

Brackish Resources Aquifer Characterization System Database data dictionary

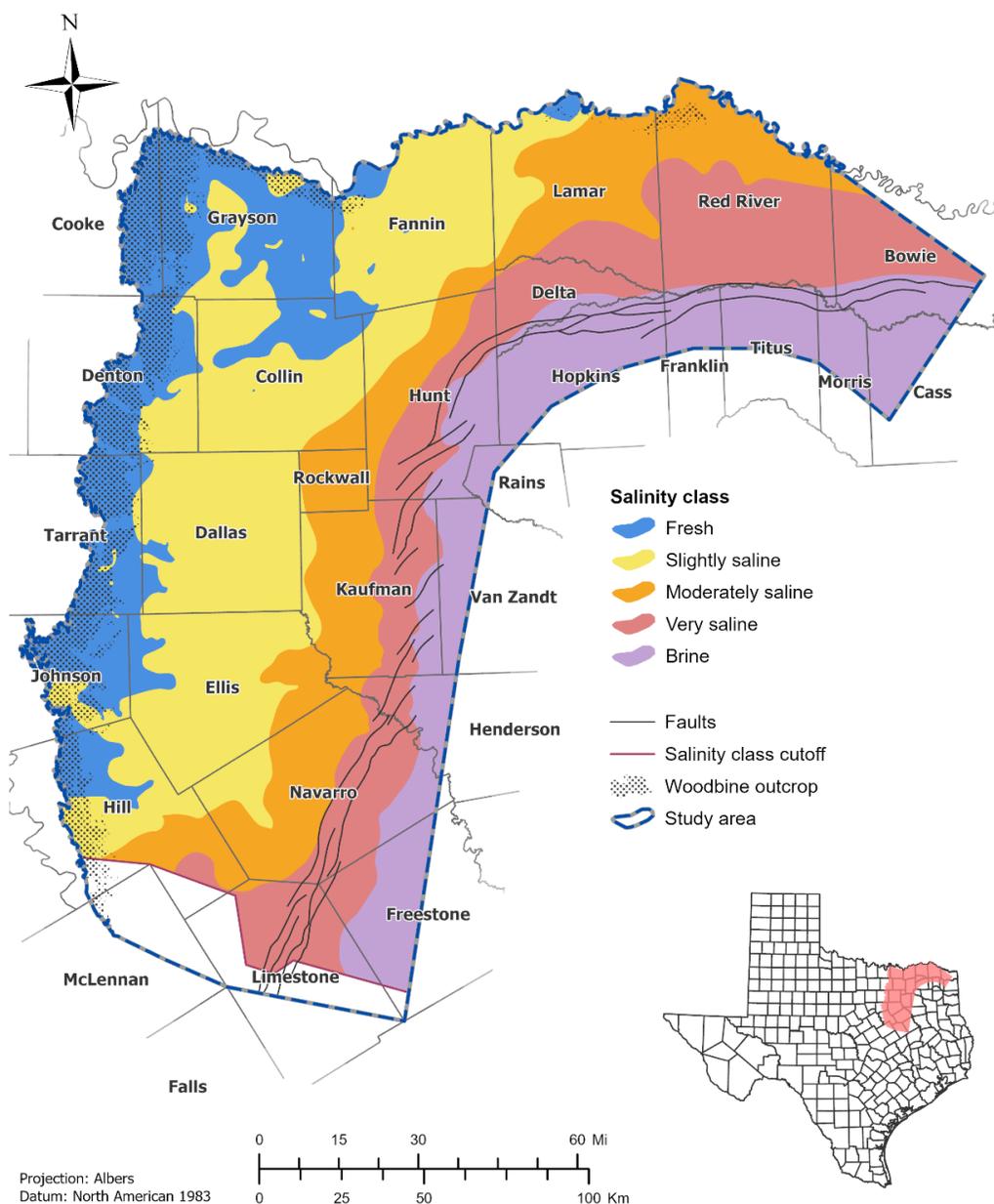
Appendix N: Woodbine Aquifer study

Open File Report 25-02

December 2025

Texas Water Development Board

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Texas Water Development Board Open-File Report 25-02

Brackish Resources Aquifer Characterization System Database Appendix N: Woodbine Aquifer

November 2025



Geoscientist Seal

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Ms. Laughlin was responsible for oversight of the dictionary update, and preparation of the final report. The seal appearing on this document was authorized on 12/16/2025.



Cover :
Map of Woodbine salinity distribution (Sutton and others, 2025).

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1. Introduction

In 2009, the 81st Texas Legislature provided funding to the Texas Water Development Board (TWDB) to establish the Brackish Resources Aquifer Characterization System (BRACS). The goal of the program is to map and characterize the brackish portions of the aquifers in Texas in sufficient detail to provide useful information and data to regional water planning groups and other entities interested in using brackish groundwater as a water supply. The Brackish Resources Aquifer Characterization System (BRACS) Database (TWDB, 2025a) was designed in 2009 to support studies characterizing brackish groundwater resources of Texas.

The BRACS data dictionary is organized to first describe primary tables and key fields and then provide custom tables from completed BRACS studies. Primary table relationships and their key fields are found in Figure 1-1. Primary tables are described in Sections 2 through 25 and custom tables developed for the BRACS Woodbine study are in Appendix A. Each table listed in this data dictionary is available in the public version of the BRACS Database. Each table includes a description of fields and their data type, size, name, description, and lookup tables. This data dictionary is an essential reference document for users to take full advantage of the information.

The BRACS Database is maintained in Microsoft® Access® 2016. The relational database is a container designed to organize records of well and geologic information in separate tables linked together with key fields. Database object naming is based on the use of standard prefixes consistent with the Hungarian style described in Novalis (1999). Table names have the prefix “tbl” and have an underscore instead of spaces. The database design relies on extensive use of lookup tables, with table names prefixed with “tblLk.” When field names are referred to in text or table captions, they will be enclosed in square brackets (for example, [WELL_ID]) so they are not confused with table names. Field names also have an underscore instead of spaces.

The public version of the BRACS Database contains tables and simple forms useful for viewing information about a well. Forms in the public version do not contain embedded data processing (Visual Basic®) code. Data change on a daily basis and table design changes on an as-needed basis so users of the information should note the following disclaimer regarding the information:

*Except where noted, all of the information provided is believed to be accurate and reliable; however, the Texas Water Development Board (TWDB) assumes no responsibility for any errors. Further, TWDB assumes no responsibility for the use of the information provided. **PLEASE NOTE** that users of these data are responsible for checking the accuracy, completeness, currency, and/or suitability of all information themselves. TWDB makes no guarantees or warranties as to the accuracy, completeness, currency, or suitability of the information provided via the BRACS Database. TWDB specifically disclaims any and all liability for any claims or damages that may result from providing BRACS data or the information the database contains.*

The BRACS Database design will continue to evolve as more studies are completed and new methods of analysis and data sources are obtained. The first through sixth editions of the data dictionary included custom tables from all completed studies. However, for the sake of brevity, this report for the Woodbine Aquifer and future data dictionaries will contain only custom tables for a recently published study.

Primary table attributes will still be available in the sixth edition of the data dictionary (Laughlin and others, 2023) from the TWDB BRACS Database webpage:

<http://www.twdb.texas.gov/groundwater/bracs/database.asp>.

Two versions of the BRACS Database exist: a working database used by TWDB staff and a public version. The public version of the BRACS Database is re-compiled as a stand-alone database with the publication of each data dictionary and may be downloaded from the TWDB BRACS Database webpage:

<http://www.twdb.texas.gov/groundwater/bracs/database.asp>.

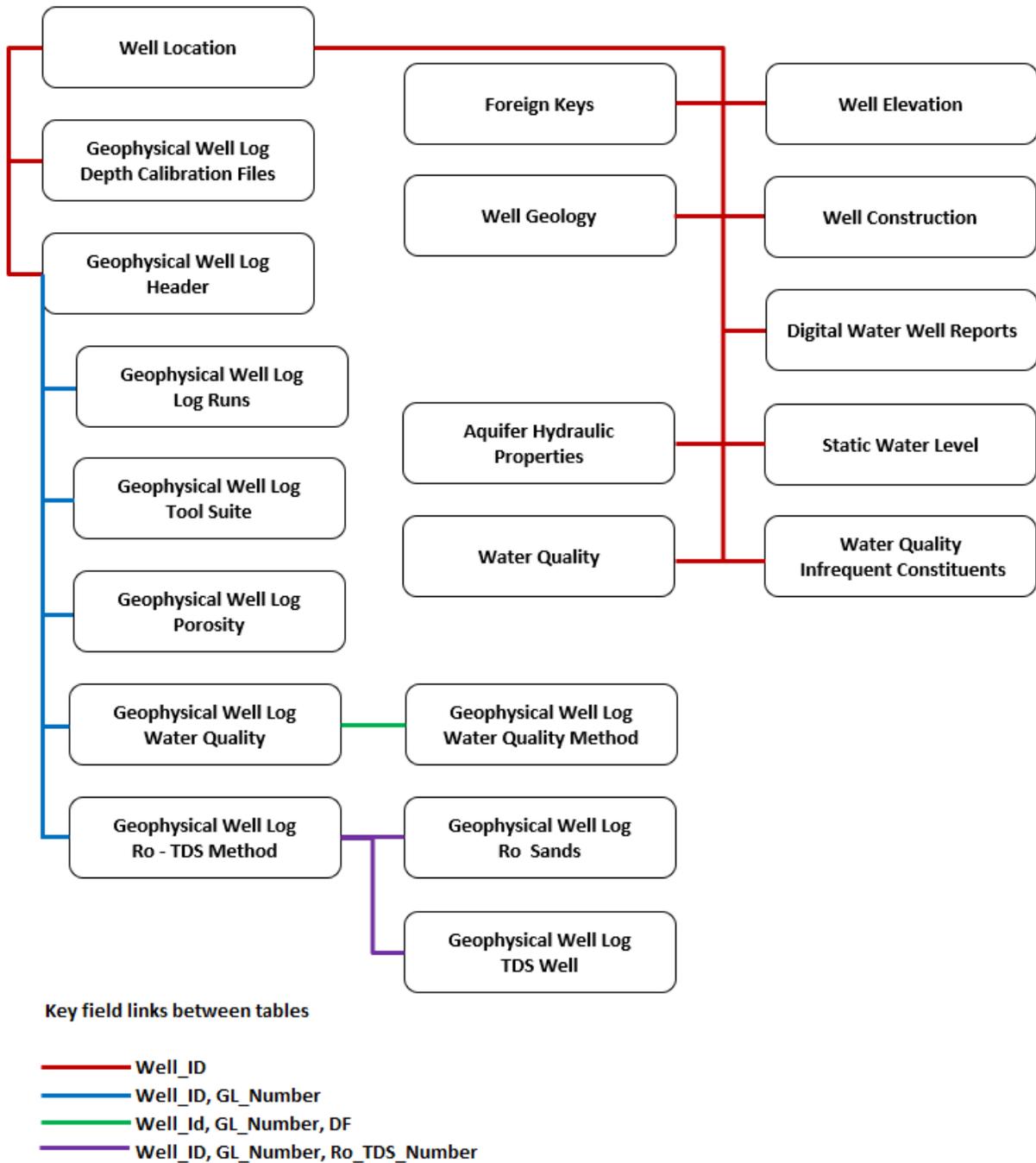


Figure 1-1. BRACS Database table relationships. Each rectangle represents a unique category of information in a primary table linked to the other tables based on key fields represented by colored lines. The well location table, in the upper left, is the primary table where the well record identification number, Well_ID, is assigned.

2. References

- Blondes, M.S., Gans, K.D., Rowan, E.L., Thordsen, J.J., Reidy, M.E., Engle, M.A., Kharaka, Y.K., and Thomas, B., 2016, U.S. Geological Survey national produced waters geochemical database v 2.2 (provisional) documentation: U.S. Geological Survey, 28 p. and Excel spreadsheet.
- Hem, J.D., 1985, Study and interpretation of the chemical characteristics of natural water: U.S. Geological Survey Water-Supply Paper 2254, 263 p. and 4 plates.
- Laughlin and others, 2023, Brackish Resources Aquifer Characterization System Database Data Dictionary: Texas Water Development Board Open File Report 12-02, Sixth Edition, 329 p.
- Novalis, S., 1999, Access 2000 VBA Handbook: Sybex, Inc., 845 p.
- Schlumberger, 1979, Log Interpretation Charts: Schlumberger Limited, 93 p.
- Sutton, S., Robinson, M., and Bauer, O., 2025, Brackish groundwater in the Woodbine Aquifer: Texas Water Development Board Report No 392, 133 p.
- TDLR (Texas Department of Licensing and Regulation), 2025, Submitted Driller's Report Database.
- TWDB (Texas Water Development Board), 2025a, BRACS Database.
- TWDB (Texas Water Development Board), 2025b, Groundwater Database.

Appendix N: Woodbine Aquifer

The tables in this appendix were developed for the following Texas Water Development Board BRACS study:

Sutton, S., Robinson, M., and Bauer, O., 2025, Brackish groundwater in the Woodbine Aquifer: Texas Water Development Board Report No 392, 133 p.

N-1. Aquifer determination: tblAquiferDetermination_Woodbine

This table contains information on which aquifer(s) may be used or penetrated by a well in the study area (Table N-1). Although aquifer codes have been assigned to wells in the Groundwater Database (TWDB, 2025b), it was determined that a systematic assessment of every well in the study area using the 3-dimensional formation top and bottom surfaces with available well screen and well depth data provides a more accurate and uniform aquifer assignment. Using the new aquifer assignment, wells with water quality data could be compared to wells using the same aquifer.

Every well within the limits of the study area that is in the BRACS Database (TWDB, 2025a), the Groundwater Database (TWDB, 2025b), and the TDLR Submitted Drillers Report Database (TDLR, 2025) was appended to a holding table. This information was imported and georeferenced in a geographic information system (GIS). The top and bottom of the Woodbine Group was determined at each well location and the values were written to the holding table. The well screen depths were compared to the Woodbine Group top and bottom depths to determine if it intersected the formation. A well may be screened in one or more aquifers. The well depth or total depth of hole were used in the absence of screen information.

A value of -99999 is written to elevation and depth fields if data are unknown.

Table N-1. Table tblAquiferDetermination_UCPE_Woodbine field names, data type and size, and lookup table references.

Field name	Data type	Size	Lookup table
WELL_ID	Long Integer	4	
STATE_WELL_NUMBER	Long Integer	4	
REGION	Long Integer	4	
AQUIFER_CODE	Text	8	tblLkAquifer
AQUIFER_NEW	Text	150	tblLkBRACS_Aquifer_AD
O_G_WELL_AQ_PENETRATED	Text	50	
AQ_REASON	Text	10	
AQ_DECISION	Text	100	tblLkAq_Decision
DEPTH_WELL	Long Integer	4	
DEPTH_TOTAL	Long Integer	4	
SCREEN_TOP	Long Integer	4	
SCREEN_BOTTOM	Long Integer	4	

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Field name	Data type	Size	Lookup table
MULTIPLE_SCREEN	Yes/No	1	
WELL_TOP	Long Integer	4	
WELL_BOT	Long Integer	4	
WELL_CD	Text	1	tblLkWell_cd
WB_T_D	Long Integer	4	
WB_B_D	Long Integer	4	
WB_AQUIFER	Long Integer	4	
LATDD	Double	8	
LONGDD	Double	8	
ELEVATION	Long Integer	4	
OWNER	Text	100	
INITIALS	Text	3	tblLkInitial
REMARKS	Text	250	
WELL_TYPE	Text	50	tblLkWellType
WELL_USE	Text	250	tblLkWellUse
INS_ID	Long Integer	4	

WELL_ID Each record in the BRACS Database is assigned a unique well ID (which is a long integer) in this table. A value of zero (0) is assigned if the well ID has not been assigned to this well.

STATE_WELL_NUMBER The state well number is assigned to each water well in the TWDB Groundwater Database. A text field was used to maintain IDs that start with a 0.

REGION This field was not used for this study.

AQUIFER_CODE The aquifer code is assigned to every water well in the TWDB Groundwater Database. These field values are listed in the lookup table tblLkAquifer, derived from a similar lookup table in the Groundwater Database.

N-2. Lookup table tblLkBRACSAquifer_AD

AQUIFER_NEW This code is the new aquifer assignment. These field values are listed in the lookup table tblLkBRACSAquifer_AD (Table M-2). This table was created because all potential aquifer combinations are not available in the Groundwater Database aquifer code table. Note: Table N-2 lists one code in the field [AQUIFER_NEW] for an aquifer. Many combinations of these single aquifer codes occur if a well is screened in multiple geological formations or a total depth of the well to ground surface is used. An example: “CZ WX” representing a well screen in both the Carrizo and Wilcox formations.

O_G_WELL_AQ_PENETRATED This field was not used for this study.

AQ_REASON This is a code used for quality control. It is based on the query used to assign a value to the [aquifer_new] field. The default value of zero (0) is used if the queries did not assign a value.

AQ_DECISION This is a description of how the aquifer was determined.

Table N-2. Lookup table tblLkBRACSAquifer_AD (Woodbine).

AQUIFER_NEW	AQUIFER_DESCRIPTION
Fm+	Formations younger and stratigraphically above the Woodbine Group
WB	Woodbine Group
Fm-	Formations older and stratigraphically below the Woodbine Group
X	Unknown aquifer (not enough information)

DEPTH_WELL The total depth of the well in units of feet below ground surface. This is reported on the water well driller report. A value of -99999 is used if the value is not known. This value was obtained from the BRACS Database for wells with a BRACS well ID or the TWDB Groundwater Database with a state well number.

DEPTH_TOTAL The total depth of the hole in units of feet below ground surface. This is reported on the water well driller report or header page on a geophysical well log. A value of -99999 is used if the value is not known. This value was obtained from the BRACS Database for wells with a BRACS well ID.

SCREEN_TOP The top of the screened interval is in units of feet below ground surface. For multiple screen wells, it represents the shallowest depth. A value of -99999 is used if the value is not known. This value was obtained from the BRACS Database for wells with a BRACS well ID or the TWDB Groundwater Database with a state well number.

SCREEN_BOTTOM The bottom of the screened interval is in units of feet below ground surface. For multiple screen wells, it represents the deepest depth. A value of -99999 is used if the value is not known. This value was obtained from the BRACS Database for wells with a BRACS well ID or the TWDB Groundwater Database with a state well number.

MULTIPLE_SCREEN A Yes or No value if a well has multiple well screens. Wells with multiple screens were manually checked for aquifer code assignment.

WELL_TOP Top of the open interval for the well. If well screen data are used, this is the top depth of the shallowest screen. If well depth or total depth is used, this value is 0. Units are in feet below ground surface.

WELL_BOT Bottom of the open interval for the well. If well screen data are used, this is the bottom depth of the deepest screen. If well screen data are not available, then either well depth or total depth is used. Units are in feet below ground surface.

WELL_CD This code is assigned to each well record based on the type of data used to compare well construction to geological formation top and bottom depths. These field values are listed in the lookup table tblLkWell_cd (Table 24-1). The precedence of data used for well construction is screen top and bottom, total depth of well, and total depth of hole.

WB_T_D Woodbine Group top depth in units of feet below ground surface.

WB_B_D Woodbine Group bottom depth in units of feet below ground surface.

WB_AQUIFER A value of Yes or No based on whether the Woodbine Group is used by the well.

LATDD Latitude of the well site in units of decimal degrees based on a North American Datum of 1983. It is a positive value, referring to a site north of the earth's equator. This value was obtained from tblWell_Location.

LONGDD Longitude of the well site in units of decimal degrees based on a North American Datum of 1983. Longitude is a negative value, referring to a site west of the Prime Meridian in Greenwich, United Kingdom. This value was obtained from tblWell_Location.

ELEVATION The elevation of the well site in units of feet above mean sea level. The elevation is determined using spatial analysis in a geographic information system by comparing the well site with the 30-meter digital elevation model for Texas. This value was obtained from tblWell_Location. A value of -99999 is used if the value is not known.

OWNER The name of the well owner. This value was obtained from tblWell_Location.

INITIALS of person who last edited the record.

REMARKS General remarks associated with the well record.

WELL_TYPE The type of well when the well was drilled and completed. These field values are listed in the lookup table tblLkWellType.

WELL_USE The well use when the well was drilled and completed. These field values are listed in the lookup table tblLkWellUse.

INS_ID Unique ID assigned to each record to ensure the data from well records processed in GIS are precisely assigned to the corresponding database record.

N-3. Stratigraphic table for GIS import: gBRACS_ST_WB

This table is created from information residing in the primary BRACS Database tables (Table N-3). Well records are appended to this table and processed using stored structured query language queries in Microsoft® Access®. This table is exported into GIS to spatially display geologic formation depth and elevation values at well sites. The point shapefile is used to create 3-dimensional geologic surfaces and contour maps.

Note: Geologic formation depth is adjusted for kelly bushing height, if known or applicable. Geologic formation elevation is calculated using geologic formation depth (adjusted for kelly bushing height, if known or applicable) and well site elevation.

A value of -99999 is written to elevation and depth fields if data are unknown.

Table N-3. Table gBRACS_ST_WB field names, data type and size, lookup table references, and source table.

Field name	Data type	Size	Lookup table	Source table	
WELL_ID	Double	8		tblWell_Location	
WELL_TYPE	Text	254	tblLkWellType		
API_NUM	Text	254		tblBracs_ForeignKey	
SW_NUM	Double	8			
TRACK_NUM	Double	8			
Q_NUM	Text	254			
SOURCE_WELL_DATA	Text	250	tblLkSourceWellData	tblWell_Location	
ELEVATION	Double	8			
KELLY_BUSHING_HEIGHT	Double	8			
DEPTH_TOTAL	Double	8			
DEPTH_WELL	Double	8			
LATDD	Double	8			
LONGDD	Double	8			
AGENCY	Text	5	tblLkAgency		
COUNTY_NAME	Text	13	tblLkCounty		
STATE_NAME	Text	50	tblLkState		
INITIALS	Text	3	tblLkInitial		
WB_T_D	Double	8			tblWell_Geology
WB_B_D	Double	8			
WB_TK	Double	8			
WB_T_E	Double	8			
WB_B_E	Double	8			

Field Descriptions

WELL_ID Each record in the BRACS Database is assigned a unique well ID (which is a long integer) in this table. This is the key field in this table.

WELL_TYPE The type of well and when the well was drilled and completed. These field values are listed in the lookup table tblLkWellType.

API_NUM The American Petroleum Institute number of the well, assigned to oil and gas wells.

SW_NUM The state well number of the well, assigned to wells in the TWDB Groundwater Database.

TRACK_NUM The track number of the well, assigned to wells in the Texas Department of Licensing and Regulation Submitted Driller's Report Database (TDLR, 2025).

WS_NUM The water source code, assigned to wells in the Texas Commission on Environmental Quality public water system program.

Q_NUM The Q number assigned to wells in the Railroad Commission of Texas Groundwater Advisory Unit program.

SOURCE_WELL_DATA Each well record is assigned the source of the well information. In some cases, multiple sources exist; in this case, the source of the geophysical well log or water well driller report takes precedence. These field values are listed in the lookup table tblLkSourceWellData.

ELEVATION The elevation of the well site in units of feet above mean sea level. The elevation is determined using spatial analysis in a geographic information system by comparing the well site with the 30-meter digital elevation model for Texas.

KELLY_BUSHING_HEIGHT The height of the drilling rig kelly bushing (KB) used as a measuring point for all subsequent logging. The units are in feet above ground surface. This value is stored as an integer. The term is synonymous with rig floor (RF), derrick floor (DF), rotary table (RT), and drive bushing (DB). This value is usually located on the geophysical well log header page as a unique value, or it must be calculated from the values of elevation of the ground surface and elevation of the kelly bushing. The default value for this field is zero (0) if the measure point of logging is ground surface or if the kelly bushing height is unknown.

DEPTH_TOTAL The total depth of the hole in units of feet below ground surface. This is reported on the water well driller report or header page on a geophysical well log. A value of -99999 is used if the value is not known.

DEPTH_WELL The total depth of the well in units of feet below ground surface. This is reported on the water well driller report. A value of -99999 is used if the value is not known.

LATDD Latitude of the well site in units of decimal degrees based on a North American Datum of 1983. It is a positive value, referring to a site north of the earth's equator. This value was obtained from tblWell_Location.

LONGDD Longitude of the well site in units of decimal degrees based on a North American Datum of 1983. Longitude is a negative value, referring to a site west of the Prime Meridian in Greenwich, United Kingdom. This value was obtained from tblWell_Location.

AGENCY The agency that collected the latitude and longitude coordinates of the well site. These field values are listed in the lookup table tblLkAgency.

COUNTY_NAME The county name where the data point is located.

STATE_NAME The county name where the data point is located.

INITIALS The initials of the geologist who interpreted the formation tops.

WB_T_D Woodbine Group top depth in units of feet below ground surface.

WB_B_D Woodbine Group bottom depth in units of feet below ground surface.

WB_TK Woodbine Group thickness in units of feet.

WB_T_E Woodbine Group top elevation in units of feet above mean sea level.

WB_B_E Woodbine Group bottom elevation in units of feet above mean sea level.

N-4. Master water quality: tblBRACS_WB_MasterWaterQuality

The master water quality table contains a copy of every water quality record in the study area organized with one record per well per date sampled with constituents in separate fields (Table N-4). This design simplifies the creation of GIS datasets, for without data residing in one table, data must be processed from the six source tables in the Groundwater Database (WaterQualityMajor, WaterQualityMinor, WaterQualityOtherUnassigned, and WaterQualityCombination) and the BRACS Database (tblBracsWaterQuality; tblBracsInfrequentConstituents). The table contains a few special fields created to support the study.

Please pay close attention to the STORET codes used to populate each of the fields. STORET, short for STOrage and RETrieval, is a repository for water quality, biological, and physical data used by the U.S. Environmental Protection Agency, the U.S. Geological Survey, and other federal agencies. These field values are listed in the lookup table tblLkStoretCode. In some cases, fields contain multiple sources of data, for example, calcium is both dissolved and total. The purpose for appending data from multiple STORET codes is to obtain a large amount of data per constituent to map the constituents and calibrate the geophysical well log analysis. Most field descriptions were obtained from the Groundwater Database Data Dictionary spreadsheet available on the TWDB website.

Total dissolved solids concentration is expressed in two different forms in this table: calculated and measured. This provides the user greater flexibility in using the information. The field total dissolved solids ([TDS_sum]) was calculated from the individual constituents and replaces the total dissolved solids concentration obtained from the input tables. It was discovered that many records from input tables contained a total dissolved solids concentration that did not match the sum of the individual constituents: some input concentrations were calculated, measured, or completely incorrect. In a deviation from prior BRACS studies, the calculated form of total dissolved solids concentration does not include multiplying the bicarbonate concentration by 0.4917.

Table N-4. Table tblBracs_MasterWaterQuality_Woodbine field names, data type and size, and lookup table references.

Field name	Data type	Size	Lookup table
STATE_WELL_NUMBER	Long Integer	4	
WELL_ID	Long Integer	4	
mm_date	Integer	2	
dd_date	Integer	2	
yy_date	Integer	2	
sample_number	Integer	2	
SOURCE_DATA	Text	200	
COUNTY_NAME	Text	13	tblLkCounty
sample_time	Long Integer	4	
top_s_interval	Long Integer	4	
bottom_s_interval	Long Integer	4	
collection_remarks	Text	30	
reliability_rem	Memo	-	
collecting_agency	Text	250	

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Field name	Data type	Size	Lookup table
lab_code	Text	250	
bu_value	Decimal	16	
bu_wqanalysis	Text	1	
silica_flag	Text	1	
silica	Decimal	16	
calcium_flag	Text	1	
calcium	Decimal	16	
magnesium_flag	Text	1	
magnesium	Decimal	16	
sodium_flag	Text	1	
sodium	Decimal	16	
potassium_flag	Text	1	
potassium	Decimal	16	
strontium_flag	Text	1	
strontium	Decimal	16	
carbonate	Decimal	16	
bicarbonate	Decimal	16	
sulfate_flag	Text	1	
sulfate	Decimal	16	
chloride_flag	Text	1	
chloride	Decimal	16	
fluoride_flag	Text	1	
fluoride	Decimal	16	
nitrate_flag	Text	1	
nitrate	Decimal	16	
pH_flag	Text	1	
pH	Decimal	16	
TDS	Long Integer	4	
TDS_measured	Long Integer	4	
TDS_RANGE	Text	255	tblLkTDS_Range
TDS_RNG_NUM	Integer	2	tblLkTDS_Range
phenolphthalein_alkalinity_flag	Text	1	
phenolphthalein_alkalinity	Decimal	16	
total_alkalinity_flag	Text	1	
total_alkalinity	Decimal	16	
spec_cond_flag	Text	1	
spec_cond	Long Integer	4	
IRON_FLAG	Text	1	
IRON	Decimal	16	
MANGANESE_FLAG	Text	1	
MANGANESE	Decimal	16	
ARSENIC_FLAG	Text	1	
ARSENIC	Decimal	16	
BORON_FLAG	Text	1	
BORON	Decimal	16	
BARIUM_FLAG	Text	1	
BARIUM	Decimal	16	
CT	Decimal	16	
CT_MEASURED	Decimal	16	

Field name	Data type	Size	Lookup table
AQUIFER	Text	255	
AQUIFER_NEW	Text	50	tblLkBRACS_Aquifer_AD
NACL_EQUIVALENT_TDS	Long Integer	4	
NACL_EQUIVALENT_TDS_MEASURED	Long Integer	4	
NACL_EQ_CF	Single	4	
NACL_EQ_CF_TDSmeasured	Single	4	
USGS_UNIQID	Long Integer	4	
REMARKS	Text	250	

Field Descriptions

STATE_WELL_NUMBER First key field for the table. This field contains the state well number assigned to each water well in the TWDB Groundwater Database. If there is no state well number, the value is zero (0).

WELL_ID Second key field for the table. Each record in the BRACS Database is assigned a unique well ID (which is a long integer) in this table. If there is no well id number, the value is zero (0).

mm_date Third key field for the table. This field contains an integer for the month the sample was collected. If the month is unknown, a zero (0) is required.

dd_date Fourth key field for the table. This field contains an integer for the day the sample was collected. If the day is unknown, a zero (0) is required.

yy_date Fifth key field for the table. This field contains an integer for the year the sample was collected. The year must have four characters. If the year is unknown, enter zero (0).

sample_number Sixth key field for the table. This is an integer for a sample number, since more than one sample may be taken on the same day. It consists of an integer beginning with one for the first record of a well and increases by a value of one for each new record.

SOURCE_DATA A reference to the source of the information, for example, the report number and table or page number.

COUNTY_NAME The county name is based on the well location. These field values are listed in the lookup table tblLkCounty. This lookup table contains state and county names for Texas and adjacent states.

sample_time This field contains the time the sample was collected using four digits in the format of 24-hour time (for example, 8:45 a.m. is 0845; 4:21 p.m. is 1621).

top_s_interval Top interval of formation where sample was collected in units of feet below ground surface (only for multiple completion wells).

bottom_s_interval Bottom interval of formation where sample was collected in units of feet below ground surface (only for multiple completion wells).

collection_remarks Remarks about the sample collected.

reliability_rem Indicates the process used to collect the sample.

collecting_agency Identifies the entity that collected the sample.

lab_code Identifies the lab used to analyze the sample.

bu_value Value of the balance/unbalanced equation. Positive or negative units in percent (for example, 3.5). Zero (0) indicates the sample is balanced.

bu_wqanalysis Indicates whether the analysis of the sample is Balanced (B) or Unbalanced (U).

silica_flag Used to identify constituent concentrations below the lab's detection limits.

silica Silica concentration in units of milligrams per liter. STORET 00955.

calcium_flag Used to identify constituent concentrations below the lab's detection limits.

calcium Calcium concentration in units of milligrams per liter. STORET 00910, 00915, 00916.

magnesium_flag Used to identify constituent concentrations below the lab's detection limits.

magnesium Magnesium concentration in units of milligrams per liter. STORET 00920, 00925, 00927.

sodium_flag Used to identify constituent concentrations below the lab's detection limits. A value of "c" indicates the sodium concentration was back-calculated from the difference between the sum of the determined anions, in units of milliequivalents per liter, and the determined cations in the same units (Hem, 1985).

sodium Sodium concentration in units of milligrams per liter. STORET 00929, 00930.

potassium_flag Used to identify constituent concentrations below the lab's detection limits.

potassium Potassium, dissolved, in units of milligrams per liter. STORET 00935, 00937.

strontium_flag Used to identify constituent concentrations below the lab's detection limits.

strontium Strontium concentration in units of milligrams per liter. STORET 01080.

carbonate Carbonate concentration in units of milligrams per liter. STORET 00445.

bicarbonate Bicarbonate concentration in units of milligrams per liter. STORET 00440.

sulfate_flag Used to identify constituent concentrations below the lab's detection limits.

sulfate Sulfate concentration in units of milligrams per liter. STORET 00945, 00946.

chloride_flag Used to identify constituent concentrations below the lab's detection limits.

chloride Chloride concentration in units of milligrams per liter. STORET 00940, 00941.

fluoride_flag Used to identify constituent concentrations below the lab's detection limits.

fluoride Fluoride concentration in units of milligrams per liter. STORET 00950.

nitrate_flag Used to identify constituent concentrations below the lab's detection limits.

nitrate Nitrate concentration in units of milligrams per liter as NO₃. STORET 71851.

pH_flag Used to identify constituent concentrations below the lab's detection limits.

pH pH, standard units (field measurement). STORET 00400.

TDS Total dissolved solids concentration, calculated, in units of milligrams per liter (STORET 70301). Total dissolved solids concentration is calculated using one of four methods, in this order of preference, depending on the presence of required parameters:

(1) [silica] + [calcium] + [magnesium] + [sodium] + [potassium] + [strontium] + [carbonate] + [bicarbonate] + [sulfate] + [chloride] + [fluoride] + [nitrate]

(2) [calcium] + [magnesium] + [sodium] + [potassium] + [carbonate] + [bicarbonate] + [sulfate] + [chloride]

(3) [calcium] + [magnesium] + [sodium] + [potassium] + [bicarbonate] + [sulfate] + [chloride]

(4) [calcium] + [magnesium] + [sodium] + [bicarbonate] + [sulfate] + [chloride]

The parameter must not equal -99999 and the parameter flag must be null for each parameter in the equations.

There are a number of samples where sodium plus potassium was back-calculated as a sodium value. These samples are indicated with a value of "c" in the field [sodium_flag]. These samples were used to calculate total dissolved solids concentration using a variation of methods 1 through 3 above, with the exception that potassium was not used because it was included in the back-calculated sodium.

TDS_measured Total dissolved solids concentration, measured, in units of milligrams per liter. Total dissolved solids concentration is calculated using one of four methods, in this order of preference, depending on the presence of required parameters:

(1) [silica] + [calcium] + [magnesium] + [sodium] + [potassium] + [strontium] + [carbonate] + [bicarbonate] + [sulfate] + [chloride] + [fluoride] + [nitrate]

(2) [calcium] + [magnesium] + [sodium] + [potassium] + [carbonate] + [bicarbonate] + [sulfate] + [chloride]

(3) [calcium] + [magnesium] + [sodium] + [potassium] + [bicarbonate] + [sulfate] + [chloride]

(4) [calcium] + [magnesium] + [sodium] + [bicarbonate] + [sulfate] + [chloride]

The parameter must not equal -99999 and the parameter flag must be null for each parameter in the equations.

There are a number of samples where sodium plus potassium was back-calculated as a sodium value. These samples are indicated with a value of "c" in the field sodium_flag. These samples were used to calculate total dissolved solids concentration using a

variation of methods 1 through 3 above, with the exception that potassium was not used because it was included in the back-calculated sodium.

TDS_RANGE This field contains a value representing the range of calculated total dissolved solids concentration (field [TDS]) used for GIS analysis of brackish groundwater resources. The ranges include values, in milligrams per liter, of 0-999; 1,000-2,999; 3,000-9,999; 10,000-34,999; and 35,000-100,000. These field values are listed in the lookup table tblLkTDS_Range.

TDS_RNG_NUM This is an integer value representing the range of total dissolved solids concentration (field [TDS_RANGE]) used for GIS analysis of brackish groundwater resources. The ranges include values, in milligrams per liter, of 1 = 0-999; 2 = 1,000-2,999; 3 = 3,000-9,999; 4 = 10,000-34,999; and 5 = 35,000-100,000. These field values are listed in the lookup table tblLkTDS_Range.

phenolphthalein_alkalinity_flag Used to identify constituent concentrations below the lab's detection limits.

phenolphthalein_alkalinity Phenolphthalein alkalinity. STORET 00415.

total_alkalinity_flag Used to identify constituent concentrations below the lab's detection limits.

total_alkalinity Total alkalinity, dissolved (analyzed in lab). STORET 00410.

spec_cond_flag Used to identify constituent concentrations below the lab's detection limits.

spec_cond Specific conductance in units of microsiemens per centimeter @ 25 degrees Celsius (field measurement). STORET 00094.

IRON_FLAG Used to identify constituent concentrations below the lab's detection limits.

IRON Iron concentration in units of milligrams per liter. STORET 01045, 01046.

MANGANESE_FLAG Used to identify constituent concentrations below lab detection limits.

MANGANESE Manganese concentration in units of milligrams per liter. Storet 01055, 01056.

ARSENIC_FLAG Used to identify constituent concentrations below lab detection limits.

ARSENIC Arsenic concentration in units of milligrams per liter. STORET 01000, 01002.

BORON_FLAG Used to identify constituent concentrations below lab detection limits.

BORON Boron concentration in units of milligrams per liter. STORET 01020, 01022.

BARIUM_FLAG Used to identify constituent concentrations below lab detection limits.

BARIUM Barium concentration in units of milligrams per liter. STORET 01005, 01007.

CT Calculated field: ([tds] / [spec_cond]). Used for log analysis of geophysical well logs.

CT_Measured Calculated field: $([tds_measured] / [spec_cond])$. Used for log analysis of geophysical well logs.

AQUIFER The aquifer name, a value obtained from the Groundwater Database table WaterQualityMajor, WaterQualityMinor, WaterQualityOtherUnassigned, or WaterQualityCombination.

AQUIFER_NEW A code for the new aquifer assignment based on an aquifer determination process. These field values are listed in the lookup table tblLkBRACSAquifer_AD (Table M-2). The table was created because not all aquifer combinations are available in the Groundwater Database aquifer code table.

NACL_EQUIVALENT_TDS This is a value calculated from existing water quality data multiplied by a weighting factor for each ion to calculate a total dissolved solids concentration equivalent to a sodium chloride solution. This value is used for geophysical well log analysis. The weighting factors are based on the lookup table tblLkCf_NaClWeightingMultiplier that was derived from Schlumberger (1979) Chart Gen-8. Note that this value only accounts for calcium, sodium, potassium, magnesium, bicarbonate, carbonate, sulfate, and chloride.

NACL_EQUIVALENT_TDS_MEASURED This is a value calculated from existing water quality data multiplied by a weighting factor for each ion to calculate a total dissolved solids measured concentration (with no bicarbonate correction) equivalent to a sodium chloride solution. This value is used for geophysical well log analysis. The weighting factors are based on the lookup table tblLkCf_NaClWeightingMultiplier that was derived from Schlumberger (1979) Chart Gen-8. Note that this value only accounts for calcium, sodium, potassium, magnesium, bicarbonate, carbonate, sulfate, and chloride.

NACL_EQ_CF The sodium chloride correction factor is a calculated field: $([TDS] / [NACL_EQUIVALENT_TDS])$. The value is used to correct the resistivity of water equivalent in a process to interpret total dissolved solids from geophysical well log analysis. Units are dimensionless.

NACL_EQ_CF_TDSmeasured The sodium chloride correction factor is a calculated field: $([TDS_measured] / [NACL_EQUIVALENT_TDS_measured])$. The value is used to correct the resistivity of water equivalent in a process to interpret total dissolved solids from geophysical well log analysis. Units are dimensionless.

USGS_UNIQID Unique id assigned to each produced water sample found within the U.S. Geological Survey Produced Water Database (Blondes and others, 2016). These samples are from the saline water co-produced with oil and gas.

REMARKS General remarks about an analysis.

N-5. Net sand: tblWell_Geology_NetSand_WB

This table contains one record per well with net sand and sand percent values for each geologic formation (Table N-5). It is created from table tblWell_Geology_ProcessingNetSand_Temp using a series of sequential structured query language queries written in Visual Basic for Applications® in a data processing form within the BRACS Database (TWDB, 2025a).

This table is exported into GIS to spatially display net sand and sand percent data and create point and contour maps.

Table N-5. Table tblWell_Geology_NetSand_WB field names, data type and size, and lookup table references.

Field name	Data type	Size	Lookup table
WELL_ID	Long Integer	4	
WB_PRESENT	Yes/No	1	
WB_PARTIAL_PEN	Yes/No	1	
WB_PARTIAL_GEODESC	Yes/No	1	
WB_NET_SAND	Long Integer	4	
WB_SAND_PERCENT	Long Integer	4	
WB_TK	Long Integer	4	
NoRecord_B_D	Long Integer	4	
WB_ParPenPer	Long Integer	4	
WB_ParGeolDescPer_NR	Long Integer	4	
WB_ParGeolDesc_Per_GNP	Long Integer	4	

Field Descriptions

WELL_ID Each record in the database is assigned a unique well ID (which is a long integer) in this table. This is the key field in this table.

WB_PRESENT A value of Yes or No if the Woodbine Group is present in this well.

WB_PARTIAL_PEN A value of Yes or No if the Woodbine Group is only partially penetrated by this well.

WB_PARTIAL_GEODESC A value of Yes or No if the geologic description is for less than 100 percent of the Woodbine Group. This can occur if the upper part of the formation is cased, or if the geologic log for the lower part of the formation is not available.

WB_NET_SAND An integer representing the total thickness of sand within the Woodbine Group, in units of feet.

WB_SAND_PERCENT The percent of sand within the Woodbine Group, calculated field: $(([\text{WB_NET_SAND}] / [\text{WB_TK}]) \cdot 100)$.

WB_TK Woodbine Group thickness, calculated field: $([\text{WB_B_D}] - [\text{WB_T_D}])$. The units are feet.

NoRecord_B_D This is the bottom depth value (units: feet) of a “no record” entry in the field [simplified_lithologic_name] in the table tblWell_Geology. A “no record” value is written to this field if there is no lithologic description for this depth range in situations of a cased well, deepened well, cavern, or lost circulation with loss of drill cuttings returned to surface. This field is used to determine how much of the geologic formation was not defined by lithology for the field [J_ParGeolDescPer_NR]. There may be zero to many no record ranges represented on a well log.

WB_ParPenPer This is the percentage of well penetration into the Woodbine Group for wells that only partially penetrate the entire geologic formation. This field is calculated by: $((\text{total depth of well} - \text{formation top depth}) / \text{formation thickness}) \cdot 100$.

WB_ParGeolDescPer_NR This is the percentage of missing lithologic data in the Woodbine Group based on the depth of the “no record” value in the field [NoRecord_B_D]. This field is calculated by: $((\text{“no record” bottom depth} - \text{formation top depth}) / \text{formation thickness}) \cdot 100$.

WB_ParGeolDesc_Per_GNP This is the percentage of missing lithologic data in the Woodbine Group based on a value of either “geology not processed – log image cut off” or “geology not processed, but available on log” (GNP) that are recorded in the field [simplified_lithologic_name] in the table tblWell_Geology and whose depth ranges overlap the Woodbine Group. The field is calculated by one of three equations, based on one of the three common scenarios: (1) entire formation is not described = 100 percent, (2) GNP overlaps the bottom of the formation, $((\text{formation bottom depth} - \text{GNP top depth}) / \text{formation thickness} \cdot 100)$, or (3) GNP overlaps the top of the formation, $((\text{GNP bottom depth} - \text{formation top depth}) / \text{formation thickness} \cdot 100)$.

N-6. Static water level: tblWB_SWL_GWDB

The Woodbine aquifer static water level table contains records for each measurement in the study area through October 2023 (Table N-6). The source of this data is the TWDB Groundwater Database.

Table N-6. Table tblWB_SWL_GWDB field names, data type and size, and lookup table references.

Field name	Data type	Size	Lookup table
WELL_ID	Double	8	
STATE_WELL_NUMBER	Double	8	
TRACK_NUMBER	Long Integer	4	
WATER_SOURCE	Text	255	
AQUIFER_NEW	Text	255	
DEPTH_WELL	Double	8	
DEPTH_TOTAL	Long Integer	4	
SWL_DEPTH	Long Integer	4	
SWL_STUDY_ELEV	Long Integer	4	
SWL_DATE	Text	255	
mm_date	Text	255	
dd_date	Text	255	
yy_date	Text	255	
SOURCE	Text	255	
Remarks	Text	255	
LATDD	Double	8	
LONGDD	Double	8	

Field Descriptions

WELL_ID Second key field for the table. Each record in the BRACS Database is assigned a unique well ID (which is a long integer) in this table. If there is no well id number, the value is zero (0).

STATE_WELL_NUMBER First key field for the table. This is the state well number assigned to each water well in the TWDB Groundwater Database. If there is no state well number, the value is zero (0).

TRACK_NUMBER The track number of the well, assigned to wells in the Texas Department of Licensing and Regulation Submitted Driller Report Database (TDLR, 2025).

AQUIFER_NEW This is a code for the new aquifer assignment. These field values are listed in the lookup table tblLkBRACSAquifer_AD (Table J-2). This table was created because not all of these aquifer combinations are available in the Groundwater Database aquifer code table. Note: Table J-2 lists one code in the field [AQUIFER_NEW] for an aquifer. In reality, there are many combinations of these single aquifer codes in this field if a well is either screened in multiple geologic formations or screen information is lacking, where all geologic formations from total depth of the well to ground surface are listed.

DEPTH_WELL The total depth of the well in units of feet below ground surface. This is reported on the water well driller report. A value of -99999 is used if the value is not known.

This value was obtained from the BRACS Database for wells with a BRACS well ID or the TWDB Groundwater Database with a state well number.

DEPTH_TOTAL The total depth of the hole in units of feet below ground surface. This is reported on the water well driller report or header page on a geophysical well log. A value of -99999 is used if the value is not known. This value was obtained from the BRACS Database for wells with a BRACS well ID.

SWL_depth The static water level measurement in units of feet below ground surface from the GWDB.

SWL_elevation The static water level measurement in units of feet relative to mean sea level from the GWDB.

SWL_Date The month, date, and year the static water level measurement was taken.

mm_date This field contains the month the static water level measurement was taken.

dd_date This field contains the date the static water level measurement was taken.

yy_date The year the static water level measurement was taken.

SOURCE Each well record is assigned the source of the well information. In some cases, multiple sources exist; in this case, the source of the geophysical well log or water well driller report takes precedence.

REMARKS General remarks about a measurement.

LATDD Latitude of the well site in units of decimal degrees based on a North American Datum of 1983. It is a positive value, referring to a site north of the earth's equator. This value was obtained from tblWell_Location.

LONGDD Longitude of the well site in units of decimal degrees based on a North American Datum of 1983. Longitude is a negative value, referring to a site west of the Prime Meridian in Greenwich, United Kingdom. This value was obtained from tblWell_Location.

N-7. Static water level: tblWB_SWL_BRACS

The Woodbine aquifer static water level table contains records for each measurement in the study area through May 2017 (Table N-7). The source of this data is the TDLR State Drillers Report Database.

Table N-7. Table tblWB_SWL_BRACS field names, data type and size, and lookup table references.

Field name	Data type	Size	Lookup table
WELL_ID	Double	8	
STATE_WELL_NUMBER	Double	8	
TRACK_NUMBER	Long Integer	4	
WATER_SOURCE	Text	255	
AQUIFER_NEW	Text	255	
DEPTH_WELL	Double	8	
DEPTH_TOTAL	Long Integer	4	
SWL_DEPTH	Long Integer	4	
SWL_STUDY_ELEV	Long Integer	4	
SWL_DATE	Text	255	
mm_date	Text	255	
dd_date	Text	255	
yy_date	Text	255	
SOURCE	Text	255	
Remarks	Text	255	
LATDD	Double	8	
LONGDD	Double	8	

Field Descriptions

WELL_ID Second key field for the table. Each record in the BRACS Database is assigned a unique well ID (which is a long integer) in this table. If there is no well id number, the value is zero (0).

STATE_WELL_NUMBER First key field for the table. This is the state well number assigned to each water well in the TWDB Groundwater Database. If there is no state well number, the value is zero (0).

TRACK_NUMBER The track number of the well, assigned to wells in the Texas Department of Licensing and Regulation Submitted Driller Report Database (TDLR, 2025).

AQUIFER_NEW This is a code for the new aquifer assignment. These field values are listed in the lookup table tblLkBRACSAquifer_AD (Table J-2). This table was created because not all of these aquifer combinations are available in the Groundwater Database aquifer code table. Note: Table J-2 lists one code in the field [AQUIFER_NEW] for an aquifer. In reality, there are many combinations of these single aquifer codes in this field if a well is either screened in multiple geologic formations or screen information is lacking, where all geologic formations from total depth of the well to ground surface are listed.

DEPTH_WELL The total depth of the well in units of feet below ground surface. This is reported on the water well driller report. A value of -99999 is used if the value is not known.

This value was obtained from the BRACS Database for wells with a BRACS well ID or the TWDB Groundwater Database with a state well number.

DEPTH_TOTAL The total depth of the hole in units of feet below ground surface. This is reported on the water well driller report or header page on a geophysical well log. A value of -99999 is used if the value is not known. This value was obtained from the BRACS Database for wells with a BRACS well ID.

SWL_depth The static water level measurement in units of feet below ground surface from the GWDB.

SWL_elevation The static water level measurement in units of feet relative to mean sea level from the GWDB.

SWL_Date The month, date, and year the static water level measurement was taken.

mm_date The month the static water level measurement was taken.

dd_date The date the static water level measurement was taken.

yy_date The year the static water level measurement was taken.

SOURCE Each well record is assigned the source of the well information. In some cases, multiple sources exist; in this case, the source of the geophysical well log or water well driller report takes precedence.

REMARKS General remarks about a measurement.

LATDD Latitude of the well site in units of decimal degrees based on a North American Datum of 1983. It is a positive value, referring to a site north of the earth's equator. This value was obtained from tblWell_Location.

LONGDD Longitude of the well site in units of decimal degrees based on a North American Datum of 1983. Longitude is a negative value, referring to a site west of the Prime Meridian in Greenwich, United Kingdom. This value was obtained from tblWell_Location.

N-8. Aquifer hydraulic properties: tblBRACS_AT_WB

The Woodbine Aquifer test table contains records of hydraulic properties such as well yield, specific capacity, and transmissivity (Table N-8).

Table N-8. Table tblBRACS_AquiferTestInformation field names, data type and size, and lookup table references.

Field name	Data type	Size	Lookup table
WELL_ID	Long Integer	4	
RECORD_NUMBER	Long Integer	4	
STATE_WELL_NUMBER	Long Integer	4	
TRANSMISSIVITY	Long Integer	4	
TRANSMISSIVITY_2	Long Integer	4	
T_UNITS	Text	50	tblLkUnitsOfMeasurement
HYDRAULIC_CONDUCTIVITY	Decimal	16	
K_UNITS	Text	50	tblLkUnitsOfMeasurement
STORAGE_COEFFICIENT	Decimal	16	
SPECIFIC_YIELD	Decimal	16	
SPECIFIC_CAPACITY	Decimal	16	
SC_UNITS	Text	50	tblLkUnitsOfMeasurement
SOURCE_WELL_DATA	Text	250	tblLkSourceWellData
DATE_TEST	Text	10	
WELL_YIELD	Double	8	
DEPTH_TOTAL	Double	8	
DEPTH_WELL	Double	8	
LATDD	Double	8	
LONGDD	Double	8	
WELL_YIELD_METHOD	Text	255	tblLkWellYieldMethod
STATIC_WATER_LEVEL	Double	8	
PUMPING_WATER_LEVEL	Double	8	
TEST_LENGTH	Double	8	
DRAWDOWN	Double	8	
AQUIFER_CODE	Text	255	

Field Descriptions

WELL_ID Each record in the database is assigned a unique well ID (which is a long integer) in this table. This is the key field in this table.

RECORD_NUMBER This is the second key field in this table. This number is not assigned as an autonumber field, as in the usual case for a key field. The value is an integer, beginning with 1 and increasing with the addition of each record for a specific well.

STATE_WELL_NUMBER This is the TWDB assigned state well number. Each well in the TWDB Groundwater Database has a state well number. Some, but not all, wells in this table have been assigned a state well number; for those without, this field contains a value of zero (0).

TRANSMISSIVITY This is a transmissivity value measured for the aquifer(s) at the well site. Transmissivity units are specified in the field [t_units]. The source of the information is specified in the field [source_well_data]. If two transmissivity values are provided for a test,

the larger value is written to this field and the smaller of the two values is written to the field [transmissivity_2]. A value of -99999 is written to the field if no data are present for this record.

TRANSMISSIVITY_2 This is a transmissivity value measured for the aquifer(s) at the well site. Transmissivity units are specified in the field [t_units]. The source of the information is specified in the field [source_well_data]. If two transmissivity values are provided for a test, the smaller value is written to this field and the larger of the two values is written to the field [transmissivity]. A value of -99999 is written to the field if no data are present for this record.

T_UNITS The units of measurement for the values in the fields [transmissivity] and [transmissivity_2]. These field values are listed in the lookup table tblLkUnitsOfMeasurement (Table N-9). This table may continue to grow with time.

Table N-9. Lookup table tblLkUnitsOfMeasurement .

UNITS	UNITS_DESCRIPTION
ft	feet
ft ² /day	feet squared per day
gpd/ft	gallons per day per foot
gpd/ft ²	gallons per day per foot squared
gpm/ft	gallons per minute per foot

HYDRAULIC_CONDUCTIVITY This is a hydraulic conductivity value measured for the aquifer(s) at the well site. Hydraulic conductivity units are specified in the field [k_units]. The source of the information is specified in the field [source_well_data]. A value of -99999 is written to the field if no data are present for this record.

K_UNITS The units of measurement for the values in the field [hydraulic_conductivity]. These field values are listed in the lookup table tblLkUnitsOfMeasurement (Table A-9).

STORAGE_COEFFICIENT This is a storage coefficient value measured for the aquifer(s) at the well site. Storage coefficient is dimensionless and can also be referred to as storativity. The source of the information is specified in the field [source_well_data]. A value of -99999 is written to the field if no data are present for this record.

SPECIFIC_YIELD This is a specific yield value measured for the aquifer(s) at the well site. Specific yield is dimensionless. The source of the information is specified in the field [source_well_data]. A value of -99999 is written to the field if no data are present for this record.

SPECIFIC_CAPACITY This is a specific capacity value measured for the aquifer(s) at the well site. Specific capacity units are specified in the field [sc_units]. Specific capacity is calculated from: ([well_yield] / [drawdown]). A value of -99999 is written to the field if no data are present for this record.

SC_UNITS The units of measurement for the values in the field [specific_capacity]. These field values are listed in the lookup table tblLkUnitsOfMeasurement (Table A-9).

SOURCE_WELL_DATA Each aquifer test record contains a source of the well information.

DATE_TEST The date the well was tested in the format of MM/DD/YYYY (M = month; D = day; Y = year). If the date is incomplete, zeros (0) are entered for missing values. The field data type is text since many test dates are incomplete and do not meet date standards.

WELL_YIELD The pumping rate of the well in units of gallons per minute (gpm). In cases of variable rate pumping tests, the original data will need to be reviewed. A value of -99999 is written to the field if no data are present for this record.

DEPTH_TOTAL The total depth of the borehole in units of feet below ground surface. This is reported on the water well driller report. A value of -99999 is written to the field if no data are present for this record.

DEPTH_WELL The total depth of the well in units of feet below ground surface. This is reported on the water well driller report. A value of -99999 is written to the field if no data are present for this record.

LATDD Latitude of the well site in units of decimal degrees based on a North American Datum of 1983. It is a positive value, referring to a site north of the earth's equator. This value was obtained from tblWell_Location.

LONGDD Longitude of the well site in units of decimal degrees based on a North American Datum of 1983. Longitude is a negative value, referring to a site west of the Prime Meridian in Greenwich, United Kingdom. This value was obtained from tblWell_Location.

WELL_YIELD_METHOD The method used to obtain the well yield. These field values are listed in the lookup table tblLkWellYieldMethod (Table N-10). This table may continue to grow with time.

Table N-10. Lookup table tblLkWellYieldMethod .

WELL_YIELD_METHOD
Bailed
Estimated
Flowed
Jetted
Pumped
Unknown

STATIC_WATER_LEVEL The static water level measured at the time of the aquifer test in units of feet below ground surface. This value is negative if the static water level is below the ground surface and positive if above the ground surface (artesian well). A value of -99999 is written to the field if no data are present for this record.

PUMPING_WATER_LEVEL The pumping water level measured at the time of the aquifer test in units of feet below ground surface. This value is negative. A value of -99999 is written to the field if no data are present for this record.

TEST_LENGTH The length of the pumping test in units of hours. A value of -99999 is written to the field if no data are present for this record.

DRAWDOWN The drawdown in water level at the end of the aquifer test in units of feet below ground surface. This value is a positive integer. A value of -99999 is written to the field if no data are present for this record.

AQUIFER CODE The aquifer code from the TWDB Groundwater Database.