describe how the interpreted total dissolved solids concentration from geophysical well log analysis relates to existing aquifer water chemistry as determined by direct measurements,
    - Describe how the log correction factors are determined, and
    - Describe how the interpretation techniques will be applied across the entire salinity range within the aquifer.

TWDB will have up to 10 business days to review the draft report, and the Contractor will schedule a meeting to discuss the techniques.

Task 4 Delineation of Potential Production Areas:
As specified in the RFQ and HB30, the potential production areas must be separated by hydrogeologic barriers and from other parts of the aquifer used for other purposes [e.g. municipal, domestic, agricultural uses with greater than (>) 1,000 mg/l TDS] and wastewater injection and disposal well zones. To expedite the delineation of potential production areas, the DBS&A team proposes performing the following steps:

Step 1 Identify excluded areas of the Blaine Aquifer under HB30.
Step 2 Identify potential production areas, based on TWDB definition of "potential" and how that relates to expected well field yield.
Step 3 Identify hydrogeologic barriers in the Blaine Aquifer and for each potential brackish groundwater production area.
Step 4 Delineate each potential production area.

<u>Identify Areas to Be Excluded For Development Under HB30</u>
Areas that are excluded for future HB 30 brackish groundwater development include geological formations in areas with injection and disposal wells and areas with brackish groundwater used for water supply. We also propose considering brackish groundwater springs in state or federally protected areas. The DBS&A team understands that feedback from stakeholders and further definition of "significant impact" may change the requirements for areas that qualify for brackish groundwater development under HB30.

We propose to use the Blaine Aquifer system Sub- Regions (presented above) to provide the initial starting point for identifying areas to be excluded. Areas where the Seymour Aquifer overlies the Blaine Aquifer and are known to be in hydraulic communication will also be considered in this analysis. Evaluation of areas to be excluded will also include the following:

- Public water supply, irrigation districts and domestic well field areas - Blaine Aquifer Sub-Regions 1 and 2 are extensively used for irrigated agriculture, and will be considered for "off limits status" for brackish groundwater development. We will identify the remaining municipal, irrigation and areas with domestic well fields within study area using GCD and TCEQ public supply well databases.
- Injection wells - We will identify injection well data from the Texas RRC, and determine if injection wells are completed in zones the have potential hydraulic connection with the Blaine.
- Federally or state protected and/or threatened brackish springs - There may be springs that discharge from the Blaine Aquifer system that are protected by Texas Parks and Wildlife or have state or federal protection for endangered species. These spring areas (if any) will be identified and protected by a buffer zone.

Buffer zones will be created around each of these excluded areas; the size of the buffer zone will be dependent on estimated aquifer properties and stakeholder input. A GIS shapefile will be created for all excluded areas and the BRACS database and 3D model will be updated.

<u>Identify and Characterize Potential Production Areas</u>

Groundwater production from the Blaine Aquifer is generally from karstified intervals. Identification of these potential karst zones is needed to identify brackish groundwater production areas with potential for higher well yields, to determine potential groundwater flow paths, and to identify production area boundaries. The DBS&A team proposes the following steps for the areas of the Blaine Aquifer outside of the identified exclusion zones:

1. The team has created a GIS shapefile with over 1,400 TDLR water well drillers' reports deeper than 50 feet for the proposed Blaine study area. We will use the GIS raster top and base surfaces created during Task 3 to intersect with each driller's report and determine a Blaine top and bottom (where feasible) for each TDLR driller's report.
2. TDLR drillers' reports within the identified exclusion areas will be removed from the active dataset. The team will review the remaining TDLR drillers' reports for the top and bottom of the groundwater producing interval screen, slotted or open). The DBS&A team will also capture well yield information from driller's reports.
3. The team will repeat the above process for selected deeper BEG cable tool drillers' reports with detailed descriptions looking for descriptions of karst features within the Blaine Aquifer.
4. The team will create a composite BlaineProd shapefile and update BRACS database and 3D model. The observed karst features and well production intervals will be used collectively to develop the Blaine Aquifer groundwater production areas.
5. An attempt will be made to correlate well data to hydraulic properties, so there will be a basis for the estimates of hydraulic properties for each potential production area.

<u>Delineate Potential Production Areas</u>

This subtask involves the delineation of potential production areas separated by hydrogeologic barriers sufficient to prevent significant impacts to water availability or water quality in any part of the same or other fresh water aquifers. Potential hydrogeologic barriers include low-permeability geologic units (adjacent, underlying, and overlying), faults and fault zones, and hydrodynamic barriers created by a brine interface.

The Blaine aquifer Sub-Regions defined by DBS&A team member JSAI are based on groundwater divides, and provide a good starting point for defining hydrogeologic barriers. The potential for further division of Sub-Regions 3 through 6 will be evaluated, because these Sub-Regions are the most likely favorable for potential brackish groundwater development zones.

Much of the Blaine Aquifer system is under water table conditions, but certain areas contain an overlying low-permeability layer. From the analysis of logs conducted under Task 3, the DBS&A team will identify areas where the Blaine Aquifer system is confined by a regional overlying low-permeability zone such as the Quartermaster Formation. The DBS&A team will evaluate the overlying and adjacent low permeability layers and the brine interface using the 3D model or GIS and determine geographic areas where low-permeability layers are thick enough to form a hydrogeological barrier. The regional underlying low-permeability layer is the Flowerpot Shale, which will be defined in the 3D geologic model.

Previous work has not identified significant faults that would act as hydrogeologic barriers. However the DBS&A team will perform a review of published geologic sources for mapped and inferred faults that may act as a hydrogeologic barrier.

The shapefiles created above and in Task 4 and under Task 3 (groundwater quality zones) will be used to delineate potential production areas. Each potential area will be characterized based on existing information and data, and the limits will be defined by the determined hydrogeologic barriers.

Task 4 Deliverables:

1. Description of areas excluded from consideration as Potential Production Areas for the final report
2. GIS datasets delineating areas excluded from consideration as Potential Production Areas
3. Figure showing areas excluded from consideration as Potential Production Areas for the final report
4. Tools, files and/or scripts used to delineate Potential Production Areas
5. Description of any hydrogeologic barriers identified for the final report
6. GIS datasets of any hydrogeologic barriers identified for the final report
7. Figure showing any hydrogeologic barriers identified for the final report
8. Write up on Potential Production Areas identified for the final report
9. Potential Production Areas GIS datasets
10. Figure showing Potential Production Areas for the report
11. Before the second stakeholder meeting, create a range of possible impacts to water availability and water quality if the areas were produced
12. Define “significant impact” and a prioritized list of Potential Production Areas for 30-year

and 50-year pumping estimates after the second stakeholder meeting and exclude those areas from the Potential Production Areas

Task 5 Determine Volume of Potential Production Areas Over 30- and 50-Year Periods: It is unlikely the existing Seymour GAM can be used to complete this task without significant modification. The Seymour Aquifer GAM includes the Blaine Aquifer as an underlying model layer, but does not adequately define the structure and characteristics of the Blaine Aquifer required to complete this project. For example, most of the Blaine Aquifer structure in the Seymour GAM is based on an inferred thickness and extent as opposed to well data, although ample data is available to develop a more representative geologic model of the Blaine Aquifer system. We will compare the updated Blaine Aquifer system framework to that included in the Seymour GAM to evaluate the extent of significant differences.

If the existing GAM is unsuitable for application, the DBS&A team will propose an alternative method that meets the requirements of the RFQ and that can be easily used and verified by the TWDB. One such option is the development of a superposition groundwater flow model based on the geologic model. Superposition (Reilly and others, 1987) is a useful, widely applied modeling approach that saves time and effort and can reduce uncertainty in some model evaluations. This approach is likely the best option for determining potential production volumes if the existing Seymour GAM is not representative of the Blaine Aquifer potential production area(s) evaluated.

Models designed to use superposition evaluate only changes in stress and changes in responses. Only the change in hydraulic heads (the drawdown) and change in groundwater flows are analyzed; this approach assumes that the response of the system is only due to the stress imposed (in this case pumping from a proposed well field) and is not due to other processes in the system. The absolute value of the hydraulic head and a quantification of the actual regional flows are not needed. If the problem to be solved involves only the evaluation of a change due to some change in stress, then the application of superposition can greatly simplify the data needs and time required for model development.

The MODFLOW finite difference code (Harbaugh and McDonald, 1996) and the graphical user interface from Groundwater Vistas 6 (Rumbaugh and Rumbaugh, 2011) will be used to model groundwater flow for this task if the GAM is not applicable. Standard MODFLOW boundary conditions and outputs can be used to simulate and represent 30-year and 50-year transient model runs, so the impacts to water quality and quantity can be reasonably evaluated. There are likely some potential impacts that cannot be reasonably addressed with a simplified model or even a standard GAM, such as evaluating the movement of brine by dewatering an overlying brackish groundwater volume. For these situations, the DBS&A team will work with the TWDB in developing the best analysis method that is defensible and achievable within the project budget.

A second option that may also be used is simulation of drawdown due to proposed well field production using analytical methods such as the Theis equation. Analytical methods are widely used where hydraulic data is limited or screening type analyses are needed. Some geologic complexities, such as aquifer pinchouts or barrier boundaries, can be incorporated in analytical approaches using the principle of superposition.

After the Stakeholder Meeting 2, TWDB will consider the Blaine Aquifer Stakeholders input and will prioritize the Potential Production Areas for evaluation. Regardless of the simulation approach selected, the Blaine production zone thicknesses created in the Blaine Prod shapefile (Task 4) will be used to calculate volumes and evaluate production potential for the 30- and 50-year periods. The production estimates and volume calculations should include a range of scenarios for each Potential Production Area..

Task 5 Deliverables:

1. Tools, files and/or scripts used to estimate the capacity of Potential Production Areas over 30- and 50-year periods, without causing a significant impact, as defined in Task 5.
2. Description of capacity of Potential Production Areas over 30- and 50-year periods, without causing a significant impact, as defined in Task 5, for the final report.
3. Table and graph of capacity of Potential Production Areas over 30 and 50 year periods, without causing a significant impact, as defined in Task 5, for the final report.

Task 6 - Reports and Deliverables

The study completion date or the contract expiration cannot be extended. The contractor shall notify in person immediately if any problems encountered during the project will delay the timely completion of any portion of this contract. Contract deliverables are listed under Section III of the RFQ; the DBS&A team will provide the required deliverables. Some specifics of our approach to database updates and GIS datasets are provided below.

Data Model

The data dictionary for the BRACS database, as defined in TWDB Open-File Report 12-02, will be used to develop all project data models. The BRACS database structure relies on an extensive use of lookup tables. The data objects and relationships defined in this report will be strictly adhered to.

BRACS relational data models will be used to organize and structure data entered into the database. These relational data models define what information is to be contained in a database, how the information will be used, and how the items in the database will be related to each other.

Data Standardization

The BRACS relational data model identified previously will be used to standardize and integrate the various datasets into the database. All data will be imported using data import templates developed for each source dataset. These tools allow the data administrator(s) to monitor data import procedures, establish content import parameters, streamline the data import process, and generate import reports, if necessary.

Quality Control (QC) Plan

A thorough quality-assured database is critical to any project, as database errors can result in incorrect analysis and reports. The DBS&A team will prepare and implement a Quality Control plan. The Quality Control plan will include specific checklists to be used during the work progress and will consider the following issues:

- Verification against original source data. Part of DBS&A's standard QC procedure is to verify data entered into a database against the original source data (if available). Data imported from an internal agency database or an outside database will be compared against the post-imported database to compare records and ensure that no duplication of data has occurred.
- Level of confidence. Databases often contain uncertainties with regard to data collection techniques. Procedures will be developed that will screen the validity of these data collection techniques and possibly rank them according to specified levels of confidence in data accuracy.
- Self-validation. A series of checks will be built into the system for self-validation. Examples of this include instrument reporting ranges, historic data for a sampling location (where available), or expected ranges of values. Incorporating automatic checks against certain criteria is an efficient method for validating data and identifying outliers.

All GIS data will be stored and delivered in an ArcGIS GeoDatabase. Detailed metadata will accompany all GIS feature layers. The metadata will include data source, detailed field descriptions, and units. Any standard BRACS naming conventions will be utilized in the geodatabase. The geodatabase will include all point, line, polygon, and grid data. These files will include but may not be limited to:

- Well control point files
- Geologic formation top and bottom surface raster files
- Net sand raster files
- Salinity classification zone top and bottom raster files
- Proposed production area top and bottom raster surfaces
- Project raster snap grids

All geodatabase features will use the BRACS naming conventions and map projection parameters.

Task 6 Deliverables:

1. 3D LeapFrog Blaine model of Blaine Aquifer tops and bottoms, salinity zones, production zones, exclusion zones, barriers and other relevant surfaces.
2. 3D salinity GIS datasets and figures
3. 3D potential production area datasets and figures
4. 3D Modeling of potential area datasets
5. Updated data for the BRACS Database containing all new well records used in the Project.
6. Copies of water well reports, water quality reports (if available), and geophysical well logs used in the study, unless those reports and logs already exist in the TWDB Groundwater or BRACS databases.

7. Three-dimensional GIS datasets that delineate groundwater salinity zones using ranges of concentrations of total dissolved solids of 0 to 1,000 milligrams per liter (fresh), 1,000 to 3,000 milligrams per liter (slightly saline), 3,000 to 10,000 milligrams per liter (moderately saline), and 10,000 to 35,000 milligrams per liter (very saline).
8. Three-dimensional GIS datasets that delineate potential production areas and the estimated volumes of brackish groundwater production in 30- and 50-year timeframes.
9. A technical report summarizing the study. See Exhibit D for formatting guidelines and Exhibit H for the report outline.
10. All geophysical well logs interpreted for total dissolved solids will be submitted to TWDB and all interpretation data values (input and output) will be documented in table(s) with links to well numbers, log numbers, depths, and names of geological formations in a Microsoft Access database format that can be linked to existing BRACS Database tables. Geophysical well log data obtained for the Project must be non-confidential and submitted in a Tagged Image Format (TIFF) and, if available, Log ASCII Standard (LAS) format. New well control will be added to the BRACS Database with complete attributes. Water quality data will be compatible with the Groundwater Database table design and should include the source of the data.
11. The tools and techniques used for determining the extent and volumes of the required ranges of total dissolved solids in the groundwater shall be thorough, use defensible scientific means and approaches, and shall be documented in the technical report. The technique(s) used to determine if Potential Production Areas is hydrogeologically separated from fresh water aquifers shall be thoroughly documented in the technical report. Each Potential Production Area will be assigned a unique ID, and all production area attributes (ID, volume of brackish groundwater subdivided by salinity classification zones, 30-year and 50-year production calculation estimates) will be recorded in a Microsoft Access database table, in supporting GIS files (top, bottom, and lateral extent), and in groundwater modeling files.
12. The calculated volumes of groundwater within each aquifer and each TWDB-prioritized Potential Production Areas will be organized by salinity classification zone, county, groundwater conservation district, and groundwater management area. All GIS data shall be thoroughly documented with metadata including source, field descriptions, and units (as applicable) and use BRACS program-naming conventions and map Projection parameters. Geologic formation top and bottom raster surfaces, net sand raster maps, salinity classification zone top and bottom raster surfaces, proposed production area top and bottom raster surfaces, well control point files, and Project raster snap grid will be submitted to TWDB. All raster surfaces will share the same map Projection and snap grid attributes. TWDB must be able to replicate the volumes estimated and techniques used to determine the extents of each of the salinity classification zones. All Potential Production Areas modeling files will be submitted to TWDB.

13. Training for TWDB staff will be provided, as needed or requested. Training may include, but not limited to how the volumes were estimated and the techniques used to determine the extents of salinity zones, geophysical log interpretation procedures.
14. All draft and final reports shall be delivered in Microsoft Word and PDF formats. Draft deliverables will be submitted for review and commented by TWDB. These comments must be addressed in the Final Report and a copy of the comments must be incorporated into the final deliverables. Acceptance of the Final Report indicates the successful completion of the Project.