

August 29, 2008

Shaw Project No. 129389

Ms. Marilyn Long, P.G.
Texas Commission on Environmental Quality
Remediation Division
Superfund Cleanup Section (MC-136)
P. O. Box 13087
Austin, Texas 78711-3087

Re: Regional Conceptual Site Model
Jones Road Groundwater Plume Federal Superfund Site (SUP075)
Harris County, Texas

Dear Ms. Long:

Shaw Environmental, Inc. (Shaw) is pleased to present the Texas Commission on Environmental Quality (TCEQ) this Regional Conceptual Site Model (CSM) prepared for the site referenced above. The work was approved in TCEQ Work Order 180-0070, Amendment 4, dated February 22, 2008. A *Final Source Area Conceptual Site Model* (Shaw, May 29, 2008) was previously prepared to define the geology and contaminant distribution in the source area located at 11600 Jones Road.

Scope of Work

The scope of work as described in the original approved Work Order was defined as follows: “The Regional CSM shall define subsurface geologic and hydrologic conditions at the Site, to aid groundwater modeling and contaminant transportation studies, baseline risk assessment, and remediation/feasibility studies planned in the near future.”

Regional Conceptual Site Model Construction

Shaw modified a regional site map prepared by the Water Supply Division of the TCEQ in 2003 (**Figure 1**), which shows the locations of public water supply (PWS) wells within a three-mile radius of the PWS well located at Finch’s Gymnastics USA and Childcare Facility (Finch’s) located at 10903 Tower Oaks Boulevard (G1012358A). Figure 1 also shows the locations of stratigraphic cross section A-A’ (**Figure 2**) and B-B’ (**Figure 3**). Stratigraphic cross section A-A’ represents an approximate dip-oriented profile, and was prepared using geophysical logs from PWS wells G1010447C and G1012882A, and geophysical logs from monitor wells MW-12, MW-17/MW-18, and MW-19. Stratigraphic cross section B-B’ represents an approximate strike-oriented profile, and was prepared using geophysical logs from PWS wells G1012097A and G1012740A, and geophysical logs from monitor wells MW-11R, MW-12,

MW-13, and MW-15. Geophysical logs were entered into the graphics software program gINT™ (Version 7.0) for preparation of the cross sections. The gINT™ software program was used as a drawing aid to illustrate the subsurface geology at the site.

Regional Geology

The regional geology in the study area was interpreted through review of geophysical logs and lithologic logs for PWS wells and monitor wells MW-10 through MW-19. For the monitor wells, the borehole geophysical logging tools/methods included natural gamma, 16-inch (short normal) resistivity, 64-inch (long normal) resistivity, and single point resistivity. For the PWS wells, various logging tools were used, including spontaneous potential, natural gamma, short normal resistivity and long normal resistivity. A PWS well for Harris County Municipal Utility District No. 130 (State Well No. 65-04-7; TNRCC Code G1012097A), located approximately 3 miles southwest of the Bell facility, was drilled to a total depth of 1,845 feet below ground surface (bgs). This well represents the deepest known water well drilled near the study area, for which a geophysical log was available for review. The geophysical log is included in Cross Section B-B' (**Figure 3**). The geophysical log for G1012097A was poor quality, and the major sand units were not readily identified. However, another well log was available for G1012740, located northeast of the site, which was drilled to a depth of approximately 1,350 feet bgs, and at least twelve major sand units were identified (**Figure 3**). The regional geology is highly complex, with sand units that tend to be discontinuous laterally and major channels that have developed through downward scouring into underlying clay units. In some cases scouring has occurred completely through the underlying clays into the next sand unit or sand units below the clays.

Regional Hydrogeology

The depth to the bottom of the Chicot Aquifer / top of the Evangeline Aquifer has been estimated to be approximately 400 feet bgs in the study area as indicated in *Texas Department of Water Resources Report 236*, Figure 4 (Baker, 1979), although the report indicated that the interface is difficult to define due to the lack of faunal markers. In addition, *Texas Water Development Board Report 365* (February, 2006) describes the difficulty in distinguishing the Chicot/Evangeline contact due to the lack of a marker bed. TCEQ Superfund Section discussions with the TCEQ Surface Casing and the Texas Department of Licensing and Registration (TDLR) indicated that the bottom of the Chicot Aquifer is approximately 400 feet bgs (TDLR, January 24, 2003). Therefore, for purposes of this investigation, the depth to the bottom of the Chicot Aquifer / top of the Evangeline Aquifer has been defined as 400 feet bgs. The contact between the two aquifers is shown by the horizontal dashed line in **Figures 2** and **3**.

In the study area, five major water-bearing units (WBUs) have been identified within the Chicot Aquifer, and at least seven major WBUs have been identified within the Evangeline Aquifer. The number of sands/WBUs is based on the correlation of geophysical logs of PWS wells and deep monitor wells and development of the cross sections as interpreted by the TCEQ and Shaw for purposes of this CSM. All of the sands that comprise the WBUs are assumed to be saturated, based on the following observations:

- Shallow monitor wells MW-1 through MW-9 are completed in the uppermost WBU (with total depths between 35- and 37-feet bgs). Monitor wells MW-1 through MW-6 have been sampled on a quarterly basis since August 2003, and MW-7, MW-8, and MW-9 have been sampled

quarterly since November 2003. Periodically, only one monitor well (MW-6) did not have enough water to obtain a groundwater sample.

- During the attempted installation of deep source area monitor well RS-1, a 100-foot sand was intersected and was determined to be saturated. An attempt was made to install a packer to retrieve a discrete groundwater sample from the 100-foot sand/WBU. Unfortunately, the packer failed and a groundwater sample was not obtained.
- There are four existing water wells where the reported total depths of the wells range from 120- to 128-feet bgs. Two of these wells have been sampled during quarterly monitoring events. The TCEQ was unable to obtain access to the other two wells.
- Over 100 water wells have been sampled on a quarterly basis since 2003. No water wells in the quarterly monitoring program were reported to be dry during quarterly sampling events conducted from 2003 to 2008, with the exception of those water wells where no access was granted, electrical power was shut off to the wells, or wells that had inoperable pumps.

Downward channeling likely created migration between the Chicot and Evangeline Aquifers, forming “leaky aquifers”. *General Groundwater (Inorganic) Quality Characterization and Comparison, March 2004* (Shaw, May 27, 2004) showed similarities between water quality samples collected from WBUs at varying depths. This may suggest hydraulic communication between the Chicot and Evangeline WBUs.

The *Deep Monitor Well Groundwater Gauging and Rainfall Data* (Shaw, November 2007) report showed the flow direction within a deep aquifer (screened within depths from approximately 233 to 296 feet bgs) to be highly consistent to the southeast, with a groundwater gradient ranging from 0.00248 to 0.00267 ft/ft. The southeast flow direction is consistent with the regional flow direction as shown on **Figure 4** (Map Showing Approximate Water-Level Altitudes in the Chicot Aquifer, Houston-Galveston Region, Texas, January-March 2007), modified from USGS Scientific Investigations Map 2968 (Kasmarek and Houston, 2007).

Pump test data from wells completed in the Chicot Aquifer WBUs were not available; testing of relatively shallow (mostly private) water wells that are not used for PWS is rare. However, reported well yield values were noted on some State of Texas Well Reports for local water wells screened within the Chicot Aquifer, which reported well yield values ranging from 6 gallons per minute (gpm) to 75 gpm.

A 36-hour pump test was performed in November 2003 for Harris County Municipal Utility District No. 130 (State Well No. 65-04-7; TNRCC Code G1012097A), with multiple well ten-inch diameter screens installed from a depth of 592 feet to 959 feet bgs (Evangeline Aquifer). The pump test resulted in 57 feet of drawdown at a constant pumping rate of 403 gpm. The test is a good example of how local wells are constructed in the Evangeline Aquifer and typical well yields that they produce.

PCE Distribution – November 2007

Figure 5 presents the distribution of Perchloroethylene (PCE) concentrations in ground water samples taken from private water wells and monitor wells screened between 261 and 300 feet bgs during the November 2007 sampling event. The locations of the interior portions of regional cross sections A-A’ (**Figure 2**) and B-B’ (**Figure 3**) are also shown on **Figure 5**. For **Figure 5**, PCE concentrations in

ground water are represented by dark colored lots (lots with private water wells) or monitor well symbols as green, yellow, or red depending upon the PCE concentration:

- Green – PCE < 0.5 parts per billion (ppb)
- Yellow – PCE \geq 0.5 ppb to \leq 5.0 ppb
- Red – PCE > 5.0 ppb

The same color scheme was used to represent PCE distribution in cross sections A-A' (**Figure 2**) and B-B' (**Figure 3**) using colored triangles within the well screened intervals of private water wells (shown as vertical lines with screens at the bottom). For the deep water wells and monitor wells with total depths below 261 feet bgs, no PCE has been detected to date. However, PCE has been detected in shallower GBUs as indicated by the light colored lots (**Figure 5**).

VC Distribution – November 2007

Figure 6 presents the distribution of vinyl chloride (VC) concentrations in groundwater samples taken from private water wells and monitor wells screened between 261 and 300 feet bgs during the November 2007 sampling event. A representation of VC concentration in groundwater was used in a similar manner as PCE:

- Green – VC < 0.5 parts per billion (ppb)
- Yellow – VC \geq 0.5 ppb to \leq 2.0 ppb
- Red – VC > 2.0 ppb

For VC, the water well samples were analyzed using the Contract Laboratory Program (CLP), and the quantitation limit for VC was 0.5 ppb. However, monitor well samples were analyzed by the EPA Region 6 Laboratory, and the quantitation limit was 1.0 ppb.

VC was detected in eight of the ten deep monitor wells installed in the study area, six screened in the depth interval 261 to 300 feet bgs, and two from the shallower depth interval 231 to 260 feet bgs. However, the private water wells screened in the depth interval 261 to 300 feet bgs showed no detectable VC.

VC was not detected in the one monitor well screened deeper than 300 feet bgs, MW-17 (410 to 430 feet bgs). Nor was VC detected in five private water wells deeper than 300 feet bgs:

Well Location	Drilled Depth	Screened Interval
11414 Jones Road	310	296 to 310
10635 Tower Oaks Boulevard	310	295 to 305
11115 Tall Timbers Drive	425	405 to 425
11510 Campos Drive	540	516 to 540
10814 Woodedge Drive	409	395 to 405

VC was not detected in any private water well at a concentration greater than 0.5 ppb during the November 2007 sampling, regardless of depth.

VC Distribution – February 2008

Figure 7 presents the distribution of VC concentrations in groundwater samples taken from private water wells and monitor wells screened between 261 and 300 feet bgs during the February 2008 sampling event. Also during the February 2008 sampling event, no VC was detected in the monitor wells or private water wells with screen intervals deeper than 200 feet bgs.

General Contaminant Distribution

Estimates of the plume size based on surface distance measurements to impacted water wells in the study area suggests that the width is approximately 2,000 feet, the length is approximately 3,000 feet, and the depth is approximately 300 feet.

Five major groundwater bearing units have been identified within the Chicot Aquifer, and seven major groundwater bearing units have been identified within the upper Evangeline Aquifer. Four of the upper Chicot Aquifer sands have been impacted by PCE, and the lower Chicot Aquifer sand and the Evangeline Aquifer sands have not been impacted by PCE, trichloroethylene (TCE), or dichloroethylene (DCE). The deep monitor wells surround the PCE plume, and PCE has not been detected in any of the deep monitor wells screened between 240 and 430 feet bgs (although low VC concentrations have been detected in some of these monitor wells). More discussion about the nature and extent of contamination at the site is discussed in the *Remedial Investigation Report* (Shaw, August 2008).

If you have any questions, or need additional information, please do not hesitate to call me at (713) 996-4571.

Sincerely,
Shaw Environmental, Inc.



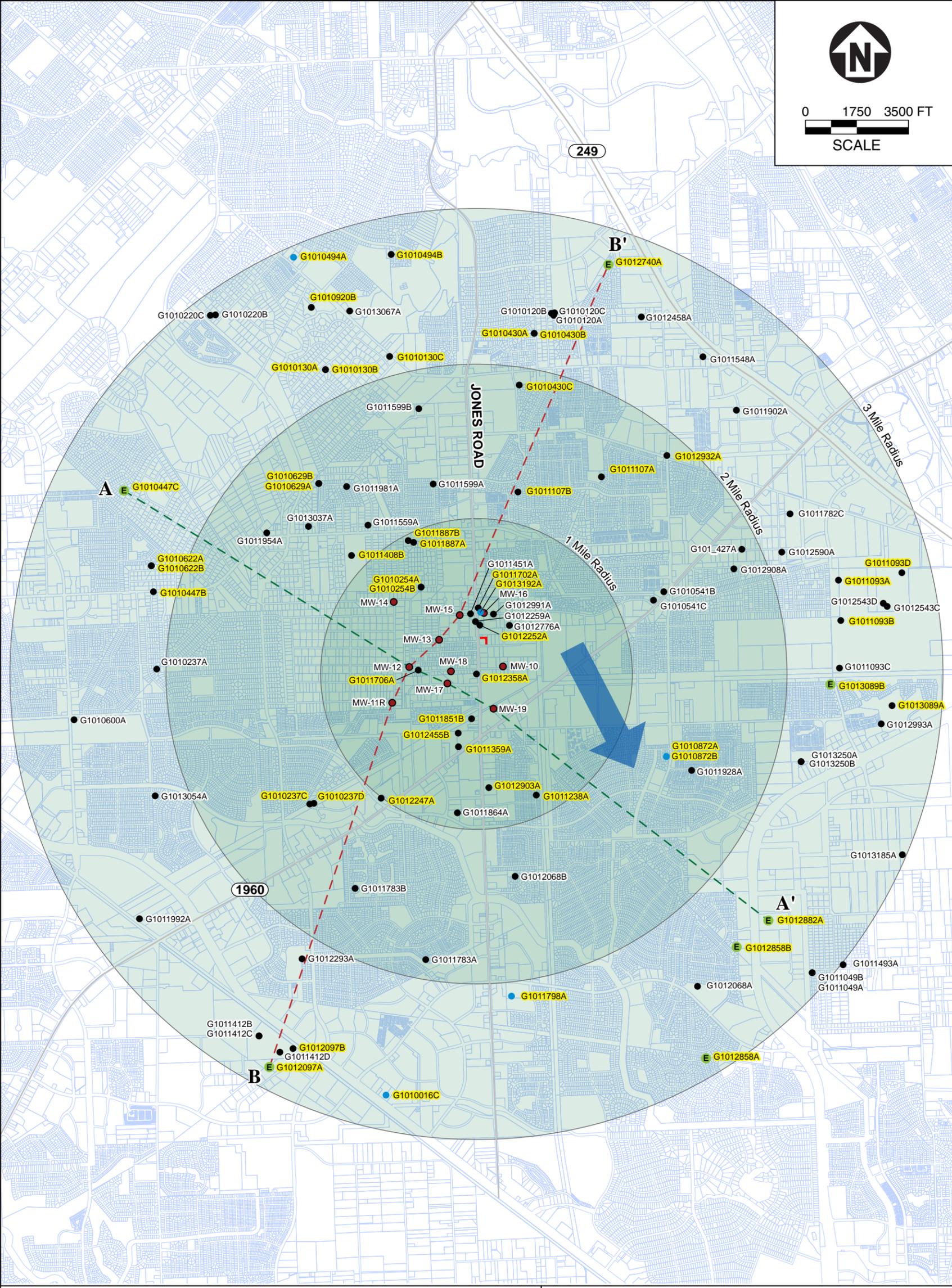
Russell S. Perry, P.G.
Project Director

RSP/mfa

- Attachments:
- Figure 1 – Regional Conceptual Site Model
 - Figure 2 – Stratigraphic Cross Section A-A'
 - Figure 3 – Stratigraphic Cross Section B-B'
 - Figure 4 – Map Showing Approximate Water-Level Altitudes in the Chicot Aquifer, Houston-Galveston Region, Texas, January-March 2007
 - Figure 5 – PCE Concentrations in Groundwater; Lots with Well Depths 261 to 300 Feet Below Ground Surface; November 2007
 - Figure 6 – VC Concentrations in Groundwater; Lots with Well Depths 261 to 300 Feet Below Ground Surface; November 2007
 - Figure 7 – VC Concentrations in Groundwater; Lots with Well Depths 261 to 300 Feet Below Ground Surface; February 2008

- References: *Final Source Area Conceptual Site Model* (Shaw, May 29, 2008)
Texas Department of Water Resources Report 236, Figure 4 (Baker, 1979)
Texas Water Development Board Report 365 (February, 2006).
TCEQ Superfund Section discussions with the TCEQ Surface Casing and the TDLR,
(TDLR, January 24, 2003)
General Groundwater (Inorganic) Quality Characterization and Comparison, March
2004 (Shaw, May 27, 2004)
Monitor Well Groundwater Gauging and Rainfall Data (Shaw, November 2007)
Map Showing Approximate Water-Level Altitudes in the Chicot Aquifer, Houston-
Galveston Region, Texas, January-March 2007), modified from USGS Scientific
Investigations Map 2968 (Kasmarek and Houston, 2007)
Remedial Investigation Report (Shaw, August 2008)

Figures



EXPLANATION

- Cross Section A-A'
- Cross Section B-B'
- Well location ID with driller's log available
- Well location ID without driller's well log available
- Groundwater monitor well location
- Well location
- Well location with test data available
- E Well screened in Evangeline Aquifer with well test data available; all other wells are screened in the Chicot Aquifer
- ➔ Regional groundwater flow direction
- ⌚ Bell Facility, 11600 Jones Road

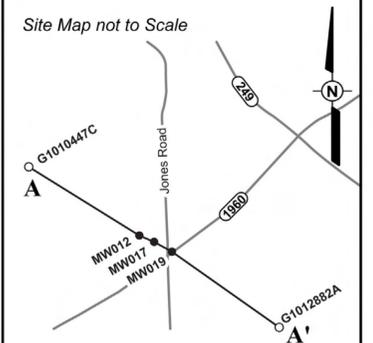
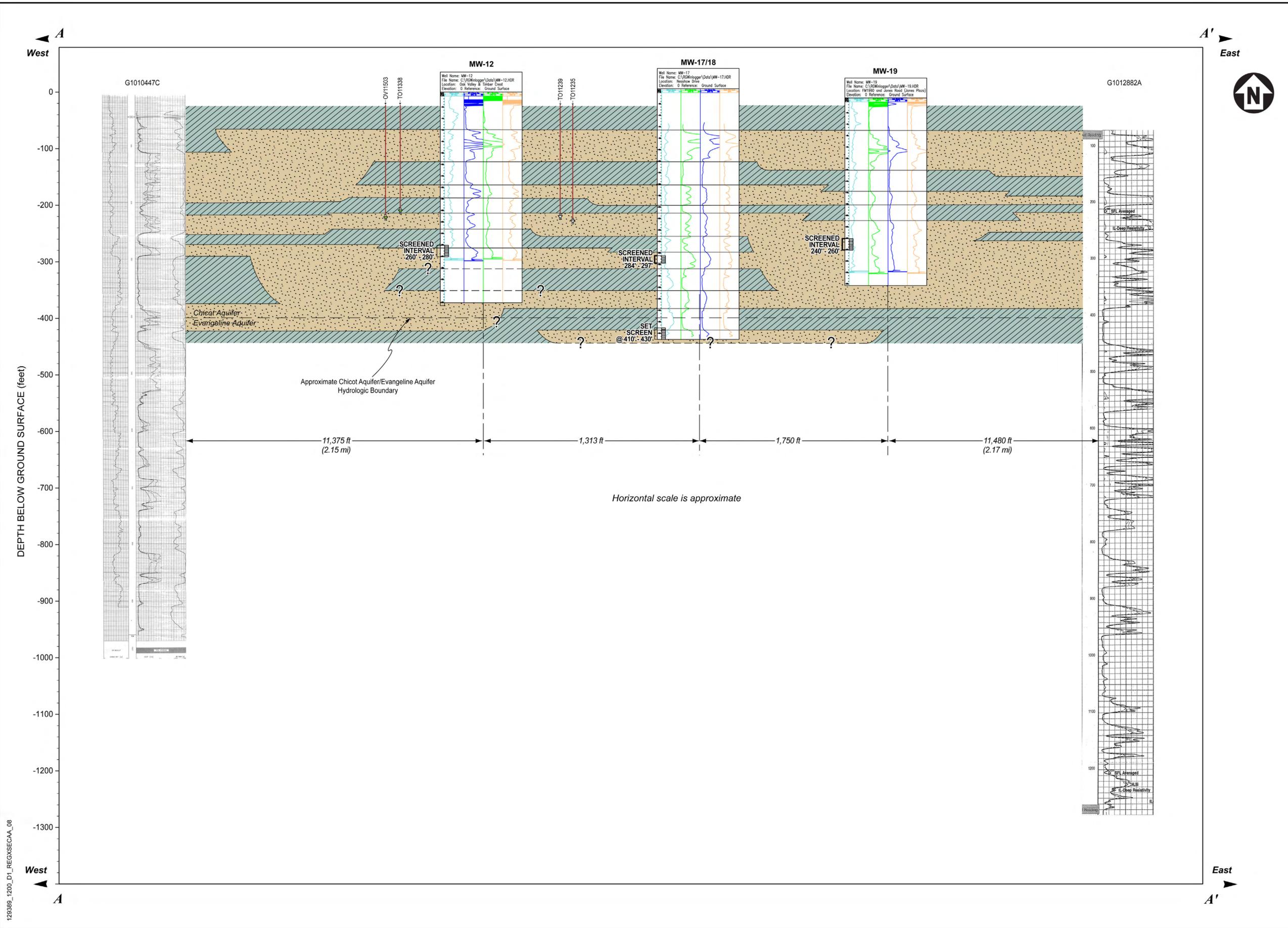
Map sources:
 Parcel data from Harris County Appraisal District, Harris County, TX (www.hcad.org)
 Well data from TCEQ Water Supply Division, 2003

Figure 1
Regional Conceptual Site Model
Jones Road Groundwater Plume
Federal Superfund Site
Harris County, Texas



Jones Road
 Superfund Site
 Harris County TX

JOB NUMBER	PLATE NUMBER
129389	129389.1200 B2



Explanation

MW-13

Resistivity data

Lithology Graphics

- Sand
- Clay
- Lithology Boundary
- Approximate Lithology Boundary
- PCE Concentration < 0.5 ppb In Groundwater
- PCE Concentration Not Sampled
- Well Screen

Vertical Scale (feet)

0

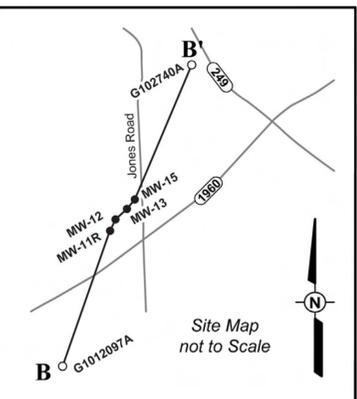
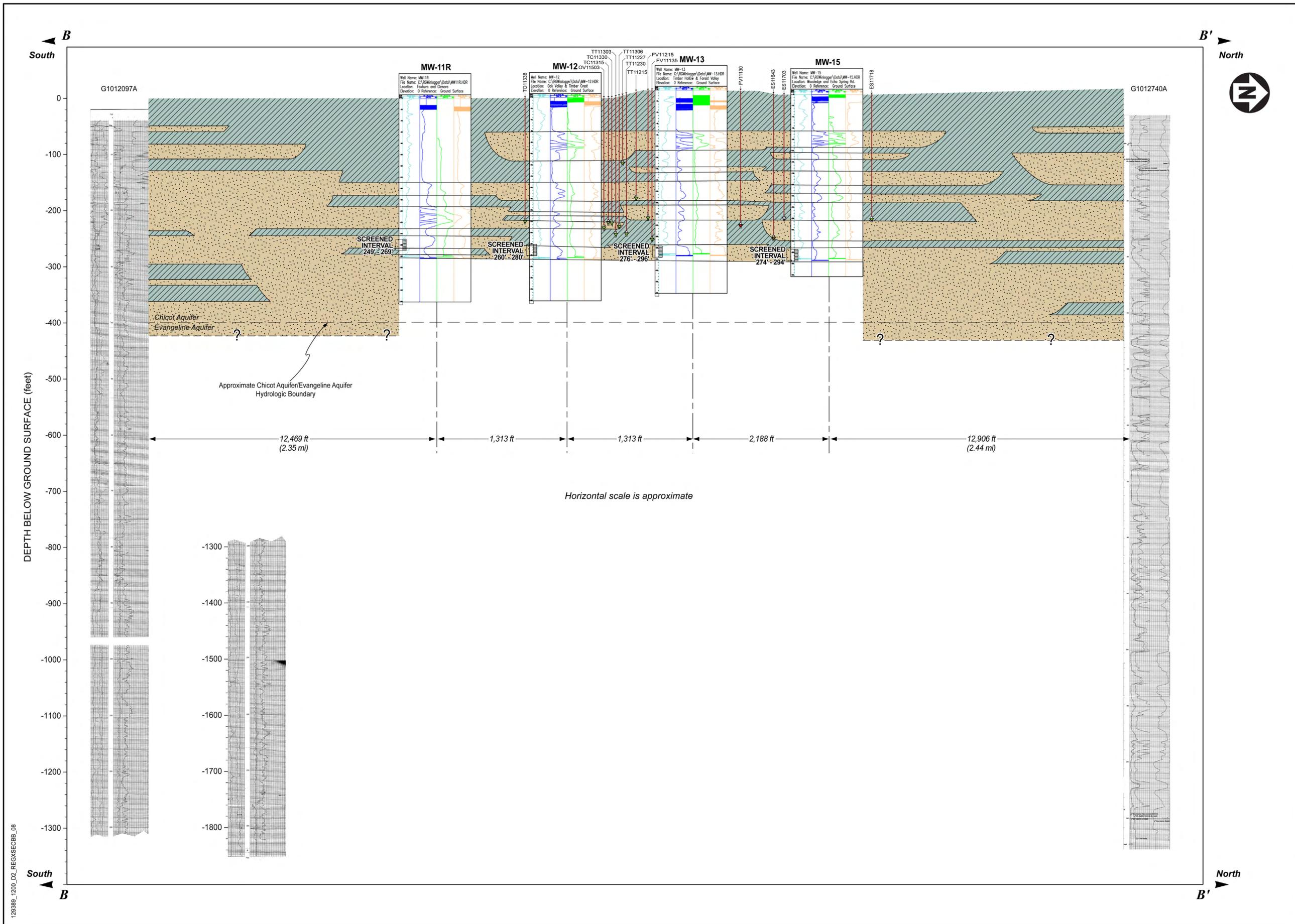
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Figure 2
Stratigraphic Cross Section A-A'
West-East Baseline

Jones Road Superfund Site
Harris County TX

JOB NUMBER	PLATE NUMBER
129389	Plate _

129389_1200_D1_REGXSECAA_08



Explanation

Resistivity data

MW-13

Lithology Graphics

- Sand
- Clay
- Lithology Boundary
- Approximate Lithology Boundary
- PCE Concentration > 5 ppb In Groundwater
- PCE Concentration ≥ 0.5 ppb to ≤ 5 ppb In Groundwater
- PCE Concentration < 0.5 ppb In Groundwater
- PCE Concentration Not Sampled
- Well Screen

Vertical Scale (feet)

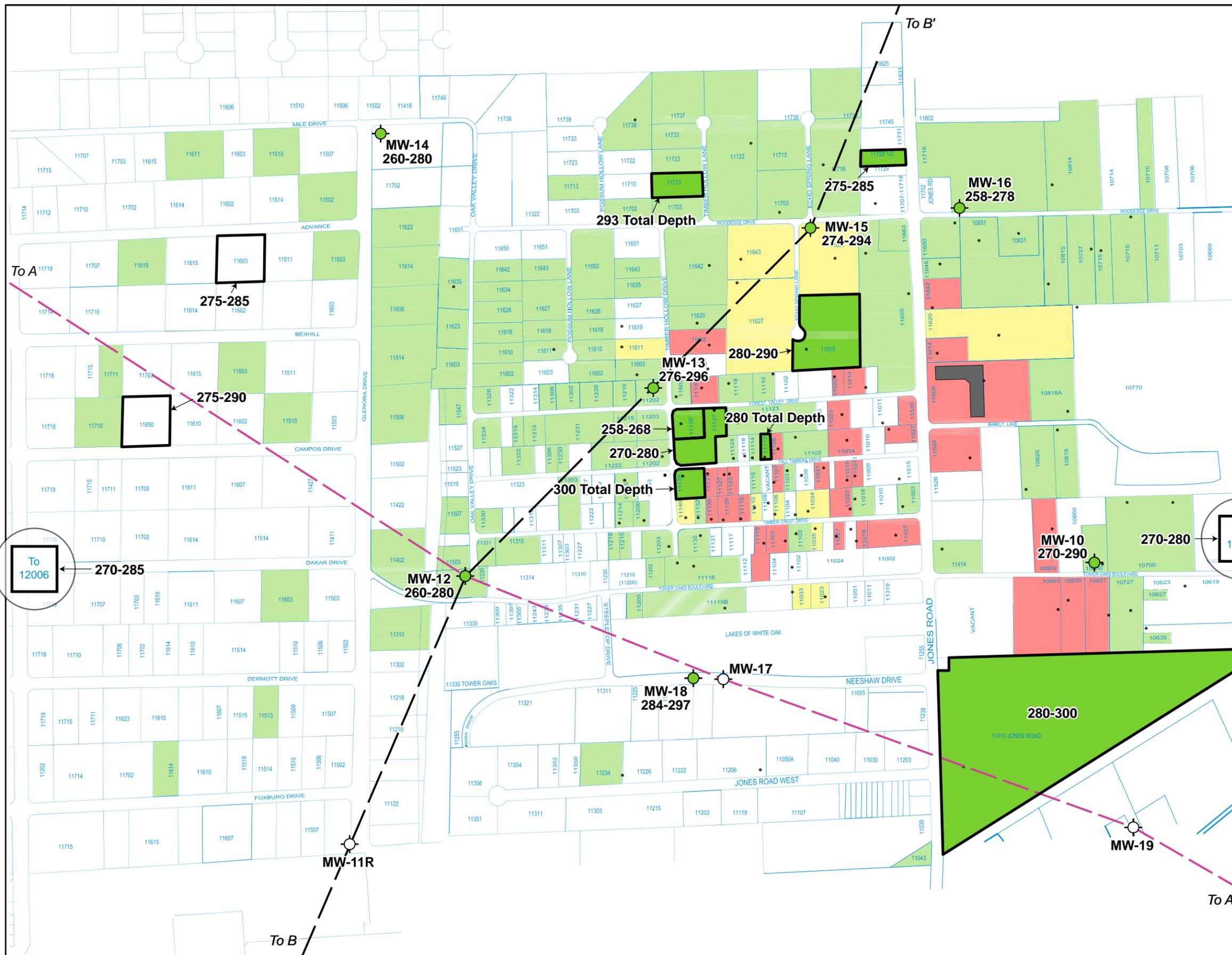
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Figure 3
Stratigraphic
Cross Section B-B'
South-North Baseline

Jones Road
Superfund Site
Harris County TX

JOB NUMBER	PLATE NUMBER
129389	Plate _

129389_1200_DZ_REGXSECB08_08



EXPLANATION

- Property boundary
- Cross Section A-A'
- Cross Section B-B'
- Approximate private well location
- Not sampled
- PCE < 0.5ppb (Quantitation limit)
- PCE >= 0.50ppb to <= 5.0ppb
- PCE > 5.0ppb (MCL)
- 270-290 → Lot with Well 261 to 300 feet bgs
- Screen interval or Total depth
- Bell Facility: 11600 Jones Road
- Monitor Well and Screen Interval



Figure 5
PCE Concentrations in Groundwater
Lots with Well Depths 261 to 300 Feet
Below Ground Surface
November 2007
Jones Road Groundwater Plume
Superfund Site
Harris County, Texas

DRAWING NUMBER 129389-A5

APPROVED BY R. PERRY 7/16/08

CHECKED BY R. PERRY 7/16/08

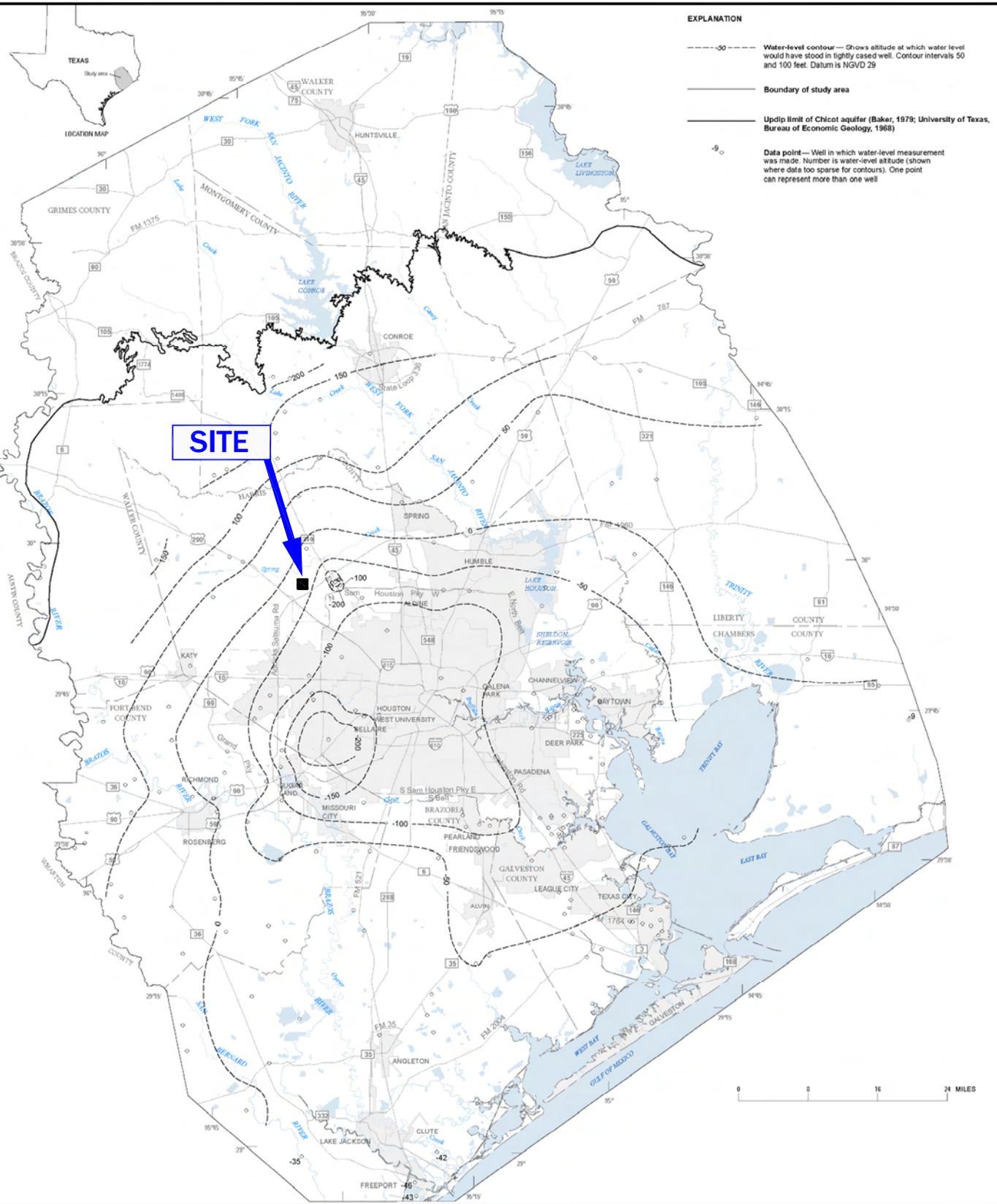
DRAWN BY L. JONES 7/16/08

OFFICE HOUSTON, TX

X-REF

IMAGE

PLOT DATE: 089/10/08
FORMAT REVISION 9/17/02

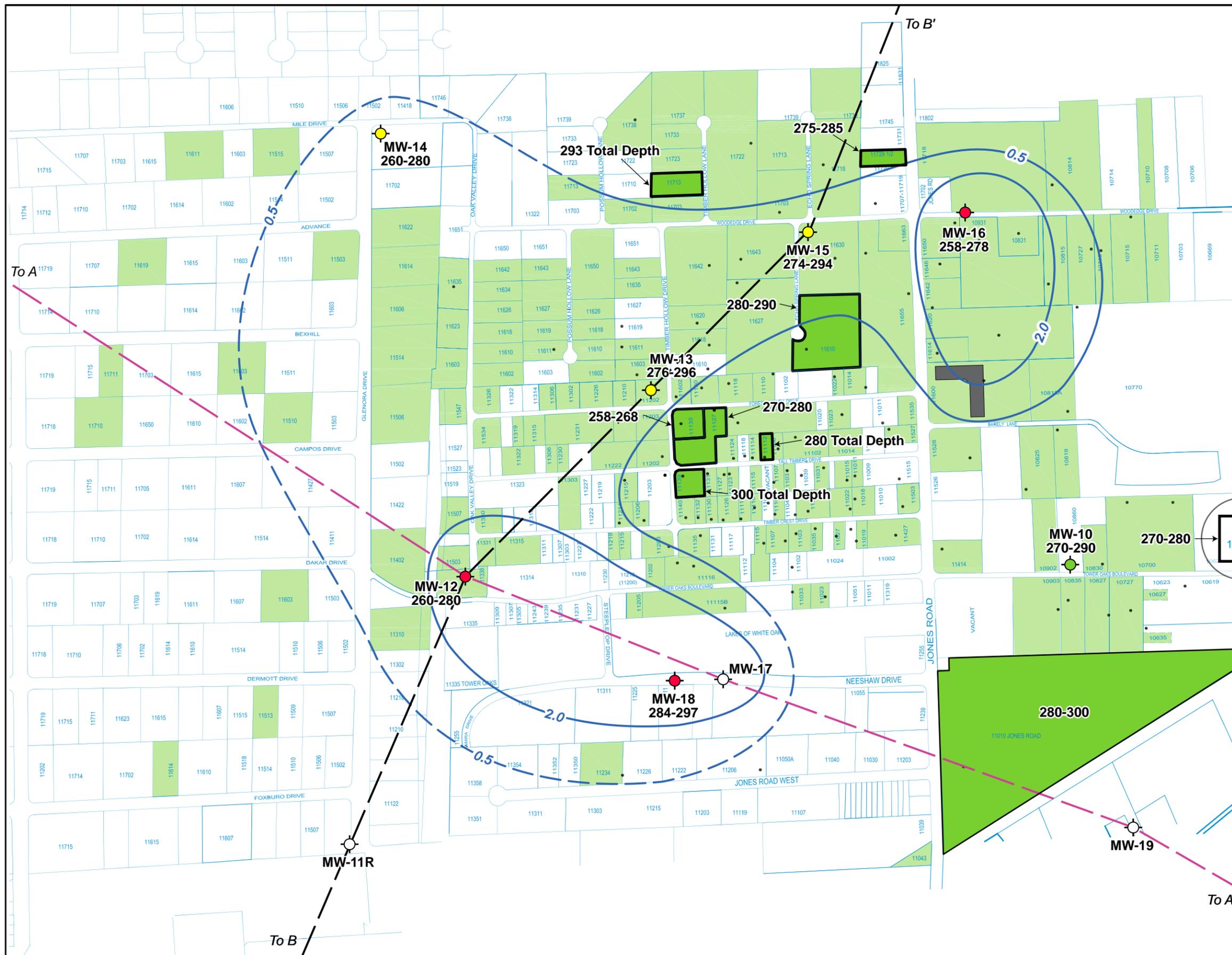


REFERENCE:
 U.S. DEPARTMENT ON THE INTERIOR
 U.S. GEOLOGICAL SURVEY
 SCIENTIFIC INVESTIGATIONS MAP 2968
 APPROXIMATE WATER-LEVEL ALTITUDES,
 CHICOT AQUIFER, 2007 SHEET 1 OF 18



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

FIGURE 4
MAP SHOWING APPROXIMATE WATER-LEVEL/ALTITUDES IN THE CHICOT AQUIFER, HOUSTON/GALVESTON REGION, TEXAS JANUARY-MARCH 2007
 HARRIS COUNTY, TEXAS



EXPLANATION

- Property boundary
- Cross Section A-A'
- Cross Section B-B'
- Approximate private well location
- Not sampled
- VC < 0.5 ppb (CLP Quantitation Limit)
- VC >= 0.5 ppb to <= 2.0 ppb
- VC > 2.0 ppb (MCL)
- 280-290 → Lot with Well 261 to 300 feet bgs
- Screen interval or total depth
- Bell Facility: 11600 Jones Road
- Inferred Isoconcentration Contour (ppb)
- Monitor Well and Screen Interval

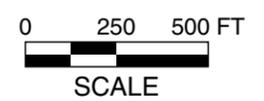
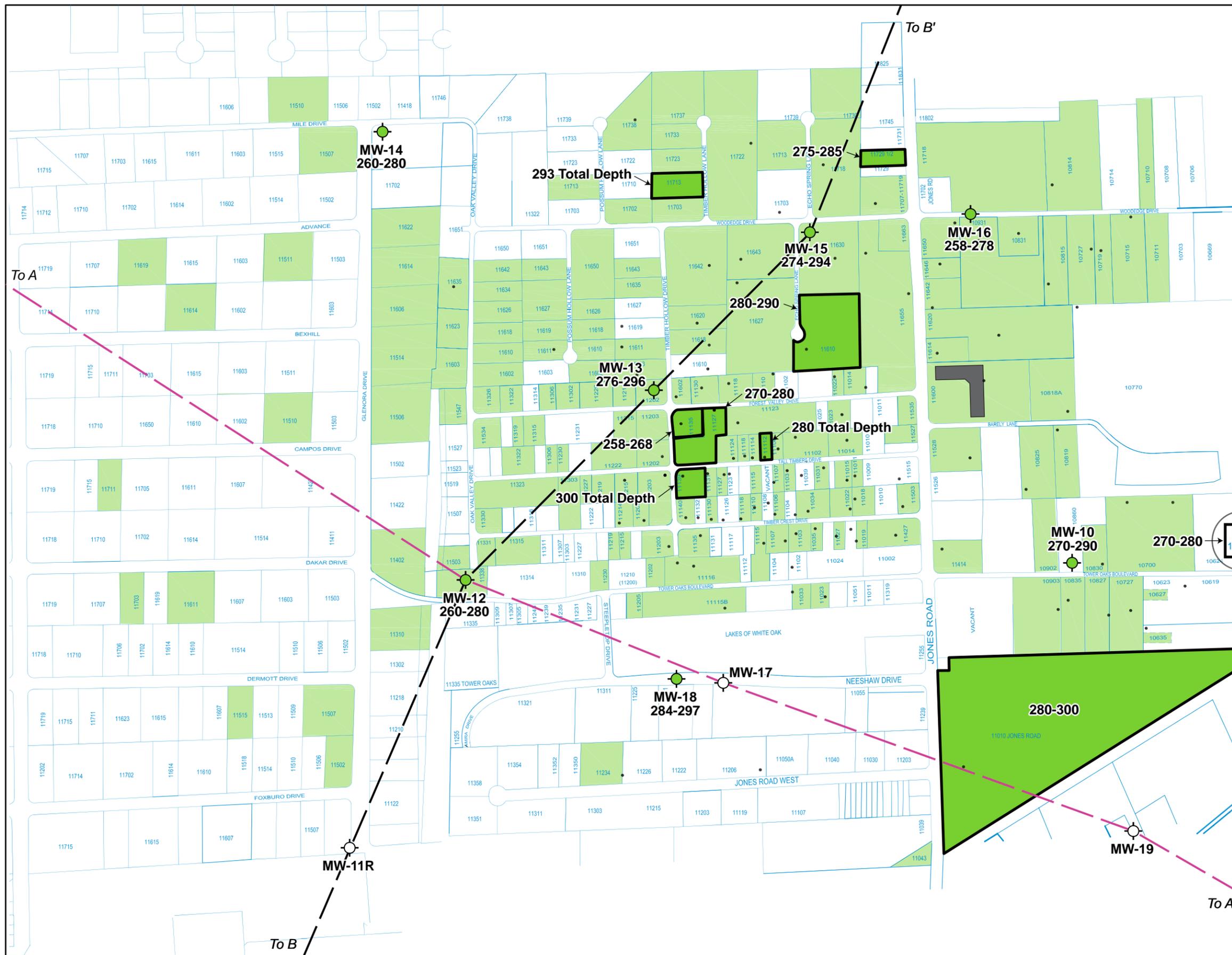


Figure 6
VC Concentrations in Groundwater
Lots with Well Depths 261 to 300 Feet
Below Ground Surface
November 2007
Jones Road Groundwater Plume
Superfund Site
Harris County, Texas



- EXPLANATION**
- Property boundary
 - Cross Section A-A'
 - Cross Section B-B'
 - Approximate private well location
 - Not sampled
 - VC < 0.5 ppb (CLP Quantitation Limit)
 - 280-290 → Lot with Well 261 to 300 feet bgs
 - Screen interval or total depth
 - Bell Facility: 11600 Jones Road
 - Monitor Well and Screen Interval

Water well samples were analyzed by the Contract Laboratory Program, and the quantitation limit for VC was 0.5 ppb.
 Monitor well samples were analyzed by the EPA Region 6 Laboratory, and the quantitation limit for VC was 1.0 ppb.

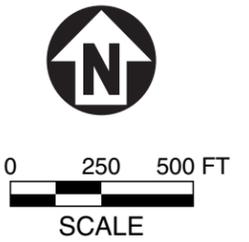


Figure 7
VC Concentrations in Groundwater
Lots with Well Depths 261-300 Feet
Below Ground Surface
February 2008
Jones Road Groundwater Plume
Superfund Site
Harris County, Texas