

NM1 - _____ 55 _____

**BORING
PLAN(S)**

2012

Jones, Brad A., EMNRD

From: Jones, Brad A., EMNRD
Sent: Tuesday, September 11, 2012 9:12 AM
To: 'Hale, Aaron'
Cc: Williams, Chad
Subject: RE: Tervita Carlsbad Siting Study Work Plan

Aaron,

The Oil Conservation has completed the review and hereby approves the use of the Boring Plan, dated September 10, 2012. Please keep me updated on the site investigation activity during the drilling. Also, please keep Mike Bratcher (of the OCD Artesia District Office) updated on the drilling dates and times and of any changes. Mike's office number is 575-748-1283 ext. 108 and his cell is 575-626-0857. Please let OCD know as soon as possible when a drilling date has been scheduled.

Brad

Brad A. Jones
Environmental Engineer
Environmental Bureau
NM Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505
E-mail: brad.a.jones@state.nm.us
Office: (505) 476-3487
Fax: (505) 476-3462

From: Hale, Aaron [<mailto:Aaron.Hale@tetrattech.com>]
Sent: Monday, September 10, 2012 2:31 PM
To: Jones, Brad A., EMNRD
Cc: Williams, Chad
Subject: Tervita Carlsbad Siting Study Work Plan

Brad –

Thank you so much for your help with this work plan. Attached is the final version ready for your approval. Upon approval, we will coordinate with the drilling contractor and provide the 10 working days notice necessary to start the project.

Please let me know if you have any other questions.

Thank you

Aaron M. Hale, P.G. | Project Manager III
Office: 432.682.4559 | Cell: 432.634.7287
Aaron.Hale@tetrattech.com

Tetra Tech | MMI
1910 N. Big Spring Street | Midland, TX 79705 | www.tetrattech.com

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Jones, Brad A., EMNRD

From: Hale, Aaron <Aaron.Hale@tetrattech.com>
Sent: Monday, September 10, 2012 2:31 PM
To: Jones, Brad A., EMNRD
Cc: Williams, Chad
Subject: Tervita Carlsbad Siting Study Work Plan
Attachments: Tervita Carlsbad Drilling Proposal.pdf

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Please let me know if you have any other questions.

Thank you

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TETRA TECH

September 10, 2012

Mr. Brad Jones
Environmental Engineer
New Mexico Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

Subject: Proposal to Assess Siting Suitability for a Commercial Landfill Facility
Carlsbad Treatment Recover Disposal
Section 2, Township 21 South, Range 28 East
Eddy County, New Mexico

Dear Mr. Jones:

Tetra Tech is pleased to submit this proposal on behalf of Tervita, LLC (Tervita) to assess the Siting Requirements associated with a New Mexico Oil Conservation Division (OCD) Form C-137 (Application for Surface Waste Management Facility). If the site meets the minimum necessary requirements as presented in Subsections A and B of 19.15.36.13 in the New Mexico Administrative Code (NMAC), Tervita intends to continue the permitting process by collecting the additional data required to complete the C-137 permit (from within 19.15.36 NMAC) to construct and operate a 412 acre commercial disposal facility complete with a reclamation plant, landfill cells, and a commercial salt water disposal well. The proposed facility is located within Section 2, T21S, R28E, approximately 10 miles northeast of Carlsbad in Eddy County, New Mexico.

At this time Tervita has not performed any initial layout of this potential facility. The boring depths provided within this proposal are all intended to evaluate for the presence of groundwater within 100 feet below the lowest elevation of the design depth of a landfill cell. The typical landfill cell design Tervita is currently building in other areas allows for a depth of the cell to be approximately 30 feet below ground surface (bgs). With the required slope of the floor of the cell and the sump, the lowest elevation of the design depth should be no more than 38 feet bgs. In the event that any kind of surface grading is necessary in the vicinity of the landfill cell, a boring depth of 150 feet bgs is proposed.

Project Understanding

Part of the process of permitting a commercial waste management facility in New Mexico with the OCD requires an approved siting study of the proposed location. The OCD C-137 permit requires a meeting with the OCD to determine if the proposed location is capable of satisfying the siting requirement of NMAC. Tervita understands that Subsections A and B of 19.15.36.13 do not contain all of the requirements for permitting a commercial waste management facility for the OCD. Subsections A and B of 19.15.36.13 NMAC do provide the minimum requirements for all permitted surface waste

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management facilities in New Mexico operating under the jurisdiction of the OCD. The initial siting requires evaluation of the subject property for the following:

- The presence of groundwater located within 100 feet below the lowest elevation of the design depth of a landfill cell;
- The presence of groundwater located within 50 feet below the lowest elevation of the design depth of a surface waste management facility;
- Identification of watercourses, lakebed, sinkholes or playa lakes within 200 feet of the surface waste facility;
- Identify existing wellhead protection areas or 100 year floodplains within the proposed surface waste facility;
- Identify wetlands located within 500 feet of the proposed surface waste facility;
- The presence of a subsurface mine below the proposed surface waste management facility;
- Identify Permanent residences, schools, hospitals, institutions or churches within 500 feet of the proposed surface waste management facility; and,
- Evaluate the subsurface conditions at the proposed facility to determine the presence of cave/karst features.

SCOPE OF WORK

Seven boring locations have been identified for drilling within the property (Figure 1 and 2). The boring program is designed to evaluate the lithology and subsurface conditions throughout the property. Upon approval of this work plan by the OCD, Tetra Tech will submit Form wr-07 (Application for Permit to Drill a Well With No Consumptive Use of Water) to the New Mexico Office of the State Engineer. Tetra Tech will then mobilize a Hollow Stem Auger (HSA) drilling unit to the site. The HSA rig will be capable of collecting a continuous core from each boring.

The drilling at this location will be completed by a State of New Mexico licensed well driller. Oversight of the drilling program and the logging of the lithology will be conducted by either a Geologist or a Geotechnical Engineer. Tetra Tech will notify Brad Jones of the OCD by telephone (505-476-3487) at least 10 working days in advance of the proposed start date of field activities.

Drilling Methodology

The HSA rig will utilize augers that have an outside diameter of 8-inches, an inside diameter of 4-inches, and are 5-feet in length. The coring tool is approximately 3.5-inches in diameter and is 5-feet in length. The coring tool will be advanced into the subsurface as each 5-foot auger section is drilled and will collect an undisturbed soil sample. Prior to placing an additional 5-foot auger section on the drill stem, the coring tool will be removed from the boring and the undisturbed soil sample will be extracted. The empty coring tool will be replaced inside the augers and the drilling will continue another 5-feet. This process will continue until either the total depth of the boring is achieved or until groundwater is present.

Soil Boring Installation

Each soil boring will extend to approximately 150 feet below the ground surface (bgs). This is approximately 112 feet below the base of waste if a landfill cell were to be located



in the area of the soil boring. The boring will be continuously cored from the surface to the total depth of each boring utilizing the above mentioned HSA drilling rig. If a potential groundwater bearing zone (moist to saturated soils) is visible in any of the core samples, the depth will be noted and the augers will be raised to a depth 2 feet above the potential groundwater bearing zone. The boring will be gauged every hour until either groundwater is gauged in the boring or 4-hours have passed. If 4 hours have passed without accumulating a measureable amount of water with a water level meter (less than 0.01-feet) drilling will continue past this zone until either another potential groundwater bearing zone is encountered or the total depth of the boring is reached. If there is measurable groundwater in the boring within 4-hours of discovery, the boring will be continuously cored and drilled until the base of the groundwater bearing zone is identified. A monitoring well will be installed as detailed in the next section.

Soil samples will be selected from various cores from the property for select geotechnical laboratory analysis. Geotechnical laboratory analysis for various samples may include unit weight, sieve analysis, moisture content, Atterburg limits, shear strength, and permeability testing. Borings will remain open for at least 24 hours after drilling is complete. Prior to plugging each boring, the boring will be gauged with a water level meter to evaluate the boring for the presence of groundwater. If groundwater is present, a monitoring well will be installed as detailed below. Soil borings will be backfilled with a bentonite grout if groundwater is not present.

Monitoring Well Installation (if groundwater is encountered)

If groundwater is encountered in a boring, a temporary monitoring well will be installed. The temporary well will be purged to clear the water and a sample will be field screened to evaluate the Total Dissolved Solids (TDS) for the water. If the TDS is less than 10,000 mg/L and the depth to water is greater than 50 feet bgs, a permanent monitoring well will be installed. If the TDS is greater than 10,000 mg/L, water samples will be obtained for laboratory testing to document the pre-existing condition of this non-protectable water table and the temporary monitoring well casing will be pulled and the boring will be plugged. The laboratory testing on the groundwater samples will include major cations and anions, BTEX, RCRA metals, and TDS.

Any permanent monitoring well installed for this project will be constructed in general accordance with the New Mexico Environmental Departments Ground Water Quality Bureau's Monitoring Well Construction and Abandonment Guidelines (Revision 1.1, March 2011). This monitoring well will be constructed of schedule 40, 2-inch PVC. A maximum of 20 feet of machine slotted well screen will be placed at the bottom of the well and extend a maximum of 15 feet into the water table. If the thickness of the groundwater bearing zone is greater than 15 feet thick, the boring will be plugged back utilizing bentonite pellets (3/8 inch chip bentonite) to allow for a 15 foot water column within the monitoring well. If the thickness of the groundwater bearing zone is less than 15 feet thick, the screen interval of the monitoring well will be reduced to allow for only 5 feet of screen to be placed into the vadose zone.

A filter pack will be placed in the annular space of the boring to an elevation of 2 feet above the top of the screened interval. In a case where groundwater is encountered more than 30 feet bgs, the filter pack will be placed with a tremmie pipe. A bentonite



seal will be placed on top of the filter pack. This bentonite seal will be at least 3 feet thick and hydrated with clean water prior to completing the annular seal of the monitoring well. After the bentonite seal has had adequate time to hydrate, the remainder of the annular space will be sealed with a bentonite based cement grout to the land surface. If the depth to the bentonite seal is greater than 20 feet, the bentonite based cement grout will be placed with a tremmie pipe.

In the event that an artesian water table is encountered, Tetra Tech will notify the New Mexico Office of the State Engineer and Brad Jones of the OCD (505-476-3487). The monitoring well will be constructed to prevent this water from coming into contact with the vadose zone. The boring will be advanced approximately 10 feet into the artesian water table. If a confining layer is encountered prior to advancing the augers 10 feet into the artesian water table, the boring will be terminated. The well screen will be placed from the total depth of the boring to the top of the formation containing the artesian water table. The filter pack will be placed no more than 1 foot above the top of the screen interval. The annular seal will be placed above the filter pack within the aquitard to the top of the aquitard (as observed during the boring coring activities). The annular seal shall be at least 3 feet thick and will not extend above the top of the aquitard. If the aquitard is less than 3 feet thick, the annular seal will extend into the artesian water table. The annular seal will be constructed by using timed release bentonite pellets and placed with a tremmie pipe. These time released bentonite pellets are designed to fall through the water contained within the annular space to the top of the filter pack prior to hydrating and creating a seal. A neat cement slurry will be placed with a tremmie pipe from within the top of the annular seal to the ground surface.

Any permanent monitoring well will be completed with a 4 foot by 4 foot by 4 inch thick concrete pad with a lockable above ground surface completion. After a sufficient time, the water level within the boring will be measured with a water level meter. The well will then be purged of at least 3 well volumes. A sample of the groundwater will be submitted for laboratory analysis of major cations and anions, BTEX, RCRA metals, and TDS.

It should be noted that if an unconfined water table is encountered, and the field sampling of the groundwater indicates that the TDS exceeds 10,000 mg/L (not protectable), Tervita may consider only a temporary installation for the monitoring well. The well will either be installed as noted above with the exception of the surface completion and the grout above the annular seal or the well may be constructed using PVC pipe containing a pre-constructed filter pack. Additional groundwater samples will be collected prior to plugging the boring location to document the groundwater conditions at the time of the siting suitability study.

If the TDS is greater than 10,000 mg/L (not protectable), and the base of the groundwater bearing zone is less than 150 feet bgs an air/mud rotary drilling rig will be utilized to drill a 15-inch diameter boring and set 10-inch diameter steel surface casing to a depth of approximately 2-feet below the base of the groundwater bearing zone. This boring will be placed within 15 feet of the monitoring well. The annular space of the steel surface casing will be sealed with a bentonite grout that is pressure injected from the bottom of the boring. The grout will be allowed to cure for at least 24-hours prior to



continuing the soil assessment activities. After this 24-hour period has passed, drilling will continue as described above using the HSA drilling rig with the 8-inch diameter augers and the coring tool until either a depth of 150 feet bgs or another groundwater bearing zone is encountered. The assessment activities will continue to be conducted as described above.

If the TDS is less than 10,000 mg/L (protectable), and the groundwater bearing zone is located at a depth of less than 100 feet below the lowest elevation of the design depth of a landfill cell, Tervita will evaluate the depth this water is encountered to determine if the site is still a viable site for a commercial waste disposal facility.

Based on the results of the soil boring program, Tervita may continue with the property evaluation by completing a boundary and topo survey of the property. In addition, a detailed geophysical survey using soil resistivity equipment will be performed. The geophysical survey will further evaluate the property for the presence of cave/karst features in the shallow subsurface.

If the geophysical survey indicates the site is still a viable site for a commercial waste disposal facility, Tervita may continue to pursue a permit to operate such a facility by gathering all the necessary data and completing a C-137 permit for submittal to the OCD. The additional data would include a more detailed analysis of the groundwater (major cations and anions, BTEX, RCRA metals, and TDS) as required by 19.15.36.8.C (15) NMAC (if protectable groundwater is located within 150 feet of the ground surface), geologic cross sections, geotechnical laboratory data and recommendations, and proposed design drawings.

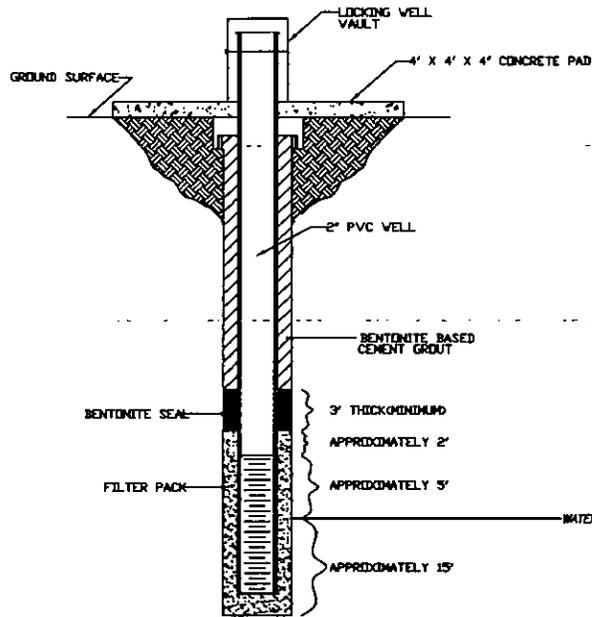
PROJECT SCHEDULE

We appreciate this opportunity to provide our Siting Assessment proposal to you for review/approval, and welcome the opportunity to discuss it with you in more detail. Tervita is eager to begin this work, so if this proposal is acceptable, please provide your written authorization to proceed. Please contact us at 432-682-4559, if you have any questions or require additional information.

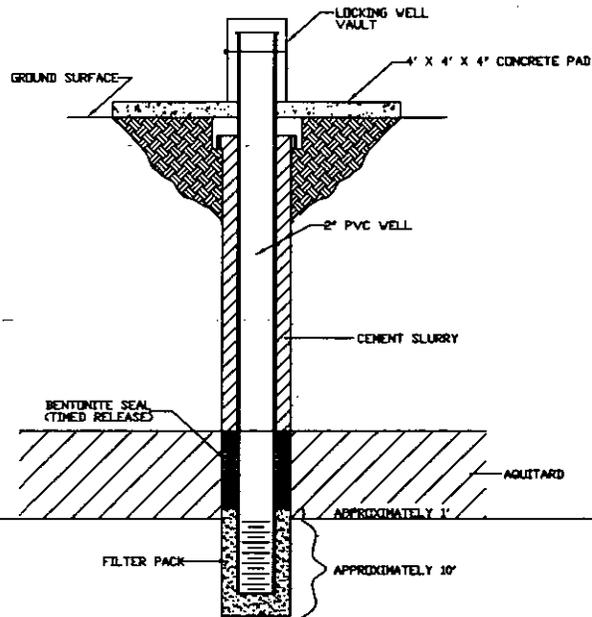
Sincerely,
TETRA TECH, INC.

Aaron M. Hale
Senior Project Manager

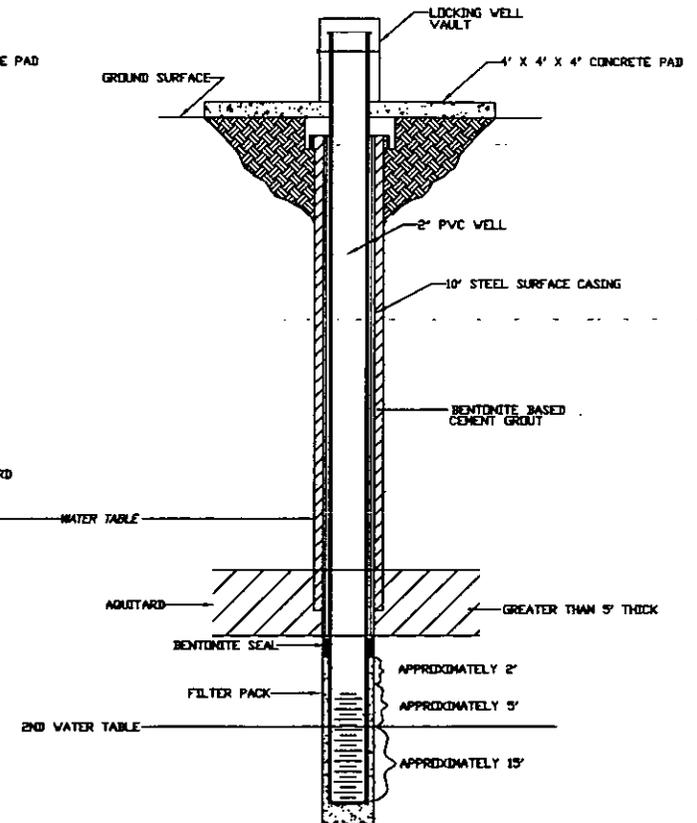
TYPICAL WELL CONSTRUCTION FOR AN UNCONFINED WATER TABLE



TYPICAL WELL CONSTRUCTION FOR AN ARTESIAN WATER TABLE



TYPICAL WELL CONSTRUCTION FOR PLACEMENT OF STEEL SURFACE CASING TO PROTECT FIRST OCCURRENCE OF GROUNDWATER



DATE:
8/20/2012
DWG. BY:
IM
FILE:
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WELL CONSTRUCTION

NOT TO SCALE

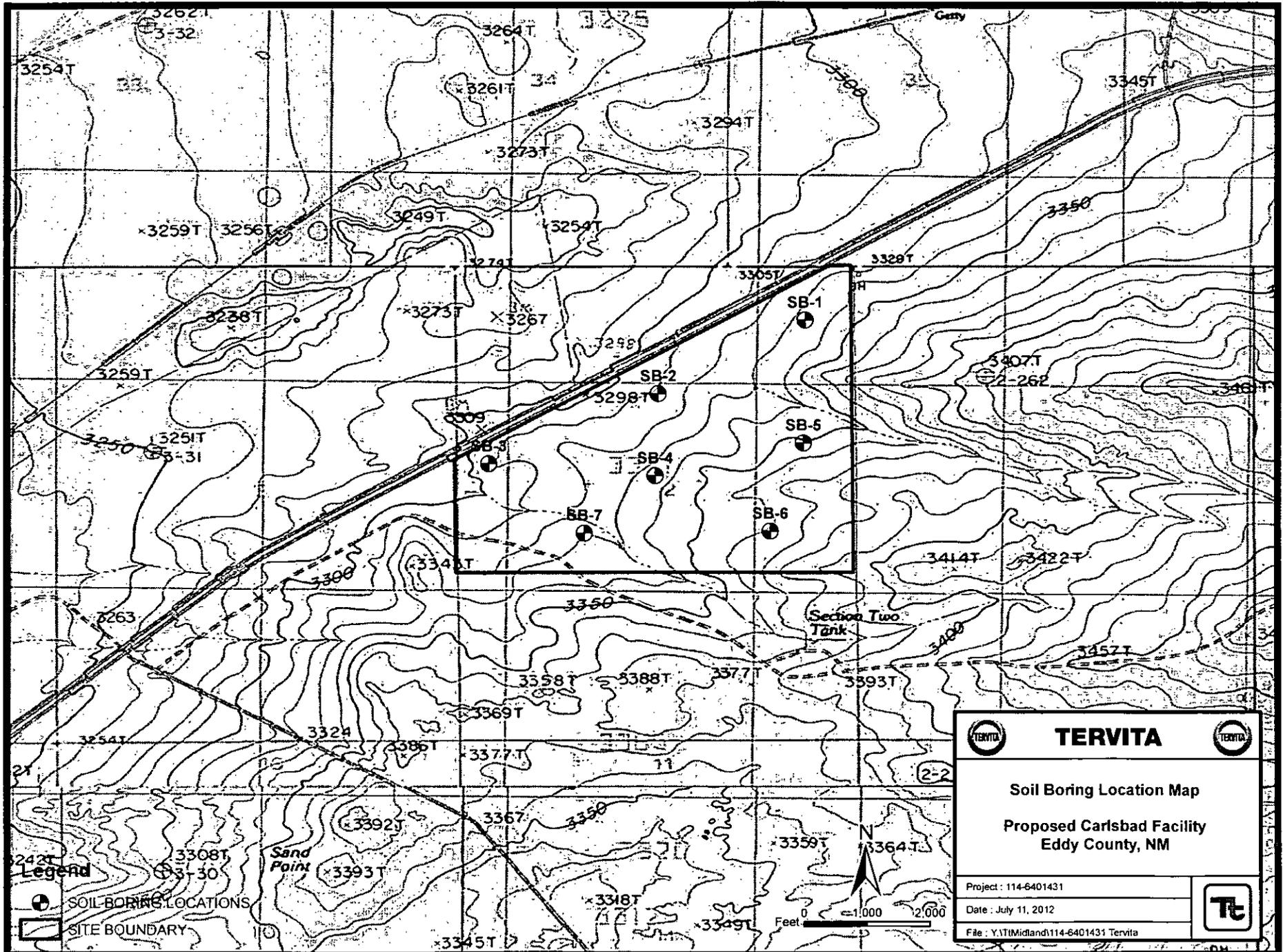

EARTH MATTERS

TYPICAL WELL CONSTRUCTION

TETRA TECH, INC.
MIDLAND, TEXAS

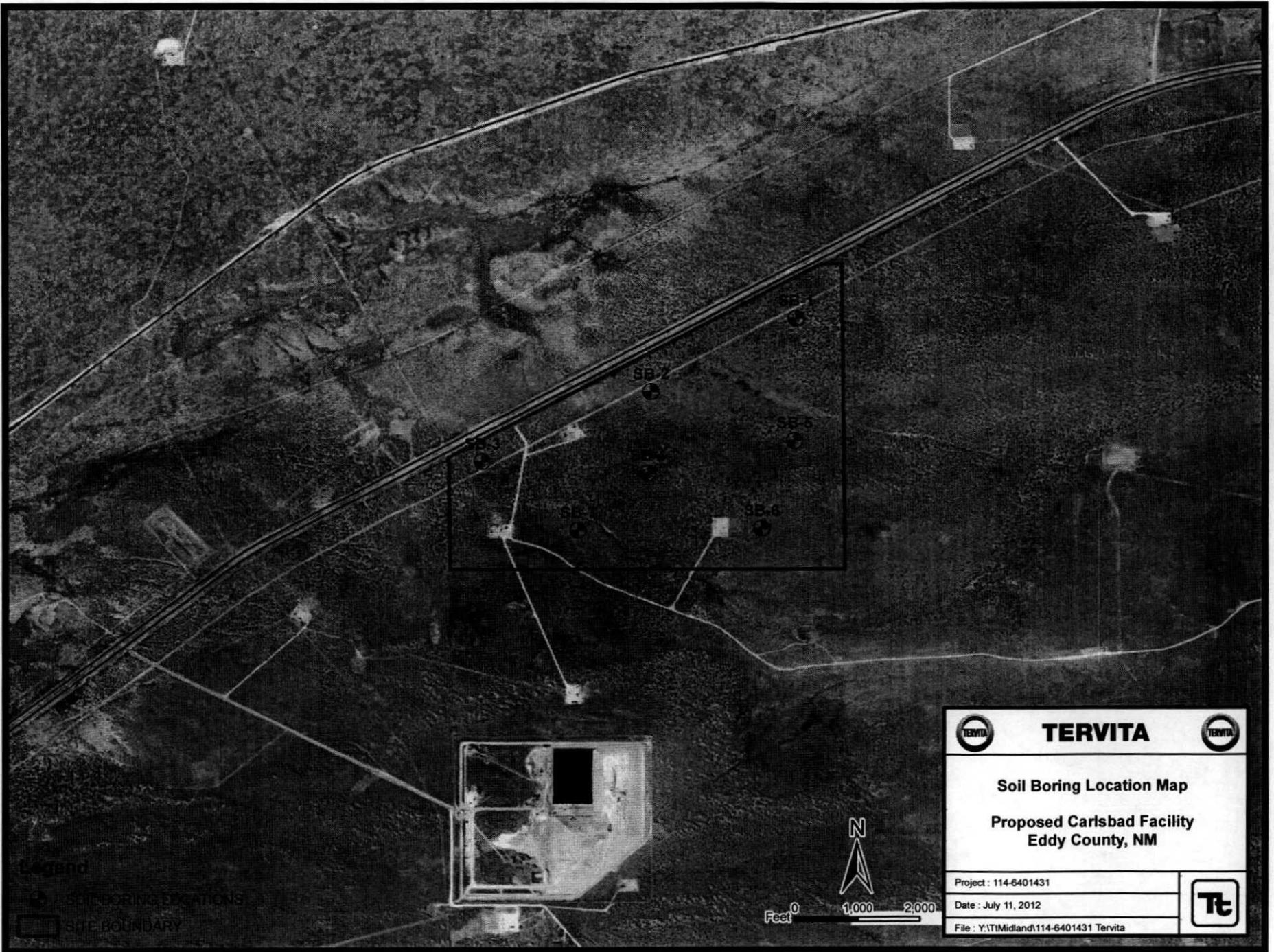


Path: Y:\IT\Midland\114-6401431 Tervita Proposed Carlsbad Facility\mxd\Soil Boring Location Map-Topo.mxd



 TERVITA 	
Soil Boring Location Map	
Proposed Carlsbad Facility Eddy County, NM	
Project : 114-6401431	
Date : July 11, 2012	
File : Y:\IT\Midland\114-6401431 Tervita	

Path: Y:\T1\Midland\114-6401431_Tervita Proposed Carlsbad Facility\mxd\Soil Boring Location Map-Aerial.mxd



Legend

- SOIL BORING LOCATIONS
- SITE BOUNDARY

 TERVITA 	
Soil Boring Location Map	
Proposed Carlsbad Facility Eddy County, NM	
Project : 114-6401431	
Date : July 11, 2012	
File : Y:\T1\Midland\114-6401431_Tervita	