CREEK COUNTY LANDFILL

Mail:
P.O. Box 1597
Sapulpa, OK 74067

Site: 10250 S. 33rd W. Ave
Jenks, OK 74037
TEL (918)-299-3755
FAX (918)-299-3793

July 27, 2020

RECEIVED
JUL 29 2020
LAND PROTECTION DIVISION
DEPT. OF ENVIRON. QLTY.

DEQ
PO Box 1677
Oklahoma City, OK 73101-1677

Attention: Hillary Young, DEQ

Ref: Tier III Permit Modification
Lateral Expansion of Permitted Boundary
Publication - Draft
Creek County Landfill, Creek County
Permit Number 3519020

Dear Ms. Young,

Please see attached our Tier III Permit Application for Creek County Landfill.
The draft notification for the Permit Modification can be reviewed in the local newspaper and viewed at the local library.

Please review this Application and we ask for your approval.

Upon completion and your approval of the results, we would proceed with In-Situ Liner installation in accordance with your regulations.

If you have any questions, please call Danny Rosencutter at (918) 299-3755.

Regards,

Danny Rosencutter
Creek County Landfill

c/2: Martha Grafton, DEQ
2 copies - DEQ

Oklahoma Department of Environmental Quality Notice

DRAFT

The Oklahoma Department of Environmental Quality (DEQ) has received an application for a C&D existing permit to expand at the Creek County Landfill, located at 10250, S. 33rd W. Ave. facility.

The DEQ has tentatively found the application meets the requirements of Title 27A of the Oklahoma Statutes, Section 2-1-101, *et seq.*, Section 2-10-101, *et seq.,* and rules of the DEQ, Oklahoma Administrative Code (OAC), Title 252, Chapters 4 and 515, and has prepared a draft permit for public review.

The draft permit conditions proposed expansion on the SW corner of the existing permitted area for the purpose in the C&D Landfill operations of C&D materials consisting of nonhazardous household trash, construction and demolition debris, yard and green waste, roofing materials and other non-hazardous type waste. This is an expansion of the existing landfill.

The application and related documents may be reviewed during normal business hours at:

Locally at Sapulpa Library, 27 W Dewey Ave, Sapulpa, OK 74066. The office of the land protection Division, Oklahoma Department of Environmental Quality, Located on the 5th floor of the DEQ building at 707 N. Robinson, P. O. Box 1677, OKC, OK 73101-1677. The DEQ contact is Martha Grafton, (405)720-5144.

Persons wishing to comment on the draft permit should submit their comments in writing to the DEQ at the above address. Also, any person may request, in writing, a formal public meeting to present written or oral statements and data concerning the draft permit. A request for a public meeting must identify the nature of the issues to be raised in the meeting. If the DEQ determines, based on the requests it receives, that there is significant degree of public interest in the draft permit, it will schedule a public meeting and provide notice of the date, time and place.

Written comments and requests for a public meeting must be received by the DEQ within 30 days after the date of this publication at the DEQ address given above. More specific information may be obtained by contacting the applicant at Creek County Landfill, PO Box 1597, Sapulpa, Ok 74067, Attention Danny Rosencutter, or the DEQ contact listed above.

TIER III PERMIT APPLICATION
LATERAL EXPANSION OF PERMITTED BOUNDARY

CREEK COUNTY LANDFILL

Permit No. 3519020
Creek County, Oklahoma

Prepared for:

ROSENCUTTER BROTHERS, INC.
P.O. Box 1597
Sapulpa, OK 74067

July 2020

Prepared by:

Joe B. Ramey P.E.

and

The CAREL CORPORATION

136 Pecan Street
Keller, Texas 76248
(817) 337-0112

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14507
7/11/2020
OKLAHOMA

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1 INTRODUCTION

Rosencutter Brothers Inc. (Rosencutter) currently operates the Creek County Landfill under Permit Number 3519020. The site was originally permitted in 1983. At that time, Rosencutter was granted permission from the ODEQ to construct, operate, maintain, and close, a Type IV Construction and Demolition (C&D) landfill. The current C&D permit describes an area containing approximately 85 acres in Section 28, Township 18 North, Range 12 East.

Rosencutter seeks a Tier III permit modification to expand the permitted boundary. The total area of the expansion is approximately 12.5 acres west of the current C&D permit. Of the additional 12.5 acres, 9.86 acres will be used for disposal area, with the balance taken up by drainage control, buffer zones and other operational areas.

This Tier III Permit Application contains all of the applicable documentation required by 27 A. O. S. Supp. 1996, §2-10-301 et. Seq., OAC 252:4 and OAC 252:515. The following application is structured to follow the Oklahoma Department of Environmental Quality (ODEQ) Regulations and follow the Application Review, Construction and Demolition Landfill Checklist dated July 23, 2018. The C&D Landfill checklist is included in Appendix A-1.

2 PUBLIC PARTICIPATION

2.1 252:4-7-13, 27A O.S. 2-10-301 Public Notice

Pursuant to 252:4-7-13(a), a public notice is required to be submitted and published in local newspapers.

2.2 252:4-7-13(b) Notice to Landowner

Pursuant to 252:4-7-13(b), Rosencutter is required to certify by affidavit that they own the real property, have a current lease or easement which is given to accomplish the permitted purpose or have provided legal notice to the landowner. Rosencutter owns the property as described in the 'Legal Description' portion of Section 4.1. See applicable documents in Appendix C.

2.3 252:4-7-13(c) Notice Content

Rosencutter, as required by 252:4-7-13(c), will provide the ODEQ with a draft notice for approval prior to publication. The draft public notice will be submitted once approved by the ODEQ. The public notice will include the following information.

- Name and address of applicant;
- Name, address and legal description of the site facility and/or activity;
- Purpose of notice;
- Type of permit or permit action being sought;
- Description of activities to be regulated;
- Locations where the application may be reviewed;
- Names, addresses and telephone numbers of contact persons for the ODEQ and for the applicant; and
- Any other information required by the ODEQ.

2.4 252:4-7-13(d) Proof of Publication

A public notice that an application for a Tier III Permit Application has been filed, as required by 27A 0.5. §2-10-301, 302, 303, and 252:4-7-13(d), was published in the Tulsa World. Proof of publication will be provided to the ODEQ as soon as practical after it is received by the applicant.

Once a public notice that a draft permit for a Tier III Permit Application has been issued by the ODEQ, as required by 27A O.S. §2-10-301, 302, 303 and 252:4-7-13 (d), it will be published in the Tulsa World upon issuance.

When public notice that a final permit for a Tier III Permit Application has been issued by the ODEQ, as required by 27A O.S. §2-10-301, 302, 303 and 252:4-7-13 (d), it will also be published in the Tulsa World upon issuance of the permit.

2.5 252:4-7-13(f)(3) Additional Notice

As required by 27A O.S. §2-10-301 and 252:4-7-13(f)(3), Rosencutter is required to provide notice by certified mail, return receipt requested, to owners of mineral interests and to adjacent landowners whose property may be substantially affected by installation of a landfill site. Appendix B contains copies of the notifications.

3 GENERAL PROVISIONS

3.1 252:515-3-1 Permit Required

Rosencutter Brothers currently owns and operates a permitted C&D Landfill (ODEQ Permit No. 3519020). This Tier III Permit Application is for expansion of the existing permitted boundary.

3.2 252:515-3-31(f) Tier III Permit Modification

As required by 252:515-3-31(f), Rosencutter Brothers is applying for a Tier III Permit Modification of the existing C&D Landfill. Rosencutter Brothers is expanding the permitted boundary of the existing C&D Landfill.

3.3 252:515-3-31(g) Disclosure Statement

As required by 252:515-3-31(g), persons submitting a permit application for a new solid waste disposal facility, or the transfer of an existing solid waste permit, are subject to disclosure statement requirements. This application is for a Tier III modification to expand the current permitted boundary of an existing facility. Therefore, no disclosure statement is required.

3.4 252:515-3-33 Oath Required

As required by 252:515-3-33, this application includes the Application Form signed under oath by Rosencutter Brothers. Appendix C-1 contains the application form.

3.5 252:515-3-34(a) Legal Right to Property

As described in Section 2.2, Rosencutter Brothers owns the property that contains the proposed expansion of the existing C&D Landfill. See Appendix C-2 for Warranty Deed.

3.6 252:515-3-34(c) Easement to the ODEQ

As required by 252:515-3-34(c), Rosencutter Brothers has granted temporary easement to the ODEQ. A copy of the easement is included in Appendix C-3.

3.7 252:515-3-35 Engineer of Record

This application also contains a signed application page sealed by an Oklahoma registered professional engineer. Appendix C-1 contains the application page. Also, all relevant engineering drawings and maps are sealed and signed by an Oklahoma registered professional engineer.

4 GENERAL INFORMATION

4.1 252:515-3-36(c) Permit Modification Applications

As required by 252:515-3-36(c), applications for modification to an existing permit shall submit information identified in 252:515-3-36(a) related to the proposed modification.

Facility Owner:	Rosencutter Brothers, Inc. P.O. Box 1597 Sapulpa, OK 74067 Telephone: (918) 299-3755
Contact:	Mr. Danny Rosencutter
Facility Name:	Creek County Landfill
Mailing Address:	P.O. Box 1597 Sapulpa, OK 74067
Physical Address:	10250 South 33rd West Avenue Sapulpa, OK
Disclosure Statement:	Not required
Legal Description:	Beginning at the Southeast Corner of the SE/4 of the NW/4, said point being a 3/8" iron pin found in place, also being the true point of beginning, Thence N 01°03'34"W along the East Line of the SE/4 of the NW4 a distance of 1322.03 feet to the Northeast-Corner thereof, Thence S 88°49'51"W along the North Line of the SE/4 NW/4 a distance of 452.24 feet, Thence S 01°03'34"E a distance of 254.08 feet, Thence S 56°21'20" E a distance 238.21 feet to a point on the South line of the SE/4 NW/4, Thence N 88o50'35" E along the South line of the SE/4 NW/4 a distance of 80.92 feet to the point of beginning.
Latitudes/Longitudes	The latitude and longitude of the facility entrance and all property corners are illustrated on the Site Plan Drawing 1.
Nearest Town:	Sapulpa, OK
Proposed Operation:	The Tier III modification application proposes to expand the permit boundary of the existing landfill by approximately 12.5 acres. Approximately 9.86 acres of the expanded boundary to be used to establish, construct, operate, close and monitor during post-closure

a construction and demolition waste landfill. The remainder of the area to be used for drainage areas, buffer areas and operational areas.

Anticipated Waste Stream: The anticipated waste stream will remain the same as before the expansion. Waste will consist of construction and demolition waste collected by the public or by hauling contractors servicing the public and waste resulting from construction activities by private individuals or contractors. Construction and demolition waste created by high winds and natural disasters, including yard waste and tree limbs, will also be accepted. The average amount of waste received by the current landfill over the past 5 years is 58,968.5 tons/year. This receipt rate is anticipated to remain the approximately the same.

Areas Served: The market for this landfill consists of the City of Sapulpa and the surrounding communities in Creek County.

Estimated Population Served: The Creek County Landfill accepted 67,019.4 tons in 2019, which is based on a 5 day work week (i.e., 257.77 tons per day). Based on 252:515-3-36(a)(10)(B), the population equivalent has been determined by dividing the anticipated amount of waste received per day by 4.4 pounds per person per day. Therefore, 257.77 tons multiplied by 2000 pounds per ton equals 515,540 pounds per day. Divide by 4.4 pounds per person per day and the population equivalent is 117,168 people.

Road Construction: The main entrance area around the existing scale and existing scale house is asphalt. The road from the asphalt area to the disposal area is compacted gravel. All weather roads will be constructed around the perimeter of the active waste disposal areas and to the operating face.

Operation Equipment: The Creek County Landfill site currently uses the following equipment: Cat-D9L bulldozer, Cat-D9R bulldozer, John Deere 700K bulldozer, Cat 350L excavator, Cat 330B excavator, 2-769B off road dump trucks, 2-621B cat scrapers. No changes in equipment are anticipated as a result of this expansion.

Permit Drawings: See Appendix D.

Location Restrictions: See Section 6.0 and Appendix E.

Operation Plan: See Section 13.0.

Stormwater Management: See Section 12.0 and Appendix J.

Closure/Post-Closure Plan: See Section 14.0 and Appendix L.

Aesthetic Enhancement Plan: See Appendix D.

4.2 252:515-3-38(1) Subsurface Investigation

Permit applications for land disposal facilities shall perform a subsurface investigation and install a groundwater monitoring system. The approved drilling plan is included in Appendix F-1 of Appendix F of this permit application.

4.3 252:515-3-38(2) Liner System

Waste disposal areas of new C&D landfills and expansions of waste disposal areas of existing C&D landfills shall, at a minimum, be constructed with:

- Prepared subgrade;
- 3-foot thick compacted clay liner with a permeability of 1×10^{-5} cm/sec or less, or
- A 5-foot thick in-situ liner with a permeability of 1×10^{-5} cm/sec or less, and
- 1-foot thick soil protection layer.

The Construction Quality Assurance (CQA) Plan is included in AppendixH.

4.4 252:515-3-38(3) Leachate Collection Layer

C&D landfills and yard waste composting facilities are not subject to the requirements of leachate collection as per 252:515-13-1(c).

4.5 252:515-3-38(4) Explosive Gas Monitoring Plan

The Creek County Landfill has an Explosive Gas Monitoring Plan for the existing landfill. See Section 11.0 and Appendix I for the Explosive Gas Monitoring Plan.

4.6 252:515-3-38(5) Waste Exclusion Plan

The Creek County Landfill has an approved Waste Exclusion Plan. See Section 16.0 and Appendix N for the Waste Exclusion Plan.

4.7 252:515-3-38(6) Closure/Post-Closure Plan

The Creek County Landfill has an approved Closure/Post-Closure Plan. See Section 14.0 and Appendix L for the Closure/Post-Closure Plan.

4.8 252:515-3-38(7) Life of Site Calculations

See life of site calculations in Section 15.2.

5 MAPS AND DRAWINGS

As required by 252:515-3-31, the following is a list of maps and design drawings included in Appendix D of this application. These are the permit drawings completed as part of a joint technical effort by The Carel Corporation and Joe B. Ramey, P.E. for the Creek County Landfill.

5.1 252:515-3-51 Additional Maps

All maps required by the subsurface investigation and the Geology/Hydrogeology section of this application are located in Appendix F.

5.2 252:515-3-52 General Location Map

See Drawing No. 1 in Appendix D.

5.3 252:515-3-53 Flood Plain Map

See Drawing No. 2 in Appendix D.

5.4 252:515-3-54 Quadrangle Topographic Map

See Drawing No. 3 in Appendix D.

5.5 252:515-3-55 Existing Contour Map

See Drawing No. 4 in Appendix D.

5.6 525:515-3-56 Site Map

See Drawing No. 4 in Appendix D.

5.7 252:515-3-57 Design Drawings

The application is also required to include design drawings that show the following details.

5.7.1 252:515-3-57(1) Cell Disposal Areas

The expansion area is designed in order to maximize the amount of airspace that is available at the site. See Excavation/In-Situ Liner Plan, Drawing No. 5 in Appendix D.

5.7.2 252:515-3-57(2) Liner Construction

An in-situ liner has been previously used at the site and is planned for the expansion area. The top of in-situ liner is the same elevation as the excavation elevation and is illustrated on Drawing No. 5 in Appendix D. A small area of fill exists on the west slope. The uppermost 3 feet of the fill will be constructed to clay liner specifications discussed in Section 9. Liner details are shown on Drawing No. 9 in Appendix D.

5.7.3 252:515-3-57(3) Leachate Collection System

C&D landfills and yard waste composting facilities are not subject to the requirements of leachate collection.

5.7.4 252:515-3-57(4) Typical Well Installation

Please see Figure 3 for the typical well installation details in the Groundwater Study Report in Appendix F-2.

5.7.5 252:515-3-57(5) Dike Sections

Please see Drawing Nos. 6A and 6B in Appendix D.

5.7.6 252:515-3-57(6) Drainage Details

Please see drainage details on Drawing Nos. 8 and 9 in Appendix D and Figure 1 of the Closure Plan, Appendix L.

5.7.7 252:515-3-57(7) Groundwater Monitoring Wells, Gas Monitoring Probes

Proposed groundwater monitoring wells are discussed in Section 7.0 and illustrated on Figure 1 in Appendix F-3. Existing and proposed gas monitoring probes are illustrated Figure 1 of the Explosive Gas Monitoring Plan in Appendix I.

5.7.8 252:515-3-57(8) Surface Water Retention Structures

The perimeter surface water drainage structure is illustrated on Drawing Nos. 5 and 7 in Appendix D and Figure 1 of the Closure Plan, Appendix L.

5.7.9 252:515-3-57(9) Other Design Drawings

All design drawings are provided in Appendix D.

5.8 252:515-3-72 Groundwater Resource and Usage Map

The Groundwater Resource and Usage Map is illustrated on Figure 2 in Appendix F-3.

5.9 252:515-3-73 Surface Geologic Map

The Surface Geologic Map is illustrated on Figure 3 in Appendix F-3.

5.10 252:515-3-74 Highest Groundwater Contour Map

The Highest Groundwater Contour Map is illustrated on Figure 4 in Appendix F-3 and on Drawing No. 5A in Appendix D.

5.11 252:515-3-75 Potentiometric Surface Map

The Potentiometric Surface Map is illustrated on Figure 4 in Appendix F-3.

5.12 252:515-3-76 Site Specific Cross Sections

The Site Specific Cross Sections are illustrated on Figures 6 and 7 in Appendix F-3.

5.13 252:515-3-77 Fill Cross Section Map

The Fill Cross Section Map is shown on Drawings No. 6A and 6B in Appendix D.

5.14 252:515-3-78 Excavation Contour Map

The Excavation Contour Map is Drawing No. 5 in Appendix D.

5.15 252:515-3-79 Top of Liner Contour Map

See Drawing No. 5 in Appendix D.

5.16 252:515-3-80 Completion Map

See Drawing No. 7 in Appendix D for the Completion Map of the Expansion Area. A sitewide Landfill Completion Map can be found on Figure 1 of the Closure Plan, Appendix L.

6 LOCATION STANDARDS

The Creek County Landfill complies with the following location standards as per OAC 252:510-5.

6.1 252:515-5-31(a) Scenic Rivers

Correspondence was sent to the Oklahoma Scenic Rivers Commission to request a determination based on the above referenced regulation. A response was received from the Oklahoma Scenic Rivers Commission which indicates that the Scenic Rivers Operations has no comments on this project. See Correspondence in Attachment E-1 of Appendix E.

6.2 252:515-5-31(b) Recreation/Preservation Areas

Correspondence was sent to the Oklahoma Archeological Survey (OAS) to request a determination based on the above referenced regulation. A letter was received by the OAS that stated that no sites are listed as occurring within the project area and based on topographic and hydrologic setting, no archaeological materials are likely to be encountered. See Correspondence in Attachment E-2a of Appendix E.

Correspondence was sent to the Oklahoma Tourism and Recreation Department to request a determination based on the above referenced regulation. Correspondence was received from the Oklahoma Tourism and Recreation Department that stated "*Based on the general locations you provided and the information we have regarding the location of the types of parks mentioned above RTP and LWCF, your project proposal will have no significant adverse impact on any federally funded park or recreation area or state park, regarding the LWCF Act 54 U.S.C. 200305(f)(3) no land may be permanently used for private or non-outdoor recreation purposes (defined by the program)*".. See Correspondence in Attachment E-2b of Appendix E.

6.3 252:515-5-31(c) Endangered or Threatened Species

Correspondence was sent to the Oklahoma Department of Wildlife Conservation and to the Oklahoma Biological Survey (OBS) to request a determination based on the above referenced regulation. Correspondence received from the Oklahoma Department of Wildlife Conservation (ODWC) states *"Based upon the site description provided, there are no species listed as species of state concern which may be at or within one mile of the permit boundary or expansion area."* Correspondence received by the OBS indicated the presence of Haliaeetus leucocephalus (Bald Eagle) but noted that the occurrence is 1.5 miles from the site, which is beyond the 1 mile requirement stated in 252:515-5-31(c).

Therefore, based on these two agencies, "no area within the permit boundary of this solid waste disposal facility is located within 1 mile of any endangered or threatened wildlife or plant species listed in state and federal laws". See correspondence in Attachments 3a and 3b of Appendix E.

6.4 252-515-5-32(a) 100-year Floodplain

A copy of the Flood Insurance Rate Map (FIRM) for the vicinity of the expansion area is included in Attachment E-4 in Appendix E. The FIRM clearly indicates that the proposed expansion area is not located within the 100-year floodplain.

6.5 252:515-5-32(b) Public Water Supply

Correspondence was sent to the Oklahoma Department of Environmental Quality, Oklahoma Water Resources Board and City of Sapulpa to request a determination based on the above referenced regulation.

Correspondence from the ODEQ states "*there are no community public water supply wells within 2 miles of Section 28, T 18 N, R 12 E near Sapulpa in Creek County, OK.*" Correspondence from the OWRB stated "*there does not appear to be either 1) a public water supply surface water intake within 1 mile or 2) a public water supply well within 2 miles of the area described in your email.*" Correspondence from the City of Sapulpa states "*Sapulpa currently does not have or operate any publicly owned water wells. We are strictly a surface water system, and we pull off of Skiatook Lake and Sahoma Lake.*" Therefore, based on all three agencies, "the proposed waste disposal facility is not located within 1 mile up gradient of an existing public water supply surface water intake or within one year time of travel of a public water supply well". See Correspondence in Attachments E-5a, E-5b and E-5c of Appendix E.

6.6 252:515-5-32(c) Wellhead Protection Area

A wellhead protection plan is only required if a new waste management or disposal areas are located within two miles of a public water supply well. As indicated in Section 6.5, the Creek County Landfill is located outside two miles of a public water supply well.

6.7 252:515-5-32(d) Wetlands

Correspondence was sent to the U.S. Army Corps of Engineers to request a determination based on the above referenced regulation. Correspondence received from the Corps of Engineers (Attachment E-6a) stated "*our office reviews proposed projects for the placement of dredge or fill material pursuant to Section 404 of the Clean Water Act (CWA) into waters of the United States (WOUS). If a proposed project requires the placement of dredge or fill material into a WOUS, then a permit would be required from our office.*" The proposed expansion does not involve placement of dredge or fill material into a WOUS, therefore a permit from the Army Corps of Engineers is not required. Further, a review of the United States Fish and Wildlife Service's current national Wetlands Inventory (NWI) Map for the proposed expansion area indicates that

there are not any potential wetlands within the expansion area. See Correspondence in Attachment E-6b of Appendix E.

6.8 252:515-5-51(a) Terrace Deposits

In order to determine if the proposed lateral expansion of the Creek County Landfill was located in an area designated as alluvium or terrace deposits and their recharge areas, the map titled "*Maps Showing Principal Groundwater Resources and Recharge Areas in Oklahoma*" Sheet 1 - Unconsolidated Alluvium and Terrace Deposits, Compiled in 1983 by Kenneth S. Johnson of the Oklahoma Geological Survey was reviewed. A portion of the map illustrating the vicinity of the Creek County Landfill is provided in Attachment E-7 in Appendix E. As can be seen, the proposed expansion area is not located within, wholly or partially, an area designated as alluvium or terrace deposits and their recharge areas.

6.9 252:515-5-51(b) Karst Terrain

According to 252:515-5-51(b), no area within the permit boundary of a new MSWLF shall be in a location that is within a locally fractured or cavernous limestone or cherty limestone bedrock and within five miles of any water well owned by a rural water district that is used or has the potential to be used to provide water to customers of the district. Review of the logs of soil borings installed at the proposed expansion area indicate that the bedrock is primarily shale, not fractured or cavernous limestone or cherty limestone. Further, this is a proposed lateral expansion to an existing permitted C&D Landfill and is not subject to the requirements of Karst Terrain as per 252:515-5-51(b).

6.10 252:515-5-51(c) Earthquake Epicenter Areas

Except as provided for in 27 O.S. § 2-10-501(D)(3), no area within the permit boundary of a new land disposal facility accepting NHIW shall be located within five miles of a known epicenter of an earthquake of more than 4.0 on the Richter Scale, or number V on the modified Mercalli Scale, as recorded by the Oklahoma Geological Survey. This application is for a proposed lateral expansion to an existing C&D Landfill facility and is therefore not subject to the requirements of Earthquake Epicenter Areas as per 252:515-5-51(c).

6.11 252:515-5-52(a) Utility/Transmission Lines

An overhead powerline exists along the west side of the proposed expansion area. Except for two poles located near the northwest corner, the line is located outside of the area proposed for expansion. The facility owner is in the process of relocating these two poles to the west. The work is expected to be completed during the summer of 2020.

6.12 252:515-5-52(b) Fault Areas

ODEQ regulation 252:515-5-52(b) prohibits waste disposal facilities within 200 feet of a fault that has had displacement in Holocene time. Based on the US Geological Survey's Quaternary Fault and Fold Database of the United States[1], the proposed lateral expansion area of the Creek County Landfill is not located within 200 feet of a fault that has had displacement in Holocene Time.

6.13 252:515-5-52(c) Seismic Impact Zones

ODEQ regulation 252:515-5-52(c) prohibits new waste management or disposal areas located within a seismic impact zone. This application is for a proposed lateral expansion to an existing C&D landfill and is therefore not subject to the seismic impact zone requirements of 252:515-5-51(c)

6.14 252:515-5-52(d) Unstable Areas

Correspondence was sent to the Oklahoma Department of Mines (ODM) to request a determination based on the above referenced regulation. A letter received from the ODM provided information on a mining permit issued Rosencutter Brothers, Inc. dba Creek County Landfill. The mining permit was issued in order for the landfill to perform excavation activities related to the operation of the landfill. Based on this information, no subsurface mines exist beneath the proposed site. Additionally, the subsurface investigation completed by Aimright Testing did not indicate the presence of unstable geologic formations beneath the proposed lateral expansion area. See ODM correspondence in Attachment E-8 in Appendix E and the geologic information in Appendix F.

6.15 252:515-5-52(e) Airports

Except as provided in 252:515-5-52(e)(2); if any waste management or disposal area of a new land disposal facility, or expansion of waste management or disposal areas of an existing land disposal facility, is to be located within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used by only piston-type aircraft, a demonstration that the facility will not pose a bird hazard to aircraft shall be provided to the ODEQ. However, C&D Landfill facilities are not subject to the requirements of airports as per 252:515-5-52(e).

[1] https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf

7 SUBSURFACE INVESTIGATION

All expansions of waste disposal boundaries of existing land disposal facilities require a subsurface investigation as per OAC 252:515-7-1. The following is a brief description of the subsurface investigation and how it correlates to OAC 252:515-7.

7.1 252:515-7-2(b) Methods

Dry drilling methods were used during the subsurface exploration. However, the ODEQ did approve the use of wet rotary techniques as an alternative drilling method in the event of auger refusal. See correspondence in Appendix F.

7.2 252:515-7-3 Compliance with OWRB Rules

As can be seen from the Geology/Hydrogeology Report in Appendix F, all field work associated with the installation of the piezometers and the drilling of the soil borings was completed in accordance with the OWRB Rules.

7.3 252:515-7-3(3) Notch

All well casings were notched by the surveyor to mark the point of measurement.

7.4 252:515-7-3(4) Latitude, Longitude and Surface Elevation

All of the monitoring wells were marked with the latitude, longitude and surface elevation by a licensed surveyor.

7.5 252:515-7-4 Drilling Plan

As required by 252:515-7-4, a drilling plan was prepared by Joe B. Ramey, P.E. and submitted to the ODEQ for approval. A copy of the Drilling Plan and all associated correspondence is included in Appendix F-1.

7.6 252:515-7-5 Drilling

Notice of Drilling was stipulated in the Drilling Plan and was provided by Aimright Testing. All associated drilling operations were supervised by a qualified groundwater scientist.

7.7 252:515-7-31 Data Collection

During the field investigation, data was collected in compliance with ODEQ requirements. The data included visual observation of soils recovered during drilling, monthly water level measurements of three (3) piezometers, logging of the piezometers, daily water level measurements from B/PZ14-1, and climatological information. More detailed information on the above is included in Appendix F.

7.8 252:515-7-32 Borehole Logs

A total of five (5) borings were drilled at the site. Three (3) of the borings were completed as piezometers for the groundwater study. Pertinent information such as the identification and characterization of soil and rock types and the depth at which groundwater was encountered is noted in the logs. Water level observations were made at the time of drilling and after 24-hours. See borehole logs in Appendix F-2.

7.9 252:515-7-33 Lithologic Sample Logs

The boring logs located in Appendix F-2 provide geotechnical test information and identification of all soil and rock layers encountered. The descriptions include the soil/rock color, texture, moisture as well as other information.

7.10 252:515-7-34 Geophysical Logs

Three borings located immediately east of the proposed expansion area have been logged using gamma ray geophysical tools. The geophysical logs are provided as Figure 10 in Appendix F-3.

7.11 252:515-7-35 Soil and Rock Sampling

Soil and rock samples were collected in accordance with the approved drilling plan. The samples were stored in accordance with 252:515-7-35(b).

7.12 252:515-7-36(1) Sample Collection

Bulk soil samples have been collected from various locations during previous construction projects at the facility. The samples were subjected to the tests listed in 252:515-7- 36(3)(A) through (H), such as soil classification, moisture content, Atterberg limits, Grain size distribution, compaction, unit weight and permeability. These samples represent the soil that will be used in both the liner system and the final cover system. All of the test results are summarized in Appendix G.

7.13 252:515-7-37 Soils Report

Please see the Soils Report in Appendix G.

7.14 252:515-7-38 Regional Hydrogeological Study

Regionally, the site is situated on the north flank of the western end of the Arkoma basin. According to Bingham and Bergman, the eastern portion of the landfill resides above Pennsylvanian age Upper Holdenville Shale and the western portion in the Coffeyville formation and Checkerboard Limestone, also of Pennsylvanian age. The composition of the Upper Holdenville Shale is mainly shale with interbedded fine-grained sandstone locally containing beds of limestone. The Coffeyville Formation is mainly shale interbedded with fine- to medium-grained sandstone locally containing thin coal seams. Its thickness ranges from 175 to 470 feet. The Checkerboard Limestone is crystalline limestone 2 to 15 feet thick that underlies the Coffeyville Formation.[2] It is noted that a more recent geologic map by Chang and Stanley[3] indicates the eastern portion of the site as the Seminole Formation, which consists of a lower sandstone interval, called the Tulsa Sandstone, and a basal and upper suite of interbedded laminated, concretionary, silty clay shales, mud shales and siltstones.

The Creek County Landfill does not overlie a major bedrock aquifer. Based on a map published by the Oklahoma Water Resources Board, the closest major bedrock aquifer to the Creek County Landfill is the Vamosa-Ada Aquifer. At its closest point, the Vamosa-Ada Aquifer is located approximately 20 miles west of the proposed expanaion area. Recharge is expected to occur on the outcrop of the aquifer. Figure 2 of Appendix F-3, a Groundwater Resource and Usage Map illustrates the location, total depth and ground water elevation of all known private water wells within a radius of one mile of the proposed expansion area, the location, total depth and ground water elevation of all public water supply wells within a radius of two miles of the proposed site boundary. Since the Vamosa-Ada Aquifer is located approximately 20 miles west, the recharge and discharge areas and the description of groundwater quality within a three mile radius of the proposed site boundary are not illustrated.

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[2] Bingham, Roy H., and Bergman, DeRoy L. "Reconnaissance of the Water Resources of the Enid Quadrangle, North-Central Oklahoma". Oklahoma Geological Society. 2008. Web. Accessed August 17, 2011. http://www.ogs.ou.edu/MAPS/HA1-12/HA7plate1.pdf.

Johnson, Kenneth S. "Principal Ground-Water Resources of Oklahoma." Oklahoma Geological Society. 2008. Web. Accessed August 15, 2011. http://www.ogs.ou.edu/pubsscanned/EP9p12_14water.pdf.

Oakes, Malcolm C. and Jordan, Louise. "Geology and Mineral Resources of Creek County, Oklahoma with a section on Oil and Gas in Creek County, Oklahoma." Oklahoma Geological Society. 1959. 100+. Retrieved August 15, 2011, from Oklahoma Geological Society database on the World Wide Web: http://www.ogs.ou.edu/pubsscanned/BULLETINS/Bulletin81.pdf.

United States Geological Survey. Mineral Resources On-Line Spatial Data. Web. Accessed August 15, 2011. http://tin.er.usgs.gov/geology/. Thomas M.

[3] Chang, Julie M and Stanley, "Geologic Map of the Sapulpa North 7.5' Quadrangle, Creek and Tulsa Counties, Oklahoma. 2011. Oklahoma Geologic Quadrangle OGQ-83 Geologic Map of the Sapulpa North 7.5 Quadrangle

7.15 252:515-7-52 Piezometers Required

One existing boring (B-4) was designated for use in the Drilling Plan, a total of five (5) additional borings were drilled at the site and three (3) of the borings were completed as piezometers for the groundwater study. The piezometer locations can be found on Figure 2 of Appendix F-2.

7.16 252:515-7-53 Piezometer Details

Three (3) piezometers are required for the proposed 12.5-acre facility. Piezometer construction details can be found on Figure 3 of Appendix F-2.

7.17 252:515-7-54 Groundwater Elevation Measurements

Water levels were measured monthly in all piezometers. A summary of the water data can be found in Table 1 of Appendix F-3. In accordance with 252:515-7-54(b), a continuous water level measuring device was installed in B/PZ-1. The data gathered from B/PZ-1 is provided in Figure 8 of Appendix F-3.

7.18 252:515-7-54 Area Rainfall

Attachment C of Appendix F-2 summarizes the thirty (30) year average climatological conditions for the City of Sapulpa, located in Creek County and was retrieved from the records of the Oklahoma Climatological Survey (Oklahoma Climatological Survey CLIMOCS data; http://www.climate.mesonet.org).

7.19 252:515-7-56 Shallow Saturated Zone Investigation

No additional borings were required due to encountering a shallow saturated zone.

7.20 252:515-7-71 Plugging

All boreholes that were not used as piezometers were properly plugged in accordance with the Oklahoma Water Resources Board requirements.

8 GROUNDWATER MONITORING

A Groundwater Monitoring System is to be installed that will yield groundwater samples from the uppermost aquifer that represents the quality of background groundwater that has not been affected by the disposal facility and that represents the quality of groundwater that has passed underneath the disposal facility. This section of the permit application describes the proposed Groundwater Monitoring System.

8.1 252:515-9-3 General Requirements

As required by 252:515-9-3, a Groundwater Sampling and Analysis Plan (GWSAP) was prepared by The Carel Corporation and is attached for approval. A copy of the GWSAP and all associated correspondence is included in Appendix F-4.

8.2 252:515-9-4 General Location Considerations

The new groundwater monitoring wells will be installed on land owned by the Creek County Landfill and at a distance of no more than 150 meters from the boundaries of waste disposal. Figure 1 of Appendix F-3 illustrates the locations of the proposed groundwater monitoring wells.

8.3 252:515-9-5 Monitoring Well Number and Location

Based on the information gathered during the groundwater study, two (2) groundwater monitoring wells are proposed for lateral expansion area of the Creek County Landfill. Given the flow directions in the uppermost saturated zone, one (1) well MW-1 will be designated as an up-gradient (background) well and MW-2 will be designated as a down-gradient (compliance) well. The well locations are illustrated on Figure 1 of Appendix F-3.

8.4 252:515-9-6 Monitoring Well Construction and Plugging

The proposed monitor well construction details are illustrated on Figure 3 of Appendix F-2.

8.5 252:515-9-7 Performance Levels

The monitoring wells, piezometers, and other measurement, sampling, and analytical devices will be maintained so that they perform to the design specifications through the life of the monitoring program.

8.6 252:515-9-31 Background Water Quality

Groundwater samples will be collected quarterly for a full year to determine background groundwater quality. The samples will be analyzed, at a minimum, for the following constituents: pH, chemical oxygen demand, and specific conductivity, which are also listed in Table 2 of the GWSAP (see Appendix F-4) as per 252:515-9-31(d)(2).

8.7 252:515-9-51 Statistical Method

C&D landfill facilities are not subject to the requirements of Statistical Methods as per 252:515-9-51.

8.8 252:515-9-52 Statistical Analysis Plan

C&D landfills are not subject to the requirements of Statistical Analysis Plan as per 252:515-9-52.

8.9 252:515-9-53 Statistical Method Performance Standards

C&D landfills are not subject to the requirements of Statistical Method Performance Standards as per 252:515-9-53.

8.10 252:515-9-54 Approved Statistical Methods

C&D landfills are not subject to the requirements of Approved Statistical Methods as per 252:515-9-54.

8.11 252:515-9-71 Detection Monitoring Required

Detection monitoring is discussed in Section 3.1 of the GWSAP of Appendix F-4.

8.12 252:515-9-72 Revisions to Monitoring Constituents

The monitoring constituents are listed in Table 2 of the GWSAP of Appendix F-4.

8.13 252:515-9-73 Monitoring Frequency

Within six (6) months after completion of background, sampling and analysis for both up-gradient and down-gradient monitoring wells will be conducted on a semi-annual basis (i.e., approximately every six (6) months) for the constituents listed in Table 2 of GWSAP in of Appendix F-4.

8.14 252:515-9-74(f) Statistical Analysis

Cumulative analysis data for the constituents in the approved groundwater monitoring program shall be submitted for each groundwater monitoring well at Creek County Landfill throughout the detection monitoring period. The data shall be submitted to the ODEQ within 60 days of sampling and presented in tabular or graphical form for trend analysis.

9 LINER DESIGN

As required by 252:515-11-2(a), waste disposal areas of new C&D landfills and expansions of waste disposal areas of existing C&D landfills are required, at a minimum, to be constructed with either a reconstructed clay liner meeting the requirements of Part 3 of OAC 252:515-11 or an in-situ liner meeting the requirements of Part 9 OAC 252:515-11. This section outlines the liner system proposed by the Creek County Landfill for this Tier III Permit Application.

9.1 252:515-11-3 Separation from Groundwater

OAC 252:515-11-3 requires C&D landfills utilizing an in-situ liner to be designed to maintain a minimum 15-foot vertical separation between the highest groundwater elevation and the lowermost surface on which waste will be placed. If a clay liner is used, the top of the clay liner is to be designed to maintain more than a five foot vertical separation between the highest groundwater elevation and the lowermost surface on which waste will be placed. The Creek County Expansion proposes to utilize in-situ liners. The base of the expansion area is designed to be at least 15 feet the highest groundwater elevation and the lowermost surface on which waste, which is demonstrated on Drawing No. 5C in Appendix D.

9.2 252:515-11-4(a) Quality Assurance/Quality Control (QA/QC) Plan

As required by 252:515-11-4(a), a Quality Assurance/Quality Control (QA/QC) Plan is required to demonstrate that the liner system will be constructed in accordance with the design as outlined in this Section. See Appendix H for the QA/QC Plan.

9.3 252:515-11-4(a)(1) QA/QC Plan Technical Information

The QA/QC Plan in Appendix H complies with 252:515-11-4.

9.4 252:515-11-5 Notification of Construction

As required by 252:515-11-5, the ODEQ will be notified at least two (2) weeks in advance of any liner construction that will be completed at the Creek County Landfill.

9.5 252:515-11-6 Liner Installation and Testing (LIT) Report

A Liner Installation and Testing (LIT) Report will be submitted to the ODEQ at the end of any cell construction to document that the liner system was installed in accordance with ODEQ requirements. The LIT Report will contain, at a minimum, the following:

- Summaries of all construction activities;

- Testing data sheets and summaries;
- Changes from design and material specifications; and
- All QA/QC documentation.

9.6 252:515-11-7 ODEQ Authorization Required

As required by 252:515-11-7, no waste will be placed on the newly constructed liner until it is authorized by the ODEQ.

9.7 252:515-11-31(b) Liner Construction Standards

As demonstrated on Drawing No. 5C in Appendix D, the in-situ liner will be at least 15-feet thick and will have a hydraulic conductivity of less than or equal to 1×10^{-5} cm/sec. A small area of earth fill will occur along the western slope of the expansion area. The upper 3-feet of the fill will be constructed in accordance with the QA/QC Plan in Appendix H and will have a hydraulic conductivity of less than or equal to 1×10^{-5} cm/sec. If, for any reason, a clay liner is required for other areas, it will also be constructed 3-feet thick, have a hydraulic conductivity of less than or equal to 1×10^{-5} cm/sec. and constructed in accordance with the QA/QC Plan in Appendix H.

9.8 252:515-11-32 Preconstruction Tests

As demonstrated in the Soil Report in Appendix G, all of the tests listed below were completed on soil found at the Creek County Landfill that would be suitable for clay liner.

- Soil Classification (ASTM D2487);
- Particle Size Analysis of Soil (ASTM D422);
- Sieve analysis of the following screens: #4, #10, #40, #200;
- Percent Fines (#200 sieve) (ASTM D1140);
- Atterberg limits (ASTM D4318);
- Moisture Content (ASTM D2216 or ASTM D4643);
- Moisture-Density Relationship (ASTM D698 to ASTM D1557); and
- Hydraulic Conductivity (ASTM D5084).

The QA/QC Plan also indicates that the above referenced tests will be completed again prior to construction of any cell at the Creek County Landfill. The sampling frequency shall be one sample per 10,000 cubic yards of soil or as material changes. The test results will be included in the Liner Installation and Testing Report that is required to be submitted to the ODEQ prior to waste acceptance.

9.9 252:515-11-33 Liner Soil Standards

A majority of each test for the following design standards will be met so long as the hydraulic conductivity standard is satisfied:

- Plasticity Index (ASTM D4318)
    - A Plasticity index will be greater than or equal to 10%.
- Liquid Limit (ASTM D4318)
    - Liquid limit will be greater than or equal to 24%.
- Percent Fines (ASTM D422)
    - Percent fines passing #200 mesh sieve will be greater than or equal to 30%.
- Gravel Amount (ASTM D422)
    - The amount of gravel (dry-weight percentage retained on the No. 4 sieve) will be less than or equal to 20%.
- Particle Size
    - Particle size will be less than one (1) inch in diameter.
- Water Content
    - After the soil is compacted, the water content of the soil will be equal to or greater than optimum.
- Soil Density
    - After the soil is compacted, the minimum density of the soil will be greater than at equal to either 95% of the standard proctor density (ASTM D698) or 90% of the modified proctor density (ASTM D1557).

As demonstrated from soil samples collected for previous cell liner construction projects at the facility in Appendix G, the soil on-site meets the standards listed above.

9.10 252:515-11-34 Subgrade Preparation

The subgrade of any clay lined areas will be compacted to 90% as required by the QA/QC Plan.

9.11 252:515-11-35(a) Internal Side Slope Construction

All of the internal side slopes from the expansion area will be no steeper than 3H:1V.

9.12 252:515-11-35(b) Moisture Control

Moisture control of the clay liner is covered in the QA/QC Plan in Appendix H.

9.13 252:515-11-35(c) Placement and Compaction

Placement and compaction of the clay liner is covered in the QA/QC Plan in Appendix H.

9.14 252:515-11-36 Construction Tests

All of the construction tests are outlined in the QA/QC Plan in Appendix H.

9.15 252:515-11-37 Verification Tests

The QA/QC Plan outlines all of the verification tests required for the clay liner. At a minimum, the following will be completed.

- Verification of thickness on a 100-foot by 100-foot grid.
- Visual inspection of the liner integrity.
- Hydraulic conductivity tests will be performed in the top 12-inches.

All of this information will be submitted with the Liner Installation and Testing Report verified by the CQA Engineer.

9.16 252:515-11-38 Repair and/or Replacement

All of the procedures for failed tests during liner construction are outlined in the QA/QC Plan in Appendix H.

9.17 252:515-11-39(c) Liner Protection

The liner will be protected after construction by a 12-inch protective layer. The QA officer will certify that the moisture content of OAC 252:515-11-33(6) was maintained in the liner until placement of the protective cover.

10 LEACHATE COLLECTION AND MANAGEMENT

10.1 252:515-13-1(d) Exceptions

As required by OAC 252:515-13-1(d), C&D landfills are not subject to the requirements of this Subchapter, except for (c) of this Section.

10.2 252:515-13-1(c) All Disposal Facilities

As required by OAC 252:515-13-1(c), all solid waste disposal facilities shall manage leachate in accordance with the requirements of Part 5 of this Subchapter.

10.3 252:515-13-51 Leachate Management

The stormwater that contacts trash will not be allowed to run-off site, but instead will be contained at the working face with the use of earthen berms.

11 METHANE GAS MONITORING AND CONTROL

All new and active land disposal facilities are required to have a methane gas monitoring plan for control of explosive gas. The following section outlines the Creek County Landfill's Explosive Gas Monitoring and Analysis Plan.

11.1 252:515-15-2 Explosive Gas Control

As required by 252:515-15-2, methane gas generated by the facility shall not exceed 25% of the lower explosive limit for methane in all structures within the permit boundary and the lower explosive limit for methane at the permit boundary.

11.2 252:515-15-3(a) Plan Required

As required by 252:515-15-3(a), The Carel Corporation developed an Explosive Gas Monitoring and Analysis Plan for the Creek County Landfill. The Explosive Gas Monitoring and Analysis Plan is included in Appendix I.

11.3 252:515-15-3(b) Type of Frequency of Monitoring

The monitoring will be in accordance with the Explosive Gas Monitoring and Analysis Plan in Appendix I.

11.4 252:515-15-3(d) Calibrated Instrument

Sampling will be conducted using the portable explosive gas monitor and it will be calibrated as per the manufacturers' instructions. Information concerning the portable explosive gas monitor is included in the Methane Monitoring and Analysis Plan in Appendix I.

11.5 252:515-15-4 Installation of Gas Monitoring Probes

Gas monitoring probes are required to be installed at the permit boundary located no more than 1,000 feet apart. The locations of the gas monitoring probes are shown in the Methane Monitoring and Analysis Plan in Appendix I. The depths and other details of the gas monitoring probes are also shown in Appendix I.

11.6 252:515-15-5 Levels Exceeding Limits Detected

If for any reason gas levels in the gas monitoring probes exceed the limits as outlined in the Explosive Gas Monitoring and Analysis Plan, all necessary measures will be done to protect human health and the environment Within seven days, the ODEQ will be notified and within 30

days a remediation plan will be submitted. Implementation of the remediation plan will be completed with 60 days of the detection.

12 STORMWATER MANAGEMENT

As required by 252:515-17, all municipal solid waste landfills are required to control surface water run-on and run-off during the construction, operation and closure. The following section outlines the Creek County Landfill's Stormwater Management Plan.

12.1 252:515-17-2 Run-on/Run-off Control Systems

The Creek County Landfill will utilize appropriate run-on and run-off control systems for a 24-hour 25-year storm.

12.2 252:515-17-3 Discharges

The Creek County Landfill will be operated such that it will prevent discharge of contaminated water into the following.

- Prevent discharge of contaminated water unless the proper permit has been obtained from the ODEQ Water Quality Division.
- Prevent the discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the federal Clean Water Act and the Oklahoma Pollutant Discharge Elimination System (OPDES) requirements.
- Prevent discharge of non-point source of pollution to waters of the United States, including wetlands, that violates any requirement of an area-wide or State-wide water quality management plan.
- Comply with all requirements of the Oklahoma Pollutant Discharge Elimination System permit.

12.3 252:515-17-3(b) Land Disposal Facilities

The Creek County Landfill currently uses a Stormwater Pollution Prevention Plan (SWPPP), prepared in accordance with OPDES Multi-Sector General Permit, Sector L. A copy of the permit is provided in Appendix J. The SWPPP retained in the operating record at the facility. The Creek County Landfill will obtain an OPDES stormwater permit for construction prior to initiating any construction activities on-site.

13 OPERATIONAL REQUIREMENTS

13.1 252:515-19-31(e) Prohibited Wastes

As required by 252:515-19-31(e), the disposal of any waste other than construction/demolition waste at the Creek County Landfill is prohibited.

13.2 252:515-19-32 Public Access Control

A sign is located at the entrance of the Creek County Landfill to identify the site name, permit number, and hours ofoperation. Public access, prevention ofunauthorized traffic, and uncontrolled dumping will be controlled by a single access gate from the east and fence around the property boundary. The roadway system to the facility is an all-weather surface; therefore, excessive dust generation from the site is not expected.

13.3 252:515-19-33 Measuring Waste

All waste received at the Creek County Landfill will be weighed using a truck scale that has already been installed at the entrance of the facility. Vehicles are weighed using the truck scale prior to and immediately following waste disposal in order to determine the amount of waste received. Waste collection vehicles that frequently utilize the facility have established and maintained an average vehicle tare weight. Such information is used in place of re-weighing the vehicle after unloading the waste.

13.3.1 252:515-19-33(2) Annual Certification

The truck scale at the Creek County Landfill was installed in accordance with the requirements of the Oklahoma Department of Agriculture, Food and Forestry Department (ODAFF). Also, the truck scale is tested and certified annually in accordance with the ODAFF.

13.3.2 252:515-19-33(3) Scales Inoperative

If, for some reason during normal operation hours, the scale becomes inoperative, tonnage will be estimated on a volume basis where one cubic yard of solid waste shall be calculated to weigh one-third ton.

13.3.3 252:515-19-33(4) Fees

Solid waste disposal fees are collected and submitted to the ODEQ in accordance with 27A O.S. 2-10-802(B).

13.3.4 252:515-19-34(5) Monthly Reports

Monthly tonnage reports are submitted to the ODEQ by the 15th of the month following the reporting month.

13.4 252:515-19-34 Limitations on Waste Received

The Creek County Landfill anticipates accepting between 200 tons per day and 300 tons per day that will originate in about a 50 mile radius of the landfill. The Creek Landfill does not anticipate accepting more than 200 tons per day from out of state. Therefore, an Out of State Disposal Plan is not required. If it appears that there will be more than 200 tons per day accepted from out of state, an Out of State Disposal Plan will be submitted meeting the requirements of OAC 252:515-19-34(d).

13.5 252:515-19-35 Litter Control

Blowing waste at the Creek County Landfill will be controlled using one or more of the following methods.

- Litter fences constructed around the tipping face adjusted daily for the wind direction;
- Ensuring that unloading of waste vehicles does not cause a significant amount of wind-blown litter;
- Posting signs near the entrance of the Creek County Landfill to advise customers to adequately cover their loads;
- Collecting litter from the site at least weekly; and
- Placing soil cover on the waste immediately after compaction to prevent blowing litter on extremely windy days.

All roadways utilized by waste collection vehicles approaching the landfill will be cleaned by Creek County Landfill personnel or by personnel directly under the supervision of Creek County Landfill employees.

13.6 252:515-19-36 Air Criteria

13.6.1 252:515-19-36(a) Comply with Clean Air Act

Since the Creek County Landfill is a Construction and Demolition Waste facility, it does not have to comply with the Clean Air Act.

13.6.2 252:515-19-36(b) Open Burning

Open burning of waste will not be allowed at the Creek County Landfill.

13.6.3 252:515-19-36(c) Control Dust

Dust will be controlled through the use of a water wagon that will spray surface water on all interior landfill roads. Also, the roadway system to the facility is an all-weather surface; therefore, excessive dust generation from the site is not expected.

13.6.4 252:515-19-36(d) Asbestos at Land Disposal Facilities

Friable asbestos will not be received at the Creek County Landfill.

13.7 252:515-19-37 Disease Vector Control

The Creek County Landfill receives only Construction and Demolition waste and is therefore not subject to the requirements under OAC 252:515-19-37. The Creek County Landfill shall control disease vectors by policing blown litter and applying earthen daily cover or approved Alternative Daily Cover at least weekly.

13.8 252:515-19-38 Placement of Waste

13.8.1 252:515-19-38(a) Waters of the State

Waste will not be placed or allowed to enter waters that communicate with waters of the state located outside of the permitted boundary.

13.8.2 252:515-19-38(b) Buffer Zones

In accordance with OAC 252:515-19-38(b) the expansion area has been designed and will be maintained with a waste-free buffer zone at least 50 feet in width between all waste disposal and handling areas and adjacent property.

13.9 252:515-19-39 Salvage and Recycling

Salvage and recycling will not be permitted at the Creek County Landfill.

13.10 252:515-19-40 Recordkeeping and Reporting

An operating record will be maintained at the Creek County Landfill that contains all the records concerning planning, construction, operation, closing, and post-closure of the facility. These records will be maintained in a secure location until the post-closure monitoring period is terminated. Records required to be maintained in the operating record include the following.

- Permit Provisions and Applications
- Location Restriction Documentation
- Stormwater Management

- Operation Requirements
- Closure and Post-Closure Care
- Cost Estimates and Financial Assurance
- Subsurface Investigation
- Groundwater Monitoring/Corrective Action
- Liner Design
- Methane Gas Monitoring and Control
- Exclusion of Prohibited Wastes

Other records that will be kept for the Creek County Landfill include a daily log of the amount of refuse processed, names, address and telephone numbers of all employees, a list of all vehicles bringing waste to the landfill, a log of major operational problems encountered, including complaints and difficulties and a log of all efforts made to control vectors, odors, dust and litter.

13.11 252:515-19-51(a) Protective Cover Required

The Creek County Landfill will cover the waste with at least six inches of compacted earthen material.

13.11.1 252:515-19-51(c) Minimum Frequency

Daily cover shall be applied a minimum of once per seven days. More frequent applications may be required for adequate control of disease vectors, fires, odors, blowing litter, or scavenging.

13.11.2 252:515-19-51(d) Alternative Protective Cover

The Creek County Landfill does not currently use alternative daily cover. The facility may submit a Tier I Permit Modification at a later date to allow the use of alternative daily cover.

13.12 252:515-19-52(a) Intermediate Cover Required

The Creek County Landfill will place an additional 12-inches of compacted earthen material over all disposal areas not protected by final cover meeting the requirements of OAC 252:515-19-53 or managed with runoff control structures meeting the requirements of OAC 252:515-17-2(2). Intermediate cover will be capable of sustaining vegetation and will be free of garbage, trash, or other unsuitable material.

13.13 252:515-19-53 Final Cover

The final cover system for the Creek County Landfill shall be as per the approved Closure Plan in Appendix L.

13.13.1 252:515-19-53(a)(1) Design Standard - Barrier Layer

The final cover for the Creek County Landfill shall have a barrier layer that is 24-inches thick and shall have a permeability that is less than or equal to 1 x 10^{-5} cm/sec, which is the same permeability of the clay liner.

13.13.2 252:515-19-53(a)(2) Design Standard - Erosion Layer

An erosion layer shall be installed above the barrier layer that will sustain plant growth. This will be on-site soil that will be stripped from the borrow area. It will be the top 12-inches of soil, which contains the most organic material to sustain vegetation. During landfill operations, the top 12-inches will be removed and stockpiled in a separate location for use during the final cover operations.

13.13.3 252:515-19-53(a)(3) Design Standard - Gradient

The final cover gradient on top of the fill for the Creek County Landfill shall be a minimum of 3% as measured from the top to the sides of the landfill. This will allow for settlement and still maintain positive drainage. The side slopes will be 4H:1V as required by 252:515-19-53(a)(4).

13.13.4 252:515-19-53(a)(5) Design Standard - Vegetation

Please see the attached Vegetation Plan in Appendix K.

13.13.5 252:515-19-53(a)(6) Design Standard - Contours

The final cover contours will be 4H:1V on the side slopes and 3% minimum on top. Please see Drawing No. 7 in Appendix D for the final cover contours.

13.13.6 252:515-19-53(a)(7) Design Standard - Waste Free

The final cover material will be virgin soil material excavated from the on-site borrow area and will be waste free.

13.14 252:515-19-53(c) Alternative Final Cover

The Creek County Landfill is not proposing any alternative final cover at this time.

13.15 252:515-19-54 Vegetative Cover

The Creek County Landfill has prepared a Vegetative Cover Plan for this permit application. The Vegetative Cover Plan is presented in Appendix K.

13.16 252:515-19-55 Soil Borrow Areas

Any on-site soil borrow area will be reshaped and revegetated so that it blends in with the natural landscape when the landfill has been closed.

13.17 Other Operational Items

The information below is additional operational issues that will be dealt with at the Creek County Landfill.

- Access Road - The access road to the Creek County Landfill is S 33rd W Avenue, which is a paved street. The entrance area around the scale and scale house are paved with asphalt and the on-site access roads will be maintained by the owner and will be passable under all weather conditions.

- Employee Facilities - A scale house with restroom facilities are available at the Creek County Landfill and will provide shelter and sanitary facilities for site personnel and citizens accessing the facility.

- Fire Protection - Any fires, whether in the facility, within equipment, or within personnel facilities, will be extinguished immediately by personnel using fire extinguishers or earthen material. If a large fire occurs, the Creek County Landfill will call the City of Sapulpa Fire Department as necessary. All employees will be familiar with procedures to follow in case of a fire.

- Maintenance - Safety is a very important aspect of the day-to-day operations of the Creek County Landfill. In order to ensure that accidents do not occur due to malfunctioning equipment, as well as to keep equipment costs as low as possible, a regular maintenance schedule will be implemented. Maintenance will be performed in accordance with equipment manufacturer's guidelines or as needed. A maintenance plan for equipment and records of equipment maintenance will be kept on file at the Creek County Landfill.

- Accident Prevention and Safety - In order to minimize accidents, all employees will be familiar with and adhere to all safety rules, requirements, and regulations as set forth by the Creek County Landfill Manager. Accident Prevention and Safety training will be provided to all employees. Multi-purpose ABC fire extinguishers will be provided on all equipment.

- Closure Plan - A Closure Plan is presented in Section 14.0 and Appendix L.

- Post-Closure Plan - A Post-Closure Plan is presented in Section 14.0 and Appendix L.

14 CLOSURE AND POST-CLOSURE CARE

All new municipal solid waste landfills are required to have a closure plan and a post-closure plan that complies with OAC 252:515-25. The following section outlines the Creek County Landfill's compliance with OAC 252:515-25.

14.1 252:515-25-2 Plans Required

A Closure Plan and a Post-Closure Plan are required to be submitted to the ODEQ for review and approval. The Closure Plan should include information on how to close the landfill in compliance with OAC 252:515-25 Part 3. The Post-Closure Plan should include information on how the Creek County Landfill will comply with OAC 252:515-25 Part 5.

14.2 252:515-25-3 Records Retention

Copies of all closure and post-closure documentation will be maintained in a file located at the Creek County Landfill. These records will be maintained through the post-closure monitoring period.

14.3 252:515-25-31 Performance Standard

The Closure Plan is included in Appendix L. The Closure Plan conforms to all of the requirements of the ODEQ regulations.

14.4 252:515-25-32 Contents of Closure Plan

The Closure Plan is included in Appendix L. It contains, at a minimum, all of the information as per the following:

- Identification of site-specific closure activities, a description of how each is expected to be performed, and a schedule for completing all activities.
- Calculation of closure cost estimates in accordance with OAC 252:515-27.
- An estimate of the maximum inventory of waste ever on-site over the active life of the facility.
- Detailed plans for the following:
    - identifying and removing from the site, all equipment, temporary buildings and other improvements not designated as permanent in the permit application;
    - reworking or replacing defective groundwater monitor wells, gas wells, and other defective monitoring equipment;
    - monitoring ground and surface water;
    - collecting and analyzing soil and water samples;
    - disposing of final wastes and affected soils;
    - decontamination of facility structures;
    - maintaining site security and access control, if post-closure monitoring is required;

- redesigning final closure in accordance with existing site conditions and applicable rules;
- preparing final closure certification and other required documents and notices; and
- performing any other tasks necessary to achieve final closure of the site.

- An estimate of the largest area of the disposal facility ever requiring final cover during the active life.
- A detailed description of the final cap design and construction, including but not limited to:
  - a calculation of the amount of material needed for each phase of closure;
  - identification of the soil type to be used for the final cover;
  - the location at which it will be obtained;
  - an analysis of the proposed cover material's permeability; and
  - mass balance calculations to demonstrate sufficient soil is available.
- Provisions for obtaining, hauling, and placing the soil for final cover.
- A description of the design and construction of final cover to meet the requirements of OAC 252:515-19-53.
- A description of the design and construction of gas vents or collection pipes to be incorporated in the cap design.
- The QA/QC methods to be used in cap construction and to document the final cover is built to specification.
- The schedule and method of placement of all components of the final cap.
- Grading, planting, fertilizing and establishing vegetation for all disturbed areas, including reshaping and revegetation of both on-site and off-site soil borrow areas to blend with surrounding terrain, or another approved reclamation plan.
- Constructing surface drainage and erosion control measures or reworking existing measures as necessary.
- Installation of final cover.
- Fitting existing leachate collection systems with a method for automatic and continuous removal of leachate not requiring owner/operator intervention.
- Remedying all former improper closure or waste placement at the site.
- Conducting the final closure survey and preparing the closure certification.
- A constructed map showing what the contours of the site will be at final closure.

14.5 252:515-25-32(c) Phased Closure Authorized

The Creek County Landfill will close in phases as per the approved Closure Plan.

14.6 252:515-25-32(c)(2) Financial Assurance Reduction

The Creek County Landfill will reduce the overall Financial Assurance requirements during phased closure of the landfill. The Creek County Landfill will utilize a registered professional engineer in the State of Oklahoma for certification that a particular area was closed in accordance with the approved Closure Plan. Approval for closure will be sought from the ODEQ prior to reducing the overall Financial Assurance requirements for the site.

14.7 252:515-25-33 Timelines

The Creek County Landfill shall notify the ODEQ in writing prior to beginning any closure activities at the site. All closure activities will begin within 90 days of the landfill receiving waste into a particular area for phased closure. All closure activities will be completed within 180 days after closure activities have been initiated.

14.8 252:515-25-34 Certificate of Final Closure

A certificate of final closure will be submitted to the ODEQ by the Creek County Landfill. This certificate will be signed by the appropriate Creek County Landfill personnel, contain a certification statement about closure activities, contain a report with related drawings describing how the Creek County Landfill was closed, and include any relevant information about gas, groundwater or surface water monitoring.

14.9 252:515-25-34(b) Land Disposal Facilities

The Creek County Landfill will also submit a closure map that will include information about the as-built conditions after closure has been completed. This would include information on the following.

- The final contours of the landfill.
- The permit boundary and waste disposal boundaries.
- The location of gas monitoring wells.
- The location of groundwater monitoring wells.
- The location of permanent surface water drainage structures.
- Aesthetic enhancements.
- Other relevant information.

This report will be signed and sealed by a registered professional engineer in the State of Oklahoma.

14.10 252:515-25-35 Final Closure

The Creek County Landfill will seek approval from the ODEQ for final closure before the post-closure period can begin.

14.11 252:515-25-36 County Land Records Notice

The Creek County Landfill will file a notice with the Creek County Clerk that will provide information that the land was used for processing and disposing of construction and demolition waste and that it has been closed. The notice shall include information on the type, location and quantity of waste processed and disposed of at the Creek County Landfill. The

notice will also include information about post-closure monitoring. A copy will be sent to the ODEQ for placement in the ODEQ file.

14.12 252:515-25-51 Post-Closure Period

The Creek County Landfill will have an eight (8) year post-closure period as required by 252:515-25-51(a).

14.13 252:515-25-53 Contents of the Post-Closure Plan

The Post-Closure Plan is included with the Closure Plan in Appendix L. The Post-Closure Plan includes information concerning the following:

- Identifies site specific post-closure activities.
- Calculates the post-closure cost estimate as per OAC 252:515-27.
- A schedule of quarterly inspections.
- Procedures for repairing and maintaining all surface drainage structures and for reworking or replacing any defective groundwater monitoring wells.
- Procedures for maintaining leachate collection and storage system.
- Procedures for collecting groundwater and surface water samples.
- Methods of maintaining site security.
- Maintaining vegetation and erosion controls.
- Documentation of legal right to enter site to perform post-closure activities.
- Procedures for preparing the annual post-closure report.

14.14 252:515-25-54 Post-Closure Operational Requirements

The Creek County Landfill will secure the site during the Post-Closure monitoring period with fences and gates so as to maintain proper security. The Creek County Landfill shall utilize the services of a registered professional engineer in the State of Oklahoma for preparation of the Annual Post-Closure Certification Report.

14.14.1 252:515-25-54(b)(1) Monitoring

The Post-Closure Plan includes information on how the integrity of the groundwater and the gas monitoring systems will be maintained. The groundwater monitoring wells and the perimeter gas monitoring probes will be sampled at least semi-annually.

14.15 252:515-25-55 Post-Closure Use of Property

The Creek County Landfill will not utilize the closed landfill during the post-closure monitoring period for any activities unless approved by the ODEQ.

14.16 252:515-25-56 Certification of Post-Closure Performance

The Creek County Landfill will utilize the services of a registered professional engineer in the State of Oklahoma for preparation of the Annual Post-Closure Report. The Annual Post-Closure Report will contain all of the information that is required in the Post-Closure Plan.

14.17 252:515-25-57 Land Use Restrictions

The Creek County Landfill does not intend to use the closed landfill for any purpose without the written approval of the ODEQ.

15 COST ESTIMATES AND FINANCIAL ASSURANCE

All solid waste disposal facilities are required to have financial assurance in the amount equal to close the largest area of the landfill. Also, the financial assurance is to include costs associated with the post-closure care. This section outlines the Creek County Landfill's compliance with OAC 252:515-27.

15.1 252:515-27-3 Duty to Maintain Financial Assurance

The Creek County Landfill will maintain financial assurance during the life of the landfill and into the 8 year post-closure period.

15.2 252:515-27-8 Economic Life of Disposal Facility

The Creek County Landfill has calculated an economic life of the landfill based on the information contained in 252:515-27-8 and listed below. The economic site life is based on the area to be permitted for this Tier III Permit Application. The Creek County Landfill uses a local Surety Bond as the financial assurance mechanism.

15.3 252:515-27-8(c) Annual Update

The Creek County Landfill will submit the annual update before April 1 of each year that shows the remaining life of the facility as of December 31 of the previous year.

15.4 252:515-27-31 Cost Estimates for Closure

Appendix M contains the current Cost Estimates for Closure and Post-Closure. These estimates are based on the procedure and unit rates listed in Appendix H and I, respectively, of the ODEQ Regulations.

15.5 252:515-27-32 Cost Estimates for Post-Closure Care

Appendix M contains the Cost Estimates for Closure and Post-Closure. These estimates are based on the procedure and unit rates listed in Appendix H and I, respectively, of the ODEQ Regulations.

15.6 252:515-27-33 Cost Estimates for Corrective Action

Since this is a Tier III Permit Application for a lateral expansion of an existing C&D landfill and none of the monitoring wells are undergoing correction action, costs for corrective action are not required.

15.7 252:515-27-34 Annual Adjustments to Cost Estimates

As indicated above, The Creek County Landfill will submit its annual adjustment before April 1 of each year for the year ending on December 31. The adjustment will use an inflation factor that is approved by the ODEQ. These might include the "Implicit Price Deflator for Gross National Product" or the "Implicit Price Deflator for Gross Domestic Product". Each of these are published by the U.S. Department of Commerce in its annual *Survey of Current Business* in the year for which the adjustment is being made.

15.8 252:515-27-51 Cost Estimates for Closure and Post-Closure

The Creek County Landfill determined the cost estimates for Closure and Post-Closure from the worksheets included in Appendix H and I of the ODEQ regulations. The worksheets for this landfill are included in Appendix M of this document.

15.9 252:515-27-71 General Requirements for Financial Assurance Mechanisms

The Creek County Landfill will utilize a Surety Bond as its financial assurance mechanism. A Surety Bond is an approved mechanism by the ODEQ under OAC 252:515-27-82.

15.10 252:515-27-72 Use of Multiple Mechanisms

The Creek County Landfill will only use the Surety Bond as its financial assurance mechanism.

15.11 252:515-27-78 Surety Bond

The Creek County Landfill currently uses the Surety Bond for the existing C&D Landfill, so therefore, it will continue to use this Financial Assurance Mechanism for the lateral expansion area.

16 WASTE EXCLUSION PLAN

All land disposal facilities, excluding generator owned and operated NHIW landfills and yard waste composting facilities, shall have a Waste Exclusion Plan (WEP). This section outlines the Creek County Landfill's conformance with OAC 252:515-29 Exclusion of Prohibited Wastes.

16.1 252:515-29-2 General Provisions

The Creek County Landfill has prepared a WEP that meets the requirements of OAC 252:515-29 and it will be implemented once the ODEQ approves the Tier III Permit Application. The WEP will be implemented to detect and prevent the disposal of prohibited wastes identified in the permit.

16.2 252:515-29-3 WEP Requirements

The WEP for the Creek County Landfill is included in Appendix N. It contains all of the information listed in OAC 252:515-29-3.

APPENDIX A

GENERAL INFORMATION

APPLICATION REVIEW CHECKLIST
LAND PROTECTION DIVISION
OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

CONSTRUCTION AND DEMOLITION LANDFILLS			
New Permits or Expansion of Permitted Boundary			
			(Shaded areas for DEQ use only)
Facility Name: Creek County Landfill			OAC 252:515
Applicant: Rosencutter Brouthers, Inc.			
County: Creek		Date:	
ODEQ Login/Permit No:		Tier Classification III:	
Administrative Reviewer:	Start Date:	Completion Date:	Deadline:
Technical Reviewer:	Start Date:	Completion Date:	Deadline:

APPLICATION REVIEW CHECKLIST
LAND PROTECTION DIVISION
OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

ITEM #	State or Federal Regulations Statutes or DEQ Rules (OAC) or Guidelines*	GENERAL DESCRIPTION	Admin Complete	Technically Complete	Remarks
FILING OF APPLICATION					
PUBLIC PARTICIPATION		Information regarding the pending application shall be made available to the public as required in 252:004-7-13. This notice is to allow concerned individuals an opportunity to voice opposition or support.			
1	252:004-7-13	Public Notice shall be made with proof submitted to the Department consisting of a copy of the publication in one newspaper, in addition to an affidavit from the publishers showing the date of publication. Applicants shall certify by affidavit that they own the real property, have a current lease or easement which is given to accomplish the permitted purpose or have provided legal notice to the landowner. Applicants for a landfill permit shall also provide notice by certified mail, return receipt requested, to owners of mineral interests and to adjacent landowners whose property may be substantially affected by installation of a landfill site.			
APPLICATION		Prior to filing a formal application, it is recommended that a Preliminary Site Evaluation be completed to determine if the proposed site meets the location standards as required in 252:515-5.			
VERIFICATION/CERTIFICATION					
2	252:515-3-33,34	Application signed under oath by the owner/operator on forms provided by DEQ. Legal Right to Property: Assurance of sufficient interest in the land for which the permit is sought to construct and operate, in addition to right of access & Easement to DEQ.			
3	252:515-3-35	Engineer of Record shall affix his/her seal to the application page and each map & drawing, as certification that the information is accurate & verifiable.			

APPLICATION REVIEW CHECKLIST
LAND PROTECTION DIVISION
OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

ITEM #	State or Federal Regulations Statutes or DEQ Rules (OAC) or Guidelines*	GENERAL DESCRIPTION	Admin Complete	Technically-Complete	Remarks
GENERAL INFORMATION					
4	252:515-3-36(a)(1)	Owner/Operator: Name, mailing address, & phone number.			
5	252:515-3-36(a)(2)	Facility Name and Type , physical address, phone number.			
6	252:515-3-36(a)(3)	Disclosure Statement (27A O.S. Supp. 1993, 2-10-103 & 302).			
7	252:515-3-36(a)(4) & (a)(5)	Legal description by metes and bounds of proposed permit boundary and waste disposal areas. To include latitude, and longitude of all corners of the proposed permit boundary.			
8	252:515-3-36(a)(6) & 3-52	Location: Both physical and mailing addresses; and location on a county highway map with respect to nearest town or city and airports within 6 miles.			
9	252:515-3-36(a)(7)	Operations: Brief description of all processing, storage and proposed disposal operations and units.			
10	252:515-3-36(a)(8)	Waste: Description of anticipated waste streams including type, source, & anticipated daily volumes.			
11	252:515-3-36(a) (9) & (a)(10)	Population: Population or population equivalent served. Names of cities and/or counties in service area.			
12	252:515-3-36(a)(11)	Access Roads: Type of road construction & materials. All roads within the site must be passable under all weather conditions.			
13	252:515-3-37	Aesthetic Enhancement: Construction plan & maps showing features to reduce dust & noise, and enhance visual harmony of facility with surrounding area.			
14	252:515-3-38(7)	Life: Anticipated life of site as calculated by OAC 252:515-27-8.			

APPLICATION REVIEW CHECKLIST
LAND PROTECTION DIVISION
OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

ITEM #	State or Federal Regulations Statutes or DEQ Rules (OAC) or Guidelines*	GENERAL DESCRIPTION	Admin Complete	Technically Complete	Remarks
MAPS & DRAWINGS:		Complete maps, plans, specifications, and narrative demonstrating the proposed site as designed & constructed, are required as outlined in: 252:515-3-51, 252:515-3-52, 252:515-3-53, 252:515-3-54, 252:515-3-55, 252:515-3-56, and 252:515-3-57. The narrative should provide design specifications for receiving & processing areas, surface water protection measures, & any other site item requiring explanation.			
15	252:515-3-52	General Location Map: County Highway map or municipality map, if available, showing location of proposed site and any airports within six (6) miles.			
16	252:515-3-53	Flood Plain Map: A Flood Plain map from an approved source depicting the 100 year flood plain on or adjacent to the proposed site.			
17	252:515-3-54	Quadrangle Topographic Map: An original USGS map showing the location of site permit boundaries. Also the map shall depict: access routes; homes & buildings; water wells; public water & waste water collection, treatment, & distribution facilities; and receiving waters & surface variations within one (1) mile of site.			
18	252:515-3-55	Existing Contour Map: A constructed map showing topographic contours, contour interval not to be greater than two (2) feet, and location & quantities of surface drainage entering & exiting site.			
19	252:515-3-56	Site Map: May be plotted on existing contour map (above map). To include dimensions of permit boundary; receiving, processing, storage or disposal areas; buffer zones; permanent bench marks, borehole and well locations with surface and top of casing elevations; surface drainage; fencing, gates, utility lines, pipelines and easements; access roads; employee & equipment shelters; and on- & off-site borrow areas.			
20	252:515-3-57	Design drawings: Provide necessary details of the design drawings & specifications for receiving, processing, storage or disposal areas, liner construction, leachate collection systems, typical well installations, monitor wells, gas monitoring probes and piezometers, dike sections, drainage channels, retention structures or other ground water & surface water protection measures, and any other specific site items requiring explanation.			
21	252:515-3-72, 73, 74, 75, & 76	Additional Maps: Groundwater resource and usage map; Surface geology map; Highest groundwater contour map; Potentiometric surface map; and Site specific cross sections.			

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22	252:515-3-77	Fill cross section map.			
23	252:515-3-78	Excavation contour map.			
24	252:515-3-79	Top of liner contour map.			
25	252:515-3-80	Completion map showing how the new facility or expansion is expected to look when it is completed, including final contours.			
LOCATION STANDARDS:		The following location restrictions are to be addressed:			
26	252:515-5-31(a)	Scenic Rivers: Not to be located within the drainage basin of any river designated under Oklahoma Scenic Rivers Commission (OSRC) Act unless statement of no adverse effect is obtained from OSRC or Oklahoma Tourism & Recreation Department and submitted to DEQ.			
27	252:515-5-31(b)	Recreation/Preservation Areas: Not to be located within one-half (1/2) mile of area dedicated & managed for public recreation or natural preservation by any governmental agency. Exceptions granted if application includes statement from appropriate agency that proposed site not expected to adversely affect recreation or natural area.			
28	252:515-5-31(c)	Endangered & Threatened Species: Statement required from Oklahoma Department of Wildlife (ODWC) and Oklahoma Biological Survey (OBS) concerning endangered or threatened wildlife or plant species within one (1) mile of proposed site. If exist, impact statement required and mitigation plan approved by ODWC or OBS to be submitted to DEQ.			
29	252:515-5-32(a) 252:515-3- 53	100 Year Flood Plain and map: No waste management or disposal areas shall be located within the 100 Year Flood Plain. 100 year flood level & boundaries to be furnished in application. DEQ may grant a variance provided subsequent redefinition of the flood plain does not include the waste management or disposal areas.			
30	252:515-5-32(b)	Public Water Supply: Not to be located within one (1) mile up-gradient of a public water supply surface water intake or one year time of travel of a public water supply well. Wellhead delineation to be performed and submitted with the application.			

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31	252:515-5-32(c)	Wellhead Protection Area: If any new waste management or disposal areas will be located within two miles of a public water supply well, a wellhead protection area shall be identified and submitted to the DEQ.			
32	252:515-5-32(d)	Wetlands: Not to be located in wetlands. Letter required from Oklahoma Conservation Commission (OCC) stating proposed site not located in wetlands. Exception upon demonstration that all of the following can be made and verified: Rebuttable presumption, No harm, No degradation, No net loss, and Sufficient information is available.			
33	252:515-5-51(a)	Terrace Deposits: Not to be located within an area designated as alluvium or terrace deposits and their recharge areas, as shown on "Maps of Aquifers and Recharge Areas in Oklahoma". Exception if demonstration with site-specific hydrological and geological data or other information that proposed location does not lie in a prohibited area.			
34	252:515-5-52(a)	Utility Separation: A minimum horizontal separation of twenty-five (25) feet shall be maintained from any above-ground or underground pipeline; or transmission line.			
35	252:515-5-52(b)	Fault Areas. No new waste management or disposal areas shall be located within 200 feet of a fault that has had displacement in the Holocene time. Exception upon demonstration that alternative setback is protective of human health and the environment and damage to the structural integrity of the disposal cell will be prevented.			
36	252:515-5-52(c)	Seismic Impact Zones. No new Waste Management or disposal areas shall be located in a seismic impact zone. Exception upon demonstration that all containment structures (liners and surface water control systems) are designed to resist the maximum horizontal and vertical displacement to lithified earth material for the site.			
37	252:515-5-52(d)	Unstable areas. No new Waste Management or disposal areas shall be located over a subsurface mining area or any other unstable area. Exception upon demonstration that engineering measures have been incorporated into the design to ensure the integrity of all structural components will not be compromised.			

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38	252:515-5-52(e)	The airport demonstration and notification requirements do not apply to C&D Landfills.			
WATER MANAGEMENT:		The entire facility site shall be constructed so as to minimize runoff. Plans and specifications regarding the design, construction & maintenance of run-on/run-off control systems & handling of leachate as outlined in 252:515-17-2 are required. In addition, facilities shall be designed, constructed, and operated in a manner that will prevent and avoid contamination of ground waters.			
39	252:515-17-2(1)	Run-on Control System: Design & implementation of control system to prevent flow onto active portion of site during peak discharge from 24-hour, 25-year storm.			
40	252:515-17-2(2)	Run-off Control System: Design & implementation of control system with sufficient capacity to collect & control all contaminated storm water resulting from 24-hour, 25-year storm.			
41	252:515-17-3 252:605 OPDES	Discharge: Comply with NPDES/OPDES permit. No discharge of pollutants, including sediment, into waters of United States in violation of any requirements of Federal Clean Water Act. If accidental discharge occurs, immediate action should be taken to stop the flow or discharge from the site, modify operational practices to prevent any future occurrences, notify the Department, and take such actions necessary to remediate contamination of ground or surface waters resulting from the flow or discharge.			
42	252:515-13-52	Storage: Leachate, if present, should be collected & stored in a manner not to cause contamination, and disposed in a manner compatible with the regulations outlined.			
43	252:515-13-51, 52, 54, 55 56, & 57	Leachate management: Leachate, if present, should be collected & stored in tanks, or surface impoundments. It may be used for irrigation; or discharged to a POTW or via a OPDES permit from Water Quality Division of DEQ; or managed with an alternative method approved by the DEQ.			

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SUBSURFACE INVESTIGATION:		The owner/operator must complete a subsurface investigation prior to submitting a permit application that will determine the location of the uppermost saturated zone(s). The subsurface investigation shall be designed to protect all saturated zones encountered while drilling, and all wells, borings, and piezometers shall be constructed according to the minimum standards set forth in OAC Title 785, Chapter 35. A Drilling Plan shall be submitted for DEQ approval prior to any drilling.			
DRILLING PLAN:		A drilling plan shall be submitted to the DEQ for approval prior to initiating the subsurface investigation for a new landfill or lateral expansion 252:515-7-4(a). It is to include the following information.			
44	252:515-7-4(b)(1)	General: To include the name, address and phone number of owner/operator, engineering firm, & individual in charge of project.			
45	252:515-7-4(b)(2)	Maps: Following maps & drawings to be included according to Sub-chapter 7: general location map; flood plain map; quadrangle topographic map; & an existing contour map showing the locations, estimated elevations and total depths of any proposed or existing borings on the site; site-specific maps showing any wetlands, fault areas, seismic impact zones, and alluvium or terrace deposits and their recharge areas; and drawings of proposed piezometers and/or monitor wells in accordance with OWRB standards OAC 785:35.			
46	252:515-7-4(b)(3)	Borings: A minimum of four (4) borings for a site of five (5) acres or less. One (1) additional boring is required for each additional five (5) acres. More borings may be required if the complexity of the hydrogeology warrants. With DEQ approval, up to one fourth (1/4) of required borings may be replaced with existing borings located within 200 feet of the proposed boundary.			
47	252:515-7-4(b)(4) & 515-7-5	Drilling: Borings to be drilled to a minimum depth of thirty (30) feet below the deepest proposed placement of waste. Borings to be spaced on a grid with at least three (3) borings two hundred (200) feet deep or a minimum of ten (10) feet into the uppermost saturated zone, whichever is less; and at least one (1) boring to a depth of one hundred (100) feet. Drilling to occur only after receipt of written permission from the DEQ, and written notice of "intent to drill" is received by the DEQ at least two (2) weeks prior. A qualified groundwater scientist shall supervise all drilling operations.			

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48	252:515-7-31	Data Collection: The following information shall be collected during drilling: borehole logs, lithologic sample logs, geophysical logs, soil & rock sampling, and soil tests & reports.			
49	252:515-7-32, 33, & 34	Borehole Logs: A lithologic sample log shall be prepared for each borehole drilled, and a geophysical log recorded for each boring to be converted to a piezometer. For disposal areas of 20 acres or less at least three (3) boreholes shall be logged by geophysical tools, including the deepest borehole. For each additional 20 acres, one additional boring shall be logged with geophysical tools.			
50	252:515-7-35, 36, & 37	Soil & Rock Sampling: Soil & rock samples to be taken at five (5) foot intervals and at soil or rock changes from the surface to the total depth drilled. Sampling methods shall include split barrel samples, core barrel for consolidated rock, and thin walled tube samples when soil samples of silts and clays are required for physical tests. Soils proposed to be used as liner and/or cover shall be tested as specified in this subsection and a laboratory report of the soil & rock characteristics and quantities stamped or sealed by the licensed professional engineer directing the soil laboratory shall be submitted to DEQ.			
HYDROGEOLOGIC STUDY:		To include both a regional and site specific study 252:515-7-38, 252:515-3-72, 252:515-3-73, and 252:515-3-76.			
51	252:515-7-38	Regional Hydrogeologic Study: Information on the geology and hydrogeology shall be collected, including: the formation underlying the deepest formation penetrated during drilling, exposed outcrops on or within ¼ mile, a geologic column and structural information of all rock formations to a depth of 500 feet, a regional surface geological map, illustrations of the regional stratigraphy, geologic cross-sections, a description of regional groundwater quality, identification of USDWs, and information sources / references.			
52	252:515-3-72	Site Specific Hydrogeology: To include a ground water resource and usage map, a site specific aerial surface geologic map, and two (2) site specific cross sections, constructed from subsurface borehole logs & other site specific information.			

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GROUNDWATER STUDY:		A groundwater study is to be conducted based on information obtained from piezometers representative of the entire site 252:515-7-51(a). Results to be included with the permit application.			
53	252:515-7-53(a)	Piezometers: To be drilled and constructed according to specifications outlined in the regulations. Screens shall be installed in the uppermost saturated zone. At least three (3) piezometers shall be installed for sites twenty (20) acres or less. One (1) additional piezometer shall be installed for each additional twenty (2) acres.			
54	252:515-7-54 & 55	Groundwater Elevation Measurements: are required to establish the minimum distance between the highest water table and the lowermost elevation at which waste will be placed. Water levels in all piezometers are to be measured for twelve (12) consecutive months with one well monitored continuously. Daily & monthly precipitation data from the climatological station closest to the proposed site which correspond to period of onsite measurements, shall be submitted with the 30-year mean precipitation value for the proposed site.			
55	252:515-7-56	Shallow Saturated Zone Investigation: If a saturated zone is encountered above the depth groundwater is anticipated, a piezometer shall be installed & screened in the shallow zone and the location offset within ten (10) feet where a new boring shall be drilled to the original proposed total depth.			
56	252:515-3-74	Highest groundwater contour map: A contour map, at two foot intervals, showing the highest elevation ever recorded at each borehole, piezometer or well at the site shall be submitted with the permit application.			
57	252:515-3-75	Potentiometric surface map: A map of the actual groundwater potentiometric surface shall be included with the permit application.			
GROUNDWATER MONITORING:		Groundwater is to be monitored for the life of the landfill and during the Closure and Post Closure Periods to insure that the facility does not endanger the surface or subsurface water quality.			
58	252:515-9-4 252:515-9-5 252:515-9-6 252:515-9-7	Monitor Well Location: Wells are to be located on land owned or leased by the owner of the landfill & placed no more than 150 meters from the waste management unit boundary. Number, spacing, and depths of monitoring wells to be based on site-specific technical information.			

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59	252:515-9-3	Filtering prohibition: Groundwater samples shall not be filtered in the field or in the lab prior to analysis.			
60	252:515-9-5	Monitor Wells Required: A minimum of three (3) monitor wells are required to yield samples from the uppermost aquifer. At least one (1) monitor well to be located up- gradient and at least two (2) monitor wells hydraulically down-gradient of the landfill based on the actual piezometric contour map.			
61	252:515-9-6 252:515-9-7	Design & Construction: Wells must be cased and constructed to at least the minimum construction standards set forth in OAC Title 785, Chapter 35. Must be maintained so that performance is to design specifications throughout the life of the monitoring program.			
62	252:515-9-6	Plugging: Unless converted to a piezometer or monitor well within thirty (30) days, all borings shall be plugged in accordance with the requirements of OAC 785:35-11.			
63	252:515-9-31 252:515-9-51 252:515-9-52 252:515-9-53 252:515-9-54 252:515-9-71 252:515-9-74	Monitoring Program: A groundwater sampling & analysis program shall be submitted for DEQ approval. It shall include: monitor well locations, depths, design, installation, development, and decommissioning, sample collection, sample preservation & shipment, analytical procedures, chain of custody control, quality assurance & quality control, sampling and analytical methods. A statistical analysis plan with statistical procedures & performance standards shall be included for approval by DEQ. Beginning no later than 30 days after the initial receipt of waste all monitor wells shall be sampled quarterly for one full year to establish background water quality for the following parameters, at a minimum: pH, chemical oxygen demand, and specific conductivity. After background has been established, detection monitoring shall begin with and monitor wells shall be sampled at least semi-annually and analysis performed. Through comparison with the background values, it shall be determined if a statistical increase has occurred.			

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EXPLOSIVE GAS MONITORING & CONTROL:		**252:515-15**			
64	252:515-15-2	Explosive Gas Control. The concentration methane gas generated by the facility shall not exceed: 1) twenty five percent (25%) of the lower explosive limit for methane in all structures; 2) the lower explosive limit for methane at the permit boundary.			
65	252:515-15-3	Explosive Gas Monitoring and Analysis. An explosive gas monitoring and analysis plan shall be submitted to the DEQ for approval. Explosive gas monitoring in accordance with the approved plan shall be performed a minimum of once every calendar quarter. Sampling shall be performed with a gas measuring instrument that has been calibrated immediately prior to the beginning of the sampling event.			
66	252:515-15-4	Installation of Gas Monitoring Probes. Gas monitoring probes shall be constructed in accordance with the requirements of the OWRB (OAC 785:35) and have a sampling port. Probes shall be located no more than 1000 feet apart along the permit boundary with exceptions. Probes shall be installed to a minimum depth equivalent to the deepest placement of waste and be screened for the entire depth of waste. As-built drawings of the probes shall be submitted to the DEQ within 90 days of installation.			
67	252:515-15-5	Levels Exceeding Limits Detected. If gas levels exceed the specified limits the owner/operator shall immediately take all necessary steps to ensure protection of human health, notify the DEQ, and follow the additional requirements of the section including submitting a remediation plan to DEQ for approval.			

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LINERS:		All C&D landfills must construct a liner on which waste will be placed 252:515-11-2. As a minimum, the liner shall be constructed with reconstructed clay liner, or an in-situ liner.			
68	252:515-11-2(a)	Liner Design: All C&D landfills must construct a liner on which waste will be placed according to OAC 252:515-11-2. The liner system shall consist of an in-situ liner with minimum of five (5) feet of in-situ soil or a reconstructed clay liner with three (3) feet of recompacted soil, both with hydraulic conductivity of no greater than 1 X 10^{-5} cm/sec, or an equivalent alternative design. Specifications and testing requirements for each type are provided in Parts 3 and 7 of this Subchapter. The Department shall be notified two (2) weeks prior to installation.			
69	252:515-11-3	Separation from groundwater: All landfills shall be designed and constructed to maintain a minimum of five-foot vertical separation between the highest groundwater elevation and the lowermost surface on which waste, including leachate, will be placed. For C&D landfills utilizing an in-situ liner shall be designed to maintain a minimum fifteen-foot vertical separation.			
70	252:515-11-4	Quality Assurance/Quality Control (QA/QC): A plan shall be submitted with the permit application to demonstrate the liner system will be installed in accordance with this Subchapter OAC 252:515-11 and the approved design plans. The plan shall include all information required for the design, placement, construction, and testing of the applicable liner. A qualified third party who is not an employee of the owner or the construction company shall conduct QA and be present during each phase of the liner construction.			
71	252:515-11-5	Notification of Construction: DEQ shall be notified at least two weeks before liner construction begins. The notice shall include the construction area, the names of the contractors and QA/QC officials and the results of pre-construction tests. A pre-construction meeting shall be held at the facility with the design engineer and QA/QC officials before the liner construction begins and DEQ shall be notified at least 48 hours in advance of the meeting.			

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72	252:515-11-6	Liner Installation & Testing (LIT) Report: To document the liner system was installed in accordance with the rules and approved plans. It shall include all information required for liner design, placement, construction, and testing to assure continuous compliance (i.e., summaries of all construction activities, testing data sheets and summaries, changes from design and material specifications, and all QA/QC documentation). Also to include top of liner contour map.			
73	252:515-11-7	DEQ authorization required: No waste shall be placed on a new liner system until DEQ inspects the liner and provides written authorization to commence disposal.			
OPERATIONAL PLAN:		The following operational standards are to be addressed, as required by 252:515-3-36 and 252:515-3-38:			
74	252:515-19-31(e)	Prohibited Waste: Includes hazardous, radioactive, and regulated PCB wastes, liquid waste, nonhazardous industrial solid waste, biomedical waste, municipal solid waste, putrescible waste or special waste. Tires are acceptable.			
75	252:515-19-32	Public Access Control: Control public access and prevent unauthorized traffic and uncontrolled dumping by using artificial and/or natural barriers.			
76	252:515-19-33	Measuring Procedure: Scales shall be installed. All waste delivered to & disposed of, shall be measured by either weight or volume (cubic yards), and the information included in the annual report.			
77	252:515-19-35	Litter: Blowing litter to be controlled so as not to leave the working face. Unloading to be performed to minimize scattering of waste. All facility users shall adequately cover loads to prevent blowing litter. Collecting litter at least weekly, more often if necessary. Approach roadways within 1/2 mile shall be cleaned of litter.			
78	252:515-19-36 (a)	Air Criteria: Shall adhere to any applicable requirements of the Oklahoma Clean Air Act and all requirements developed under a State Implementation Plan (SIP) as approved or promulgated by the EPA.			
79	252:515-19-36(b)	Fire Protection: Open burning of solid waste is prohibited.			
80	252:515-19-36(c)	Dust Control: Measures to be taken to control fugitive dust emissions. Narrative of control measures to be included.			

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81	52:515-19-37	Vector Control: Disease vectors to be prevented or controlled. Narrative of control measures appropriate for the protection of human health & the environment to be included.			
82	252:515-19-38(b)	Buffer Zone: A waste-free buffer zone at least fifty (50) feet in width shall be established & maintained within the proposed permit boundary, between the developed portions of disposal site and adjacent property.			
83	252:515-19-39	Salvage: No scavenging to be permitted at disposal site. Salvage & recycling operations permitted with prior approved operational plan and shall be located in a separate area.			
84	252:515-19-51	Daily Cover Requirements: Disposed solid waste to be covered at once with at least six (6) inches of compacted earthen material at a minimum of of once every seven (7) days or more frequent to control vectors, firs, blowing litter, or scavenging. Cover material shall be free of garbage, trash or other unsuitable material.			
85	252:515-19-52	Intermediate Cover: An additional twelve (12) inches of compacted earthen material, free of garbage, meeting design standards must be placed on all disposal areas not protected by final cover.			
86	252:515-19-53	Final Cover Requirements: A final cover comprised of an erosion layer over a barrier layer shall be installed in accordance with a DEQ approved closure plan. The barrier layer shall consist of two (2) feet of compacted earthen material meeting the specified hydraulic conductivity requirements. An erosion layer of one (1) foot thickness capable of sustaining plant growth shall be placed on top of the barrier layer.			
87	252:515-19-54	Vegetative Cover: Shall establish and maintain vegetative cover, or alternate cover as approved by DEQ, over waste disposal areas.			
88	252:515-25	Closure & Post Closure: (as outlined below) to be included in the operational plan.			
89	252:515-27	Financial Assurance: The amount and instrument supporting compliance with Subchapter 27 to be included.			
90	252:515-29-3	WEP Requirements: Personnel trained to recognize inappropriate waste; Random inspections of incoming loads and documentation of inspections; Notification and safe storage of rejected waste; Procedures for verification of proper disposal of prohibited wastes.			

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RECORDKEEPING REQUIREMENTS:		The following information is to be submitted to the Department and a copy retained in the operating record of the landfill 252:515-19-40. The operating record is to be maintained until the designated post closure period has expired.			
91	252:515-19-40	General: shall submit to the DEQ & maintain in the operating records any location restriction demonstrations, daily operational records, inspection records, monthly operational reports, documentation & analyses demonstrating the nonhazardous classification of wastes received, monitoring or testing data required, closure & post closure plans, and any cost estimates & financial assurance documentation. Annual report due within 30 days of the anniversary date of permit. Such records shall be maintained until the post-closure monitoring period is terminated.			
CLOSURE PLAN:		All applications shall contain a closure plan which identifies steps necessary to achieve final closure, including the last phased closure when applicable as required in 252:515-25. The plan shall provide for the closure of the site when no phased or final closure has been conducted for twelve months, storage capacity is filled and the site has accepted its final wastes for disposal.			
92	252:515-25-32(a)	Closure Plan: Identification of site-specific closure activities with narrative descriptions of proposed extent, performance, & estimated cost of each per subchapter 252:515-25. Activities to include contracting technical consultative services; administrative overhead; identification and removal of equipment; monitoring & sampling of ground & surface water and soils; maintenance of monitor wells; temporary buildings & other improvements; site security; and access control.			
93	252:515-25-32(b)	Additional Information: To address disposing of final wastes & affected soils; description of final cover construction; plans for construction & maintenance of surface drainage, erosional control measures, & vegetative cover; collection, treatment, & disposal of leachate; & final closure survey.			

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94	252:515-25-32(b)(4)	Map: Showing what the contours of the site will be at final closure.			
95	225:515-25-32(c)	Phased Closure: If facility is to be closed in phases, the real extent of the site to be closed in each phase, set forth proposed schedule for such closures, specify a progression of surface drainage controls.			
96	252:515-25-33	Timelines: The DEQ is to be notified prior to beginning final closure of the site. Closure activities shall begin no later than ninety (90) days after final receipt and completed within 180 days of closure initiation.			
97	252:515-25-34	Certification of Final Closure: Preparation of certification and other reports & notices are required.			
98	252:515-25-53(9)	Right-to-Use: Documentation of applicants right-to-use, enter upon, maintain, & monitor site through period of post closure.			
99	252:515-27-31 252:515-27-51	Closure Costs: Cost of hiring a third party to close the facility in accordance with the permit, closure plan, and rules. Cost estimates shall be determined as specified in 252:515-27-51 using Appendix H or other DEQ approved method, including the average of 3 current bids for tasks not included in the Appendix, and to include a ten percent (10%) contingency factor for unanticipated occurrences.			
100	252:515-27	Financial Assurance: A non-negotiable instrument guaranteeing sufficient funds for the adequate completion of closure upon the failure of the permittee to fully complete performance according to the terms of the permit and applicable law. Types of financial assurance considered acceptable are: trust funds, surety bonds, letter of credit, insurance, certificate of deposit, cash or other state approved mechanism meeting the criteria specified in 252:515-27.			
POST-CLOSURE:		Applications shall contain a post-closure plan which specifies how the disposal site will be monitored and maintained during the required post-closure period.			
101	252:515-25-53	Post-closure Plan: Identification of site-specific post-closure activities with detailed narrative descriptions of how each is expected to be performed, a schedule for completion & estimated cost of each activity. The itemized written cost estimate must assume the cost of hiring a third party to complete post-closure.			

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OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

ITEM #	State or Federal Regulations Statutes or DEQ Rules (OAC) or Guidelines*	GENERAL DESCRIPTION	Admin Complete	Technically Complete	Remarks
102	252:515-25-53	Activities: To include contracting for technical consultative services; routine site inspections; proper collection, treatment, & disposal of leachate; maintenance of all onsite equipment & improvements; maintenance of final cover &erosional control; monitoring & sampling of surface water, groundwater and soil; maintenance of monitor wells; security & access control; and preparation of annual maintenance & monitoring post-closure reports.			
103	252:515-25-55	Post-closure use of property: Use of the property during post-closure care must not disturb the final cover, liner or any other components of the containment system. Other uses of the property may be approved by DEQ.			
104	252:515-25-56	Certification of Post-closure performance: A certification shall be submitted to DEQ at the conclusion of the post-closure period meeting the requirements in 252:515-25-56.			
105	252:515-27-32	Post-closure Costs: Shall be detailed written estimate, in current dollars of hiring a third party to conduct post-closure care in accordance with the permit, post-closure plan, and rules. Cost estimates shall be determined as specified in 252:515-27-51 using Appendix I or other DEQ approved method, including the average of 3 current bids for tasks not included in the Appendix, and to include a ten percent (10%) contingency factor for unanticipated occurrences.			
106	252:515-27	Financial Assurance: A non-negotiable instrument guaranteeing sufficient funds for the adequate completion of post-closure upon the failure of the permittee to fully complete performance according to the terms of the permit and applicable law. Types of financial assurance considered acceptable are trust funds, surety bonds, letter of credit, insurance, certificate of deposit, cash or other state approved mechanism meeting the criteria specified in 225:515-27.			

APPENDIX B

PUBLIC PARTICIPATION/NOTICE

ROSENCUTTER BROS., INC.

Dba CREEK COUNY LANDFILL

Mail
P O Box 1597
Sapulpa OK 74067

Site 10250 S 33rd W Ave
Jenks OK 74037
TEL 918-299-3755
FAX 918-299-3793

July 14. 2020

By Registered Mail Return Receipt Requested

Fair Oil. Ltd
P O Box 689
Tyler. TX 75710
225 S College
Tyler. TX 75702
Email: Land@fairoil com

Re. Creek County Landfill
Creek County. Oklahoma
Tier III Permit Modification

Dear Sir/Madam

As required by Oklahoma Statue 27A O S 2-10-301 and Oklahoma Annotated Code (OAC) 252:4-7-13(f)(3) we are notifying you. as the recorded mineral owners on July 14. 2020. The Creek County Landfill. Oklahoma. will be submitting a Tier III Permit Modification to the Oklahoma Department of Environmental Quality (ODEQ) to increase the permitted area of the existing C&D Landfill. The expanded boundary is proposed to be located to the South of the existing C&D Landfill

Please see attached Public Notice that will be posted in the Sapulpa Library. Sapulpa. Oklahoma This letter is merely a notification on our part and requires no action from you. If you have any questions or comments please feel free to review the Tier III Permit Modification or contact DEQ Martha Grafton. (405) 702-8100 We appreciate your time and effort in this matter.

LEGAL DESCRIPTION:

Section 28 T18N R12E County Creek

Regards.

Danny Rosencutter
Creek County Landfill

USPS TRACKING #

9590 9402 5763 0003 1623 97

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

United States Postal Service

• Sender: Please print your name, address, and ZIP+4® in this box•

Creek County Landfill
Rosencutter Bros INC
PO Box 1597
Sapulpa OK 74067

7-159797

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Fair Oil Ltd
PO Box 689
Tyler, OK 75710
LAND DIVISION

9590 9402 5763 0003 1623 97

2. Article Number (Transfer from service label)

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Kristy Messer
C. Date of Delivery 7-21-20

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2015 PSN 7530-02-000-9053

Domestic Return Receipt

ROSENCUTTER BROS., INC.

Dba CREEK COUNY LANDFILL

Mail:
P.O. Box 1597
Sapulpa, OK 74067

Site: 10250 S. 33rd W. Ave
Jenks, OK 74037
TEL (918)-299-3755
FAX (918)-299-3793

July 14, 2020

By Registered Mail Return Receipt Requested

Glenda O'Brien
814 S Olympia Ave
Tulsa, OK 74132

Re: Creek County Landfill
Creek County, Oklahoma
Tier III Permit Modification

Dear Ms. O'Brien:

As required by Oklahoma Statue 27A. O.S. 2-10-301 and Oklahoma Annotated Code (OAC) 252:4-7-13(f)(3) we are notifying you, as the recorded landowner on July 14, 2020. The Creek County Landfill, Oklahoma, will be submitting a Tier III Permit Modification to the Oklahoma Department of Environmental Quality (ODEQ) to increase the permitted area of the existing C&D Landfill. The expanded boundary is proposed to be located to the South of the existing C&D Landfill.

Please see attached Public Notice that will be posted in the Tulsa World. This letter is merely a notification on our part and requires no action from you. If you have any questions or comments, please feel free to review the Tier III Permit Modification or contact DEQ Martha Grafton, (405) 702-8100. We appreciate your time and effort in this matter.

Regards,

Danny Rosencutter
Creek County Landfill

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits..

1. Article Addressed to:

Glenda O'Brien
8414 ~~844~~ Solympia Ave
Tulsa OK 74132

9590 9402 5763 0003 1623 42

2. Article Number *(Transfer from service label)*

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Glenda O'Brien ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* Glenda J O'Brien

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

WEST TULSA STATION
JUL 24 2020
TULSA, OK 74101

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2015 PSN 7530-02-000-9053 Domestic Return Receipt

ROSENCUTTER BROS., INC.

Dba CREEK COUNY LANDFILL

Mail:
P.O. Box 1597
Sapulpa, OK 74067

Site: 10250 S. 33rd W. Ave
Jenks, OK 74037
TEL (918)-299-3755
FAX (918)-299-3793

July 14, 2020

By Registered Mail Return Receipt Requested

Danny Rosencutter
Rosencutter Bros., Inc.
PO Box 1597
Sapulpa, OK 74067

Re: Creek County Landfill
Creek County, Oklahoma
Tier III Permit Modification

Dear Mr. Rosencutter:

As required by Oklahoma Statue 27A. O.S. 2-10-301 and Oklahoma Annotated Code (OAC) 252:4-7-13(f)(3) we are notifying you, as the recorded landowner on July 14, 2020. The Creek County Landfill, Oklahoma, will be submitting a Tier III Permit Modification to the Oklahoma Department of Environmental Quality (ODEQ) to increase the permitted area of the existing C&D Landfill. The expanded boundary is proposed to be located to the South of the existing C&D Landfill.

Please see attached Public Notice that will be posted in the Tulsa World. This letter is merely a notification on our part and requires no action from you. If you have any questions or comments, please feel free to review the Tier III Permit Modification or contact DEQ Martha Grafton, (405) 702-8100. We appreciate your time and effort in this matter.

Regards,

Danny Rosencutter
Creek County Landfill

CERTIFIED MAIL

Rosencuter Brothers Inc.
Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74067

7019 2280 0000 2573 7283

1021

74067

U.S. POSTAGE P.
FCM LETTER
JENKS, OK
74037
JUL 15, 20
AMOUNT
$6.95
R2304M110574-0

Danny Rosencutter
Rosencutter Bros., Inc.
Creek County Landfill
PO Box 1597
Sapulpa, OK 74067

7-16

74067@1597 B009

APPENDIX C

GENERAL PROVISIONS

APPENDIX C-1

GENERAL PROVISIONS

ODEQ APPLICATION FORM

APPLICATION TO MODIFY FOR A SOLID WASTE DISPOSAL FACILITY PERMIT

Date: **FEBRUARY 26, 2020** County: **CREEK**

Send to:

Solid Waste Permitting Unit
Waste Management Division
Dept. of Environmental Quality
707 N. Robinson (PO Box 1677)
Oklahoma City, OK 73101-1677

FOR DEQ USE

DEQ Log No. _____
No. Copies _____

Date Received: _____

DANNY ROSENCUTTER proposes to establish, construct, operate, and maintain
(Applicant's Name)
the **CREEK COUNTY LANDFILL**, located at
(Facility Name)
10250 S 33RD W Ave Tulsa, OK 74132

(Exact legal description:
SW/C NW/4 28-T-18N-R12E located in Creek County Oklahoma

metes & bounds, platted lot, or land survey. Append extra sheets if necessary)

in **CREEK** County, Oklahoma, and hereby make application for a modification of existing permit **3519020** as required by **Oklahoma Solid Waste Management Act** and Rules pursuant thereto.

Brief description of application: Landfill operations of C&D materials consisting of nonhazardous household trash, construction and demolition debris, yard and green waste, roofing materials and other non-hazardous type waste. This is a modification of the existing landfill.

Applicant or Authorized Agent:

Signature

Danny Rosencutter
Typed Name

Address: **10250 S 33RD W AVE**
City: **JENKS** State: **OK**

Date signed: 2-24-2020

Phone: **918-299-3755**

Preparing Engineer:

Signature

Joe Ramey
Typed Name

Address: **6533 E 11st ST**
City: **TULSA** State: **OK**

Date signed: 2-26-2020

Phone: **918-836-0021**

VERIFICATION[1]

STATE OF OKLAHOMA)
) ss
COUNTY OF CREEK)

Danny Rosencuter, of lawful age, being first duly sworn, upon oath state that I have read the foregoing APPLICATION FOR A PERMIT, that I am familiar with the matters set forth therein, and that the same are true to the best of my information and belief.

Applicant

Subscribed and sworn to before me this 26 day of February 2020, by Danny Rosencutter (Applicant or legal representative).

Jennifer Sanchez
Notary Public

My commission expires:

02/19/2024

JENNIFER SANCHEZ
NOTARY PUBLIC
Commission # 20002006
My Commission Expires 02-19-2024
STATE OF OKLAHOMA

[1] This Verification is required for a Tier III application.

APPENDIX C-2

GENERAL PROVISIONS

WARRANTY DEED

85

WARRANTY DEED

THIS INDENTURE, Made this 4 day of April, 2015 between Mike O'Brien and Glenda Jean O'Brien, husband and wife, party of the first part, and Rosencutter Bros., Inc., party of the second part.

WITNESSETH, That in consideration of the sum of $10.00 DOLLARS, the receipt of which is hereby acknowledged said party of the first part does, by these presents, grant, bargain, sell and convey unto said party of the second part, its successors, heirs, executors or administrators, all of the following described real estate, situated in the County of Creek, State of Oklahoma, to-wit:

A tract of land located in the Southeast Quarter of the Northwest Quarter of Section 28, Township 18 North, Range 12 East, of the Indian Base and Meridian, Creek County, Oklahoma more particularly described as follows,
Beginning at the Southeast Corner of the SE/4 of the NW/4, said point being a 3/8" Iron Pin Found in Place, also being the True Point of Beginning,
Thence N 01°03'34"W along the East line of the SE/4 of the NW/4 a distance of 1322.03 feet to the Northeast-Corner thereof, Thence S 88°49'51" W along the North line of the SE/4 NW/4 a distance of 452.24 feet, Thence S 01°03'34" E. parallel to the East line of the SE/4 NW/4 a distance of 1001.85 feet, Thence S 44°44'34" E a distance of 254.08 feet, Thence S 56°21'20 E a distance of 238.21 feet to a point on the South line of the SE/4 NW/4, Thence N 88°50'35" E along the South line of the SE/4 NW/4 a distance of 80 .92 feet to the point of beginning,

containing 12.50 acres m/l TO HAVE AND TO HOLD THE SAME, together with all and singular the tenements, hereditaments and appurtenances thereto belonging or in any wise appertaining forever.

And said party of the first part, its successors or assigns, do hereby covenant, promise and agree to and with said party of the second part at the delivery of these presents they are lawfully seized in their own right of an absolute and indefeasible estate of inheritance in fee simple, of and in all singular the above granted and described premises , with the appurtenances : that the same are free, clear, and discharged and unencumbered of and from all former and other grants, titles, charges, estates, judgments , taxes, assessmentsand encumbrances, of whatsoever nature and kind.

And that said party of the first part will WARRANT and FOREVER DEFEND the same unto said party of the second part their successors, heirs, executors or administrators, against said party of the first part, their successors or assigns, and all and every person or persons whomsoever , lawfully claiming or to claim the same.

IN WITNESS WHEREOF, The said party of the first part hereto has caused these presents to be signed the year and day first above written.

M. L O'B

Michael O'Brien

Glenda Jean O'Brien

Glenda Jean O'Brien

I-2015-004855 Bk 0970 Pg 332
04/08/2015 9:40 amPg 332-332
Fee: $ 13 00 Doc $ 0.00
Jennifer Mortazavi - Creek County Clerk
State of Oklahoma

STATE OF OKLAHOMA
COUNTY OF CREEK
Before me, a Notary Public in and for this state on this 8 day of April, 2015, Personally appeared Michael O'Brien and Glenda Jean O'Brien, husband and wife, to me known to be the identical person(s) who executed the foregoing instrument, and acknowledged to me that they executed the same as their free and voluntary act and deed for the use and purposes therein set forth.

Ruth Golden

Notary Public

Tax Exempt interfamily conveyance

RUTH GOLDEN
NOTARY PUBLIC
IN AND FOR
STATE OF
OKLAHOMA
COMMISSION # 11000814

APPENDIX C-3

GENERAL PROVISIONS

ACCESS EASEMENT

TEMPORARY EASEMENT FOR ACCESS

Pursuant to the Oklahoma Environmental Quality Code (27A O.S. §2-1-101 *et seq.*, including the Solid Waste Management Act, the rules promulgated thereunder, and in accordance with the conditions and requirements of Permit No. 351920, issued by the Oklahoma State Department of Health, the predecessor in interest to the Oklahoma Department of Environmental Quality (DEQ) on February 19, 2020 , Rosencutter Bros, Inc. , (his/her heirs and assigns) (its successors and assigns), hereinafter referred to as Grantor, does hereby grant unto the DEQ, including its contractors, employees, and its successors and assigns, the right of access for purposes of performing closure, post-closure monitoring, or corrective action in the event of default by the owner or operator. The Easement is granted over and across the following described land, situated in Creek County, State of Oklahoma:

Tract 1 (the permitted area): (legal description of permitted area), more particularly described as the permitted area of Creek County landfill, Oklahoma Department of Environmental Quality Permit Number 351920 ; and

Tract 2 (the borrow area): *Legal description of site: 10250 S 33 rd W Avenue, Creek County Oklahoma, SWC NW/4 28-T-18N-R12E located in Creek County Oklahoma

This Temporary Easement for Access is given subject to the following conditions:

1. The Grantor hereby grants unto the DEQ an easement and right-of-way over and across Tract 1, above set out, for access to said Tract 1 for the purposes of conducting closure and post-closure activities and/or corrective action as prescribed by the laws of the State of Oklahoma and Rules of the DEQ;

2. The Grantor hereby grants unto the DEQ an easement and right-of-way over and across Tract 2, above set out, for access to said Tract 2 for the purposes of utilizing borrow material while performing closure and post-closure activities and/or corrective action as prescribed by the laws of the State of Oklahoma and Rules of the DEQ;

3. This Easement is temporary and shall become null and void upon certification by the DEQ that post-closure and/or corrective action has been properly completed.

This Easement shall be binding upon the heirs, successors and assigns of the parties hereto.

IN WITNESS WHEREOF, the Grantor has hereunto set (his/her/its) hand this 19th day of February 2020.

Danny Rosencutter, CEO
(Name, Title)

ACKNOWLEDGMENT

STATE OF OKLAHOMA)
) SS:
COUNTY OF CREEK)

Before me, the undersigned, a Notary Public within and for said County and State, on this 26 day of February 2020 , personally appeared Danny Rosencutter, CEO to me known to be the identical person who executed the within and foregoing instrument, and acknowledged to me that (he/she) executed the same as (his/her) free and voluntary act and deed, for the uses and purposes therein set forth.

Witness my hand and official seal the date above written.

Jennifer Sanchez
Notary Public

My commission expires:

02/19/2024

JENNIFER SANCHEZ
NOTARY PUBLIC
Commission # 20002006
My Commission Expires 02-19-2024
STATE OF OKLAHOMA

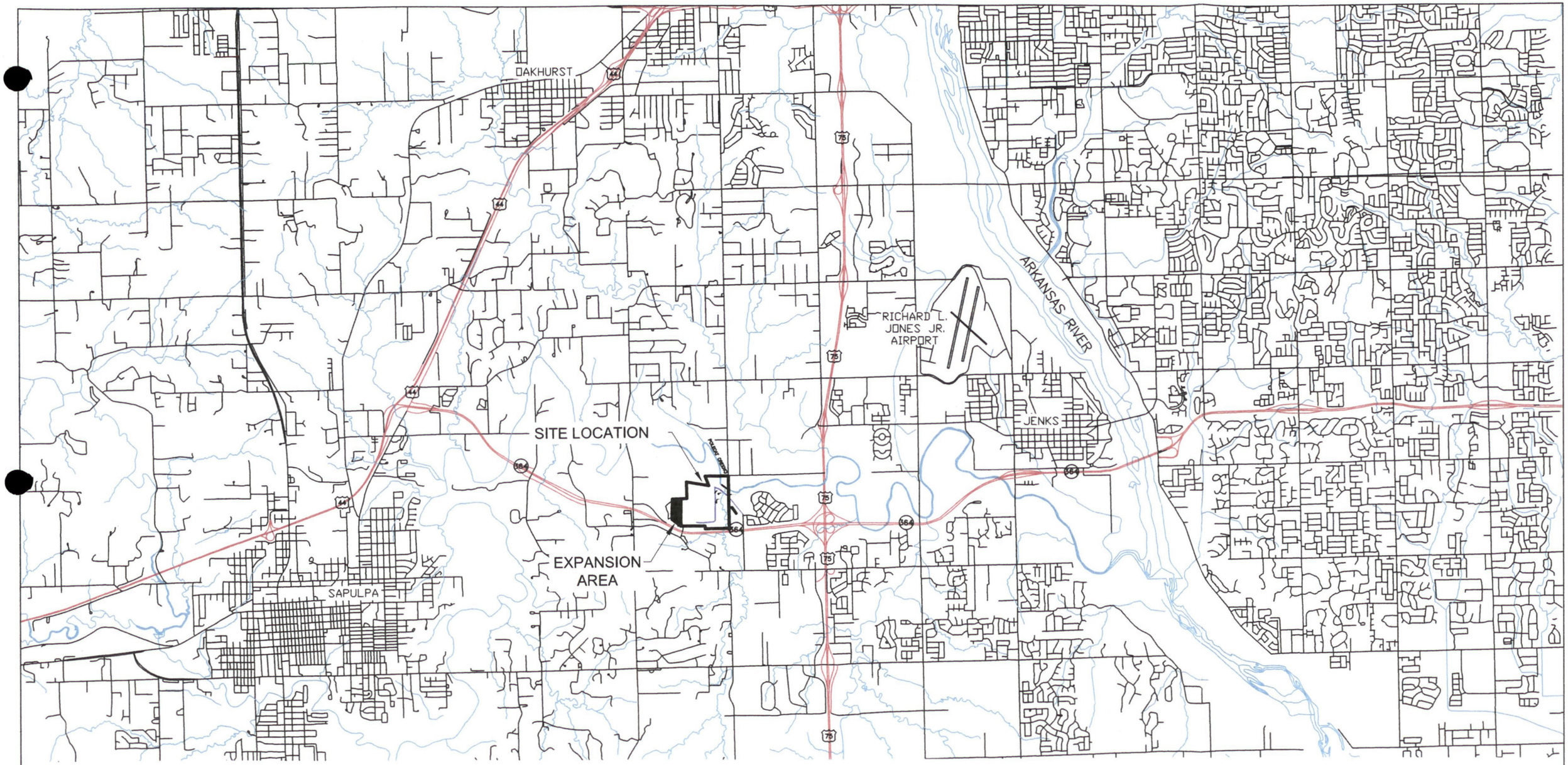
***Legal description of site:** 10250 S 33rd W Avenue, Creek County Oklahoma,
SW/C NW/4 28-T-18N-R12E located in Creek County Oklahoma

A tract of land located in the Southeast Quarter of the Northwest Quarter of Section 28, Township 18 North, Range 12 East, of the Indian Base and Meridian, Creek County, Oklahoma more particularly described as follows, Beginning at the Southeast Comer of the SE/4 of the NW/4, said point being a 3/8" Iron Pin Found in Place, also being the True Point of Beginning

Thence N 01 ^{0}03'34"W along the East line of the SE/4 of the NW/4 a distance of 1322.03 feet to the Northeast-Corner thereof, Thence S 88 ^{0}49'51 " W along the North line of the SE/4 NW/4 a distance of 452.24 feet, Thence S 01 ^{0}03'34 " E. parallel to the East line of the SE/4 NW/4 a distance of 1001.85 feet, Thence S 44^{c} 44^{1}34" E a distance of 254.08 feet, Thence S 56^{0}21 '20 E a distance of 238.21 feet to a point on the South line of the SE/4 NW/4, Thence N 88^{0}50'35" E along the South line of the SE/4 NW/4 a distance of 80 .92 feet to the point of beginning,

APPENDIX D

PERMIT DRAWINGS



LEGEND:

PROPTERY BOUNDARY

EXPANSION AREA

N

SCALE:

0 0.5 1 MILES

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Compiled from U.S. Geological Survey, National Geospatial Technical Operations Center.

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14537
OKLAHOMA
7/7/2020

JOE B.
RAMEY, P.E.

The CAREL CORPORATION

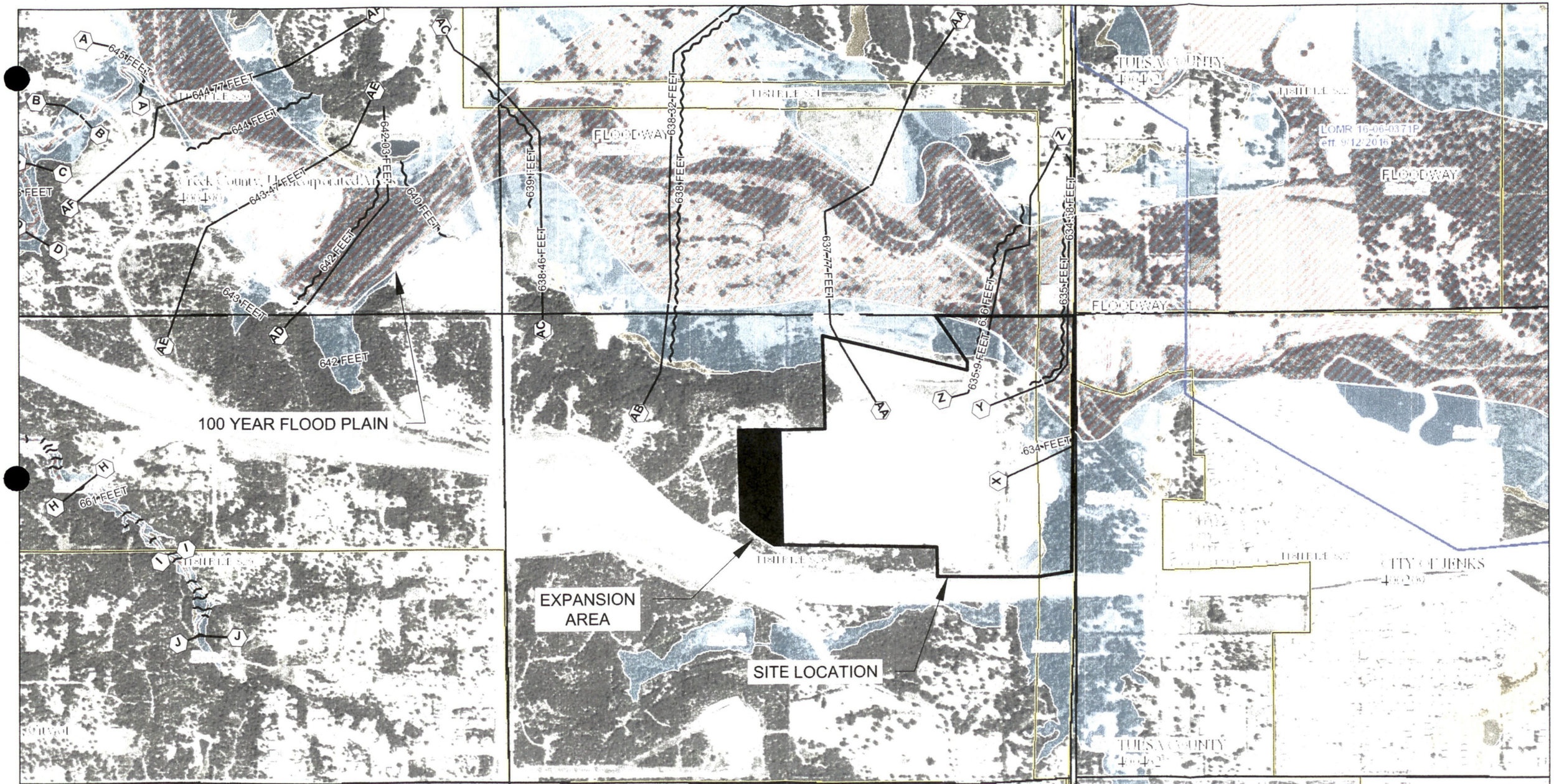
136 Pecan Street, Keller, TX 76248

SITE LOCATION MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

DRAWING 1



N

SCALE:

0 500 1000

FEET

FLOOD HAZARD INFORMATION

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
  - Zone A, V, A99
  - With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee
- Area with Flood Risk due to Levee Zone D

OTHER AREAS

- NO SCREEN — Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood HazardZone D

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall
- B 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- Base Flood Elevation Line (BFE)

OTHER FEATURES

- Limit of Study
- Jurisdiction Boundary

NOTES:

1. Flood Insurance Rate Map Published by the Federal Emergency Response Management Agency, Creek County, Oklahoma 2009

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14537
OKLAHOMA
7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

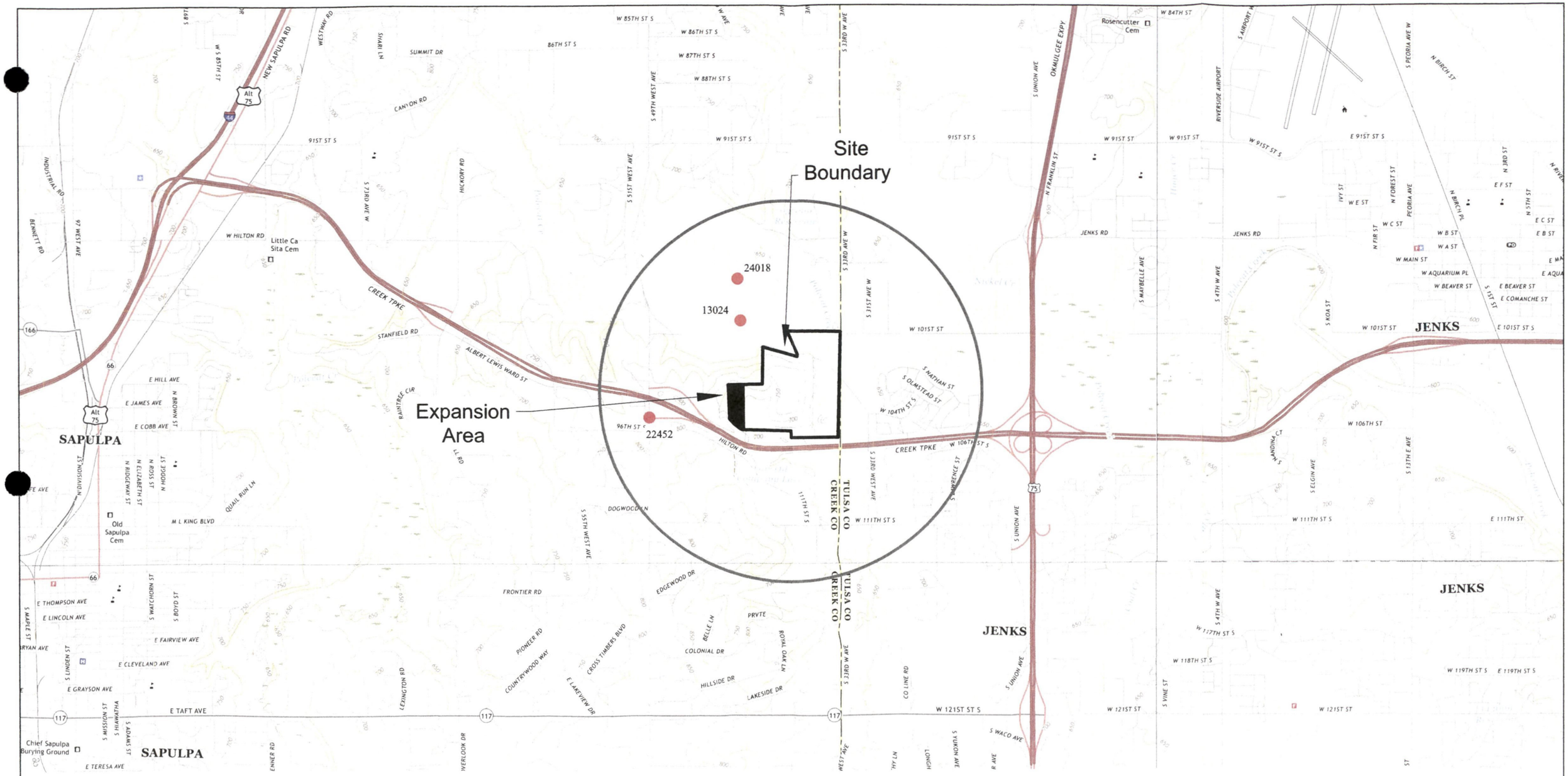
136 Pecan Street, Keller, TX 76248

FLOOD PLAIN MAP`

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

DRAWING 2



LEGEND:

PROPTERY BOUNDARY

24018 WATER WELLS

N

SCALE:

0 0.25 0.5 MILES

NOTES:

1. USGS Quadrangle North Sapulpa, South Sapulpa, Jenks, and Brixby 2018..
2. Water Well locations obtained from the Oklahoma Water Resources Board, 2020.

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
OKLAHOMA
7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

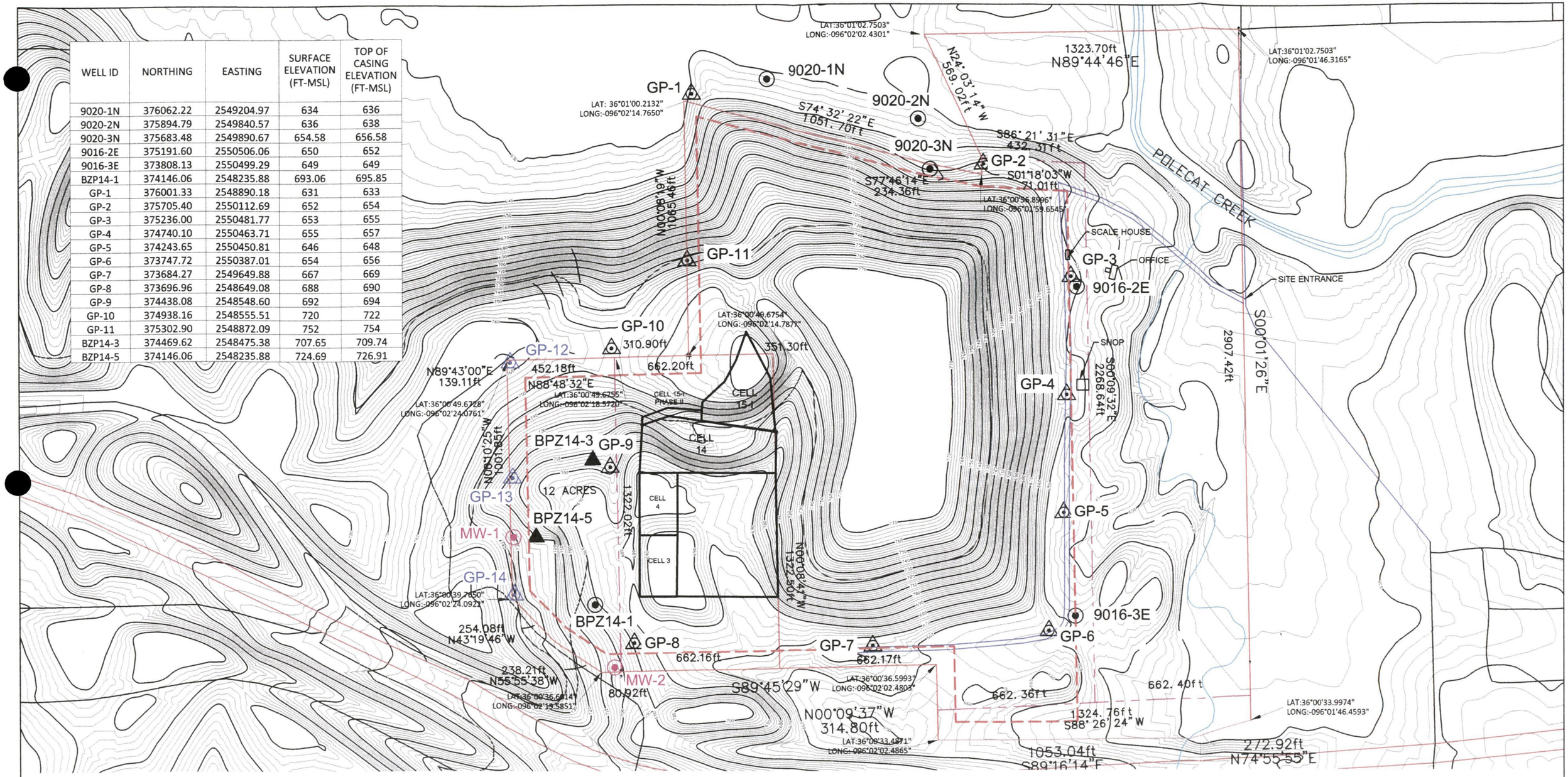
QUADRANGLE TOPOGRAPHIC MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

DRAWING 3

WELL ID	NORTHING	EASTING	SURFACE ELEVATION (FT-MSL)	TOP OF CASING ELEVATION (FT-MSL)
9020-1N	376062.22	2549204.97	634	636
9020-2N	375894.79	2549840.57	636	638
9020-3N	375683.48	2549890.67	654.58	656.58
9016-2E	375191.60	2550506.06	650	652
9016-3E	373808.13	2550499.29	649	649
BZP14-1	374146.06	2548235.88	693.06	695.85
GP-1	376001.33	2548890.18	631	633
GP-2	375705.40	2550112.69	652	654
GP-3	375236.00	2550481.77	653	655
GP-4	374740.10	2550463.71	655	657
GP-5	374243.65	2550450.81	646	648
GP-6	373747.72	2550387.01	654	656
GP-7	373684.27	2549649.88	667	669
GP-8	373696.96	2548649.08	688	690
GP-9	374438.08	2548548.60	692	694
GP-10	374938.16	2548555.51	720	722
GP-11	375302.90	2548872.09	752	754
BZP14-3	374469.62	2548475.38	707.65	709.74
BZP14-5	374146.06	2548235.88	724.69	726.91



N

SCALE:

0 200 400 FEET

LEGEND:

- PROPTERY BOUNDARY
- PERMIT BOUNDARY
- BUFFER
- ACCESS ROAD
- GROUNDWATER MONITOR WELL
- GAS MONITORING PROBE
- PROPOSED GROUNDWATER MONITOR WELL
- PIEZOMETER
- PROPOSED GAS MONITORING PROBE

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .
3. Gas probe locations via Google Earth
4. Gas probe Top of Casing estimated.

REGISTERED PROFESSIONAL ENGINEER JOE B. RAMEY 14597 OKLAHOMA

7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

SITE PLAN

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

DRAWING 4

CELL 14-I

CELL 4

CELL 3

FUTURE CELL

CELL 15-I PHASE II

LIMIT OF WASTE

Perimeter Berm

Perimeter Ditch

Exterior Berm

50' Buffer

2%

3%

3:1

2:1

668'

667'

666'

665'

664'

663'

662'

661'

660'

659'

658'

657'

656'

655'

760

750

740

730

720

690

700

LEGEND:

- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER

N

SCALE:

0 50 100 FEET

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER JOE B. RAMEY 14597 OKLAHOMA

7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

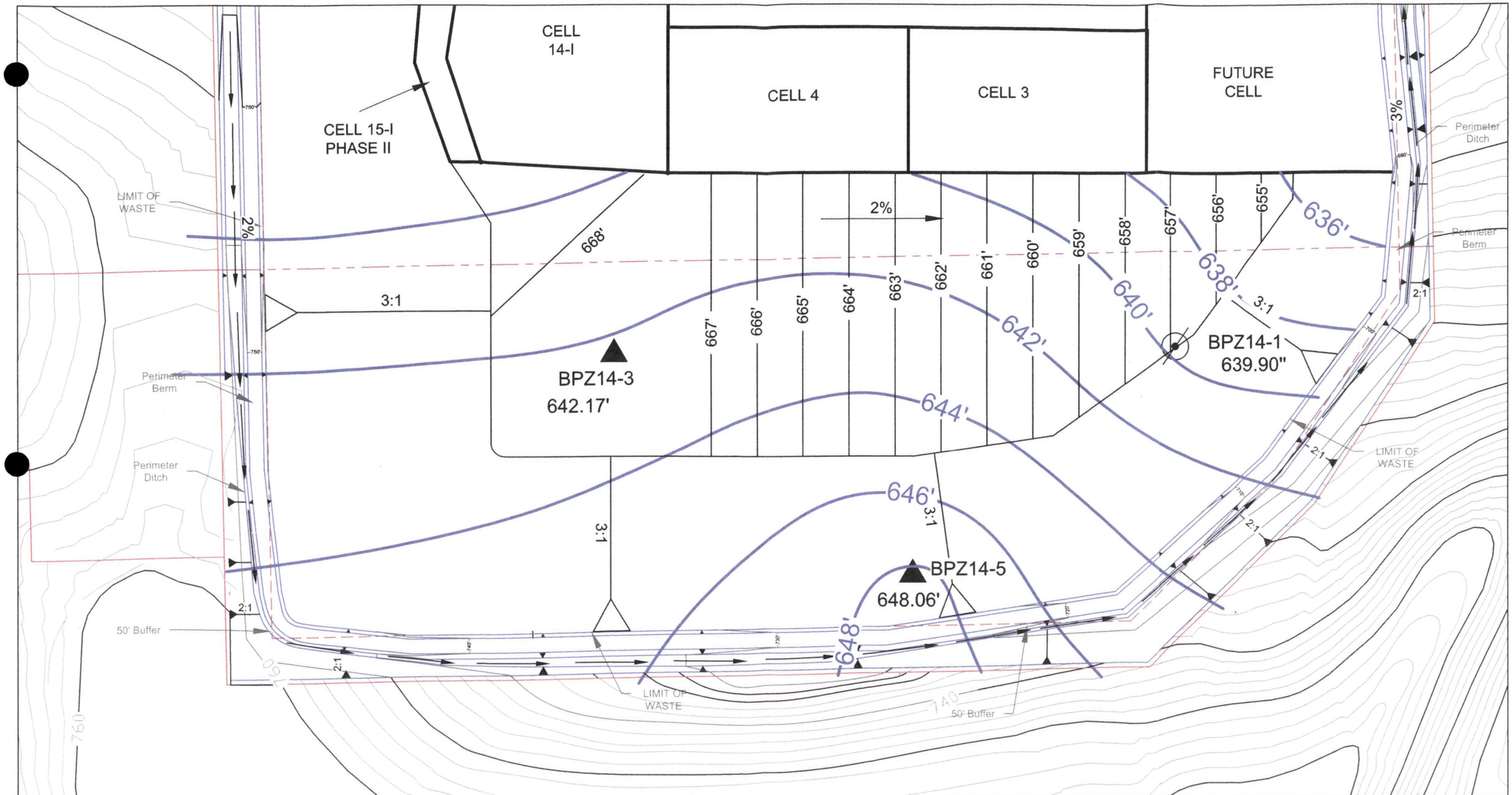
EXCAVATION PLAN AND TOP OF IN-SITU LINER

CREEK COUNTY LANDFILL

SAPULPA, OKLAHOMA

DATE DRAFTED: May 6, 2020

DRAWING 5



LEGEND:
- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER

SCALE: 0 50 100 FEET

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER JOE B. RAMEY 14597 OKLAHOMA 7/17/2020

JOE B. RAMEY, P.E.

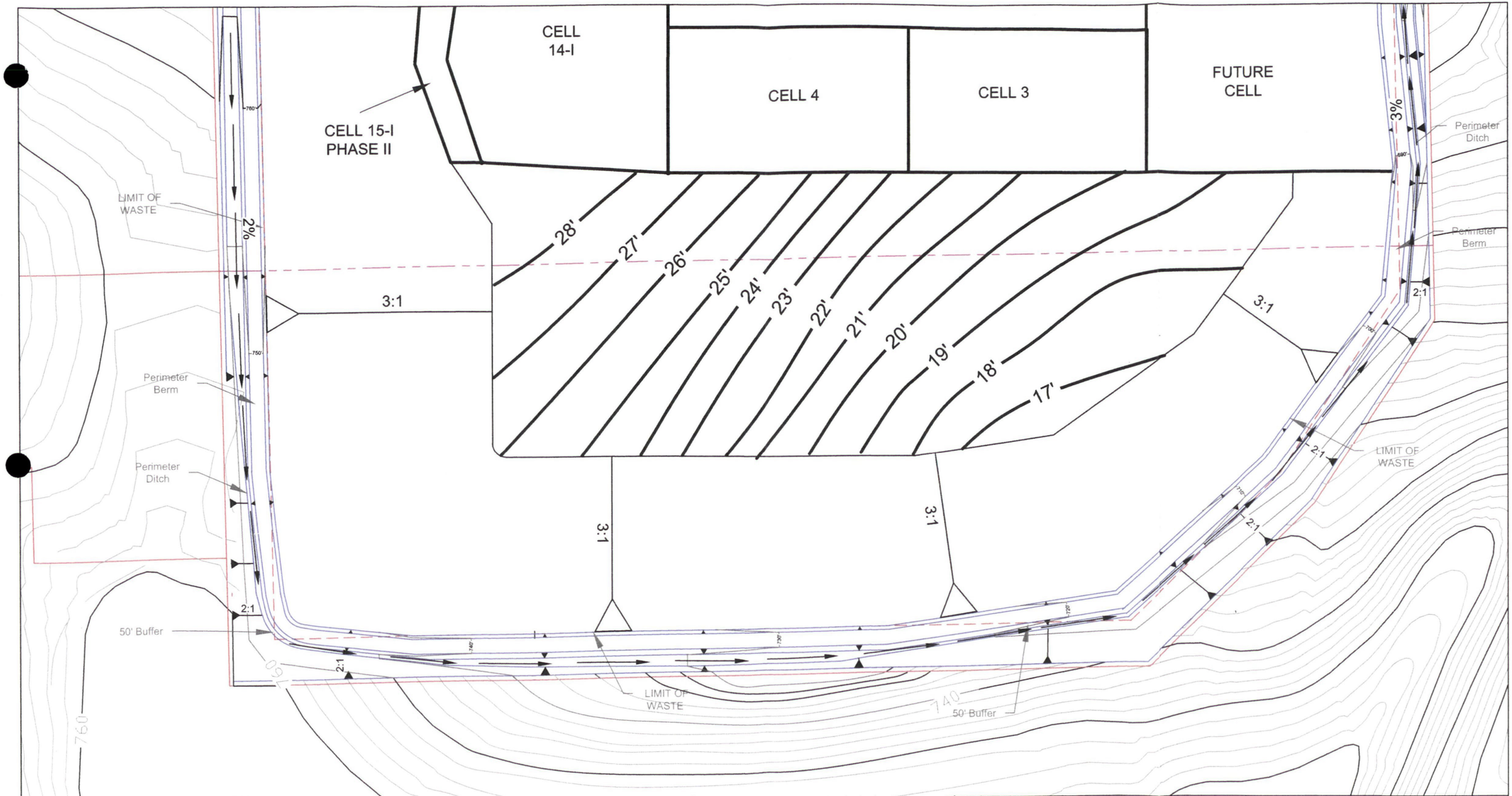
The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

EXCAVATION PLAN WITH HIGHEST GROUNDWATER CONTOURS

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

DRAWING 5A



N

SCALE:

0 50 100 FEET

LEGEND:

- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER JOE B. RAMEY 14597 OKLAHOMA

7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

ISOPACH MAP BETWEEN HIGHEST GROUNDWATER AND IN-SITU LINER

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: JULY 5, 2020

DRAWING 5B

Exterior Berm

Perimeter Ditch

Perimeter Berm

760'

750'

740'

730'

720'

710'

700'

690'

A 2

760'

3% Slope Minimum

Expansion Area

4:1 Slope

2:1

A 1

A 1

Perimeter Berm

INNER 25' DRAINAGE DITCH

Perimeter Ditch

2:1

LIMIT OF WASTE

2:1

APPROXIMATE LIMITS OF WASTE

750'

740'

730'

720'

2:1

50' Buffer

OUTER 10' DRAINAGE DITCH

2:1

LIMIT OF WASTE

A 2

50' Buffer

N

SCALE:

0 50 100 FEET

LEGEND:

- PROPERTY BOUNDARY
- DITCH FLOWLINE
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
OKLAHOMA

2/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

FILL CROSS-SECTION LOCATION MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: June 25, 2020

DRAWING 6

NORTH

SOUTH

FINAL COVER

SOUTH LIMIT OF EXPANSION AREA

GROUND SURFACE

NORTH LIMIT OF EXPANSION AREA

IN-SITU LINER

Elevation (ft)

760 740 720 700 680 660 640

0 200 400 600 800 1,000 1,200 1,400

Distance Along Baseline (ft)

SCALE:
FEET

20 10 0

0 50 100

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
OKLAHOMA

7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

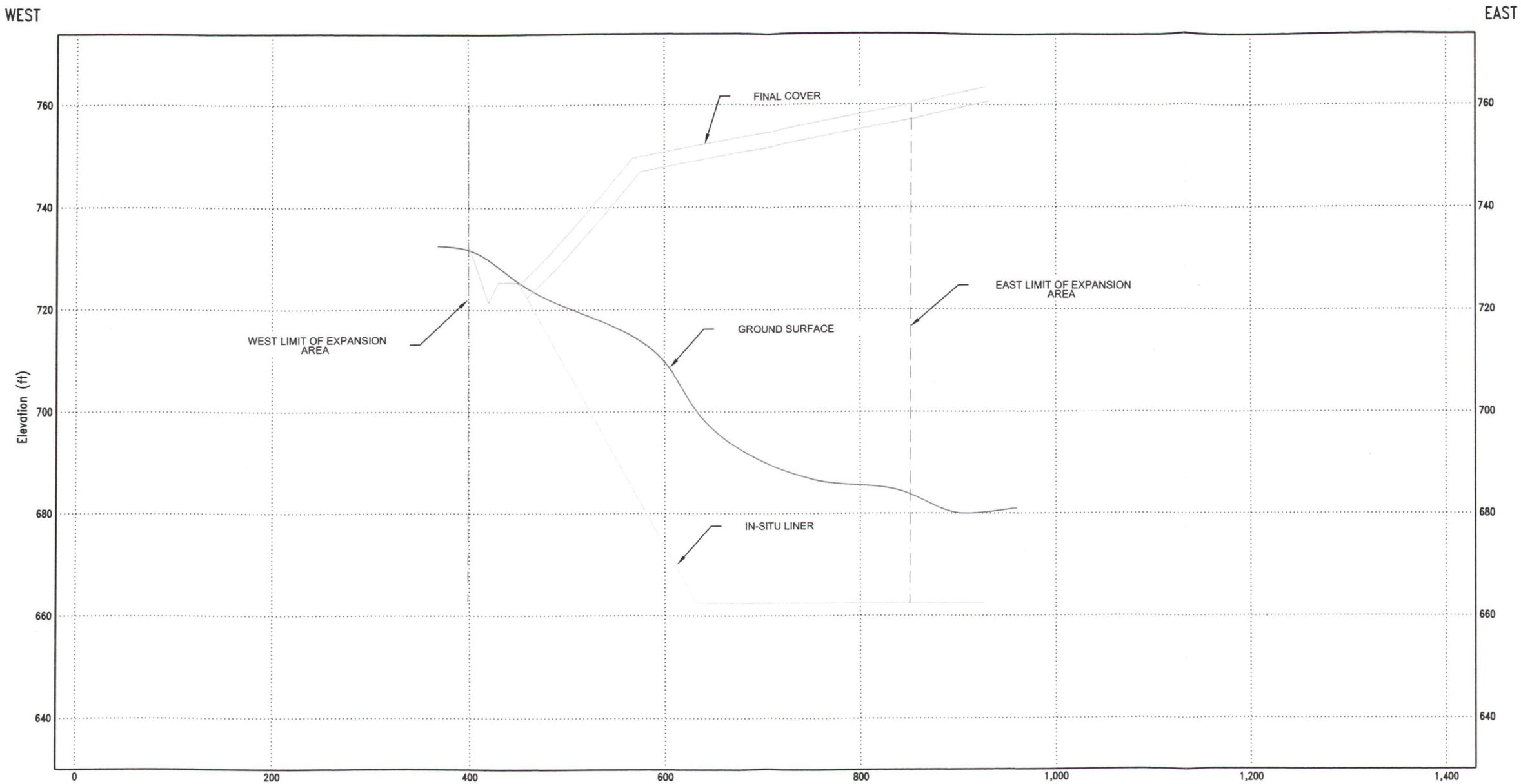
136 Pecan Street, Keller, TX 76248

FILL CROSS-SECTIONS A1

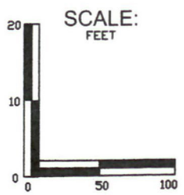
CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: May 13, 2020

DRAWING 6A



SCALE:
FEET



NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
7/17/2020
OKLAHOMA

JOE B. RAMEY, P.E.

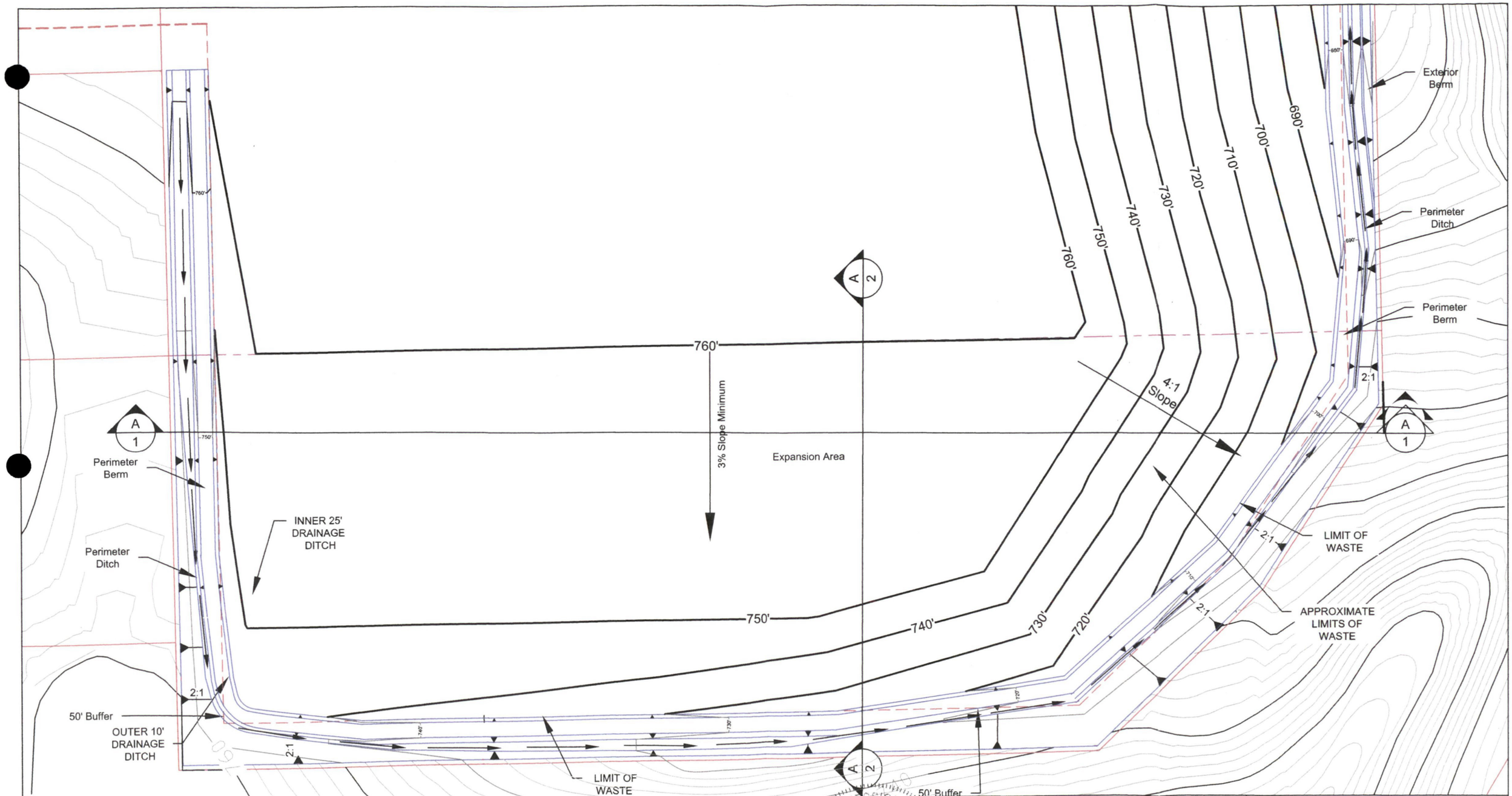
The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

FILL CROSS-SECTION A2

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: June 25, 2020

DRAWING 6B



N

SCALE:

0 50 100 FEET

LEGEND:

- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER
- PROPOSED MONITOR WELL

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

REGISTERED PROFESSIONAL ENGINEER JOE B. RAMEY 14597 OKLAHOMA 7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

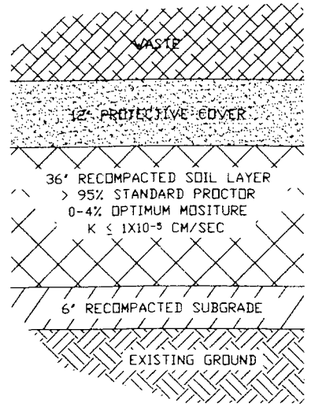
COMPLETION MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

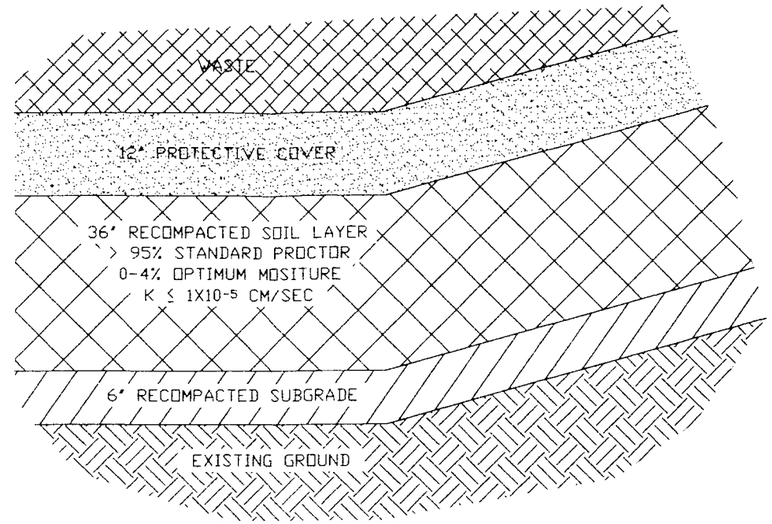
DATE DRAFTED: JULY 5, 2020

DRAWING 7

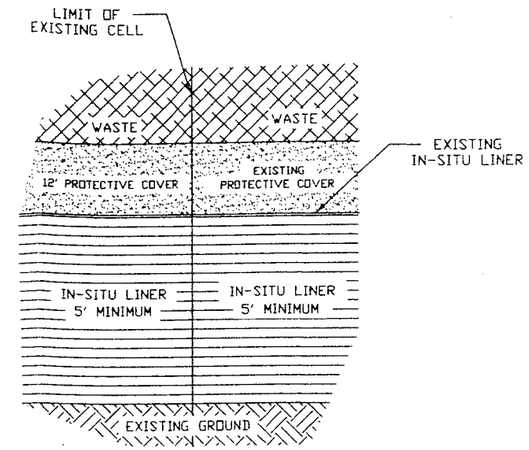
A / 8 — IN-SITU LINER
NOT TO SCALE



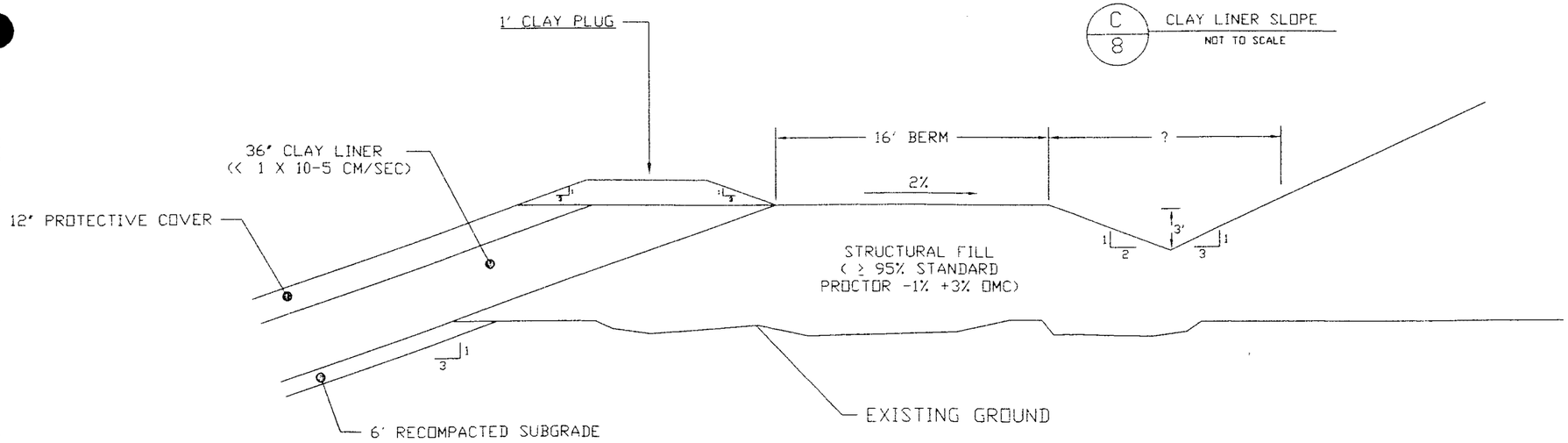
B / 8 — CLAY LINER
NOT TO SCALE



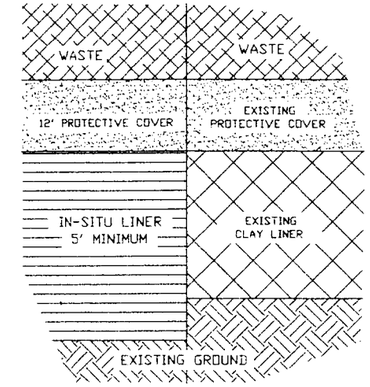
C / 8 — CLAY LINER SLOPE
NOT TO SCALE



D / 8 — IN-SITU - IN-SITU LINER TIE-IN
NOT TO SCALE



E / 8 — TOP OF SLOPE / BERM DETAIL
NOT TO SCALE



F / 8 — IN-SITU - RECOMPACTED LINER TIE-IN
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
7/21/20
OKLAHOMA

JOE B. RAMEY, P.E.

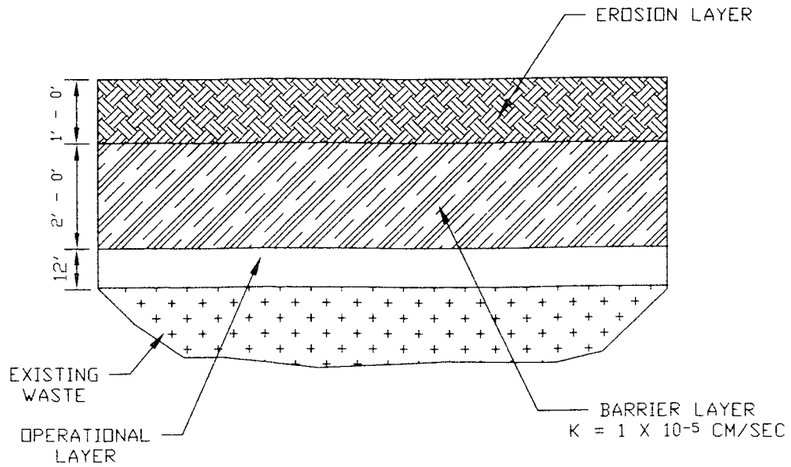
The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

LINER DETAILS

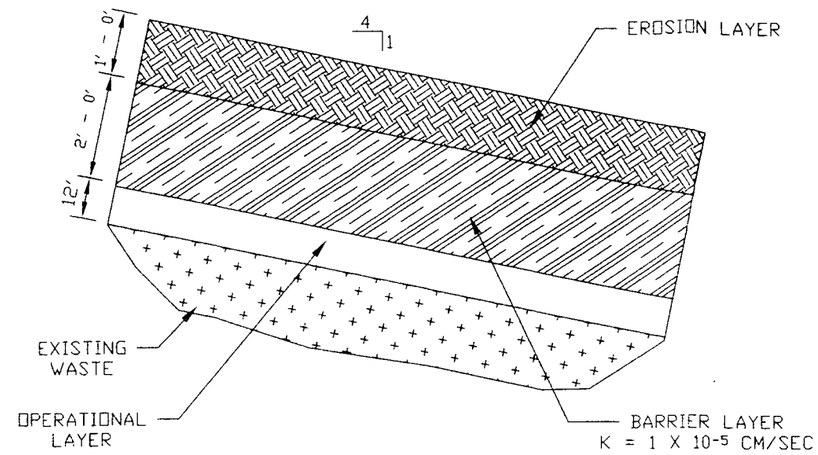
CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: JULY 5, 2020

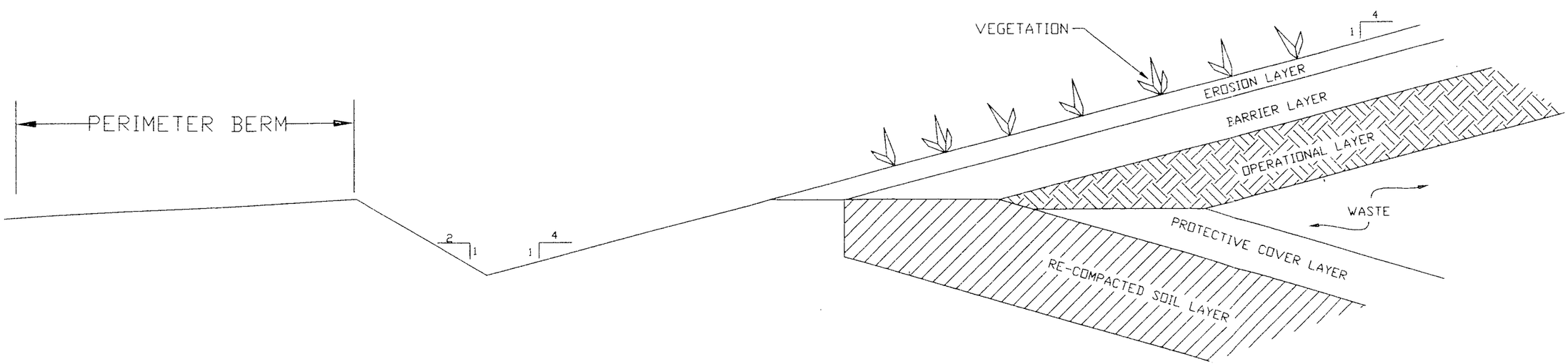
DRAWING 8



G / 9 FINAL COVER - TOP OF SLOPE
NOT TO SCALE



H / 9 FINAL COVER - SIDE SLOPE
NOT TO SCALE



I / 9 FINAL COVER SYSTEM TERMINATION LANDFILL PERIMETER
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
7/17/2020
OKLAHOMA

JOE B. RAMEY, P.E.

The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

FINAL COVER DETAILS

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

DRAWING 9

APPENDIX E

LOCATION DEMONSTRATION DOCUMENTATION

Fite, Edward

From: kevin.carel@thecarelcorporation.com
Sent: Tuesday, May 12, 2020 9:57 AM
To: Fite, Edward
Subject: EXTERNAL: Proposed Landfill Expansion in Creek County Oklahoma

Mr. Fite,

Per our conversation last Friday, I am writing to seek a determination as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31 regarding a proposed landfill expansion. The determination involves a 12 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County. The ODEQ regulation states the following: "*no area within the permit boundary of a new solid waste disposal facility, or expansion of the permit boundary of an existing solid waste disposal facility, shall be located within the drainage basin of any river designated under the Oklahoma Scenic Rivers Commission Act.*" Please review the location and provide this determination as required by the ODEQ. Thank you.

Kevin T. Carel, P.G.

O - 817-337-0112 C - 817-991-7370

The CAREL CORPORATION

Grand River Dam Authority - Scenic Rivers Operations has no comments on this project(s).

5/12/2020

Vice President Date

Attachment E-1

Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK

"kevin.carel@thecarelcorporation.com" [kevin.carel@thecarelcorporation.com]

Sent: 4/18/2020 11:11 AM

To: ""archsurvey@ou.edu"" <archsurvey@ou.edu>

I am writing to seek a determination as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31 regarding a proposed landfill expansion. The determination involves an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County and is outlined in red on the attached drawing.

The ODEQ regulation states the following: "*no area within the permit boundary of a new solid waste disposal facility, or expansion of the permit boundary of an existing solid waste disposal facility, shall be located within one-half mile of any area formally dedicated and managed for public recreation or natural preservation by a federal, state, or local government agency*". Please review the attached drawing and provide this determination as required by the ODEQ.

If you have any questions or need additional information please contact me at Kevin.Carel@TheCarelCorportion.com or at (817) 991-7370.

Kevin T. Carel, P.G.

O - 817-337-0112 C - 817-991-7370

The CAREL CORPORATION

Attachments: Figure 1 Creek County Expansion.pdf

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Attachment E-2a

Oklahoma Archeological Survey
THE UNIVERSITY OF OKLAHOMA

May 27, 2020

The Carel Corporation
Attn: Kevin Carel
136 Pecan Street
Keller, TX 76248

Re: OAS FY20-1943 The Carel Corporation Proposes Lateral Expansion of the Creek County Landfill. Legal Description: SE ¼ NW ¼ SW ¼ Section 28, T18N, R12E, Creek County, Oklahoma.

Dear Mr. Carel:

The Community Assistance Program staff of the Oklahoma Archeological Survey has reviewed the above referenced project in order to identify areas that may potentially contain prehistoric or historic archeological materials (historic properties). The location of your project has been crosschecked with the state site files containing approximately 26,000 archaeological sites, which are currently recorded for the state of Oklahoma. No Sites are listed as occurring within your project area, and based on the topographic and hydrologic setting, no archaeological materials are likely to be encountered. Thus, an archaeological field inspection is not considered necessary. Please contact this office at (405) 325-7211 if buried archaeological materials such as chipped stone tools, pottery, bone, historic crockery, glass, metal items or building materials are exposed during construction activities.

This environmental review and evaluation is done in cooperation with the State Historic Preservation Office, Oklahoma Historical Society. The responsible federal agency or their official delegate must also have a letter from that office to document consultation pursuant to Section 106 of the National Historic Preservation Act.

In addition to our review comments, under 36CFR Part 800.3 you are reminded of your responsibility to consult with the appropriate Native American tribe/groups to identify any concerns they may have pertaining to this undertaking and potential impacts to properties of traditional and/or ceremonial value.

Sincerely,

Kary L. Stackelbeck

Kary L. Stackelbeck, Ph.D.
State Archaeologist

: ksw
cc: SHPO

111 Chesapeake, Room 102, Norman, Oklahoma 73019-5111, PHONE: (405) 325-7211, FAX (405) 325-7604
A UNIT OF ARTS AND SCIENCES SERVING THE PEOPLE OF OKLAHOMA

Re: [External] OklaTravel Feedback Form Submitted

"Eve Atkinson" [Eve.Atkinson@travelok.com]

Sent: 4/29/2020 8:05 PM

To: ""kevin.carel@thecarelcorporation.com"" <kevin.carel@thecarelcorporation.com>

Cc: ""Susan Henry"" <Susan.Henry@travelok.com>

Mr. Kevin Carel,

This area is close to a Golf Club on the north and trails in a neighborhood to the east around a couple of ponds for flood detention. The golf Club may not be operating because the club house parking lot looks cracked and the course appears over grown. The following is a link I found with Google dated 2015. http://golfoklahoma.org/clary-fields-to-close-at-end-of-october/ The old golf course is in the section north of section 28.

Clary Fields to close at end of October - GOLF OKLAHOMA

By Ken MacLeod. Clary Fields Golf Course in Sapulpa will close at the end of October, owner D.W. Kang said Thursday. Clary Fields, located in a valley just off the Creek Turnpike about five minutes from Highway 75, opened in 2000 with intentions of competing as a privately-owned course in the mid to upscale daily fee market.

golfoklahoma.org

The neighborhood trails to the east are a about 3/4th miles from the existing landfill. There is also a neighborhood park located in the South County area in the Southern Reserve development, located at Latitude 36.0125, long. -96.0231. These areas are in section 27-T18N-R12E in the N 1/2.
There are known public recreation areas in the type of records we keep. We only keep records of State Parks and the Land and Water Conservation Fund and Recreational Trails Fund. However, check with the City of Jenks and the City of Sapulpa and City of Tulsa Planning Departments.

I have attached a map of the relevant area with notations of features. This is as a courtesy to facilitate communication and illustrate general areas.

Based on the general locations you provided and the information we have regarding the location of the types of parks mentioned above RTP and LWCF, your project proposal will have no significant adverse impact on any federally funded park or recreation area or state park, regarding the LWCF Act 54 U.S.C. 200305(f)(3) no land may be permanently used for private or non-outdoor recreation purposes (defined by the program).

Thank you for the opportunity to review your proposal.

Eve Atkinson
Planner II
Oklahoma Department of Tourism and Recreation
900 N. Stiles
Oklahoma City, OK 73104
405.522.9516.
Eve.Atkinson@travelok.com

Message: I am writing to seek a determination regarding a proposed landfill expansion area as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31. The determination involves an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The

subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County.

The ODEQ regulation states the following: "no area within the permit boundary of a new solid waste disposal facility, or expansion of the permit boundary of an existing solid waste disposal facility, shall be located within one-half mile of any area formally dedicated and managed for public recreation or natural preservation by a federal, state, or local government agency" Please provide this determination as required by the ODEQ.

If you have any questions or need additional information please contact me at Kevin.Carel@TheCarelCorportion.com or at (817) 991-7370.

Attachments: Creek Turnpike area -Neighborhood pool and park.JPG Sapulpa area Landfill.JPG

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Attachment E-2b

WILDLIFE CONSERVATION COMMISSION

Bruce Mabrey, CHAIRMAN
Robert S. Hughes II, VICE CHAIRMAN
Leigh Gaddis, SECRETARY
James V. Barwick, MEMBER
Bill Brewster, MEMBER
John D. Groendyke, MEMBER
Rick Holder, MEMBER
John P.Zelbst, MEMBER

J. KEVIN STITT, GOVERNOR
J.D. STRONG, DIRECTOR

DEPARTMENT OF WILDLIFE CONSERVATION

P.O. Box 53465 Oklahoma City, OK 73152 (405) 521-3851

April 20, 2020

Kevin Carel
The Carel Corporation
817-991-7370

Re: Proposed Lateral Expansion of the Creek County Landfill, ODEQ 3519020

Dear Mr. Carel:

This letter is written in response to your request for information regarding an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa, Oklahoma. Based upon the site description provided, there are no species listed as species of state concern which may be at or within one mile of the permit boundary or expansion area.

Please understand that due to time and a personnel constraint, the Oklahoma Department of Wildlife Conservation has not performed an actual field survey of this specific project area; therefore, we can provide only limited site-specific information. The information sent to this office regarding the proposed project has been reviewed and compared against our current records for endangered and threatened species, and our response is based on this review. I will make note that there is a difference between STATE and FEDERALLY listed species. The Oklahoma Department of Wildlife Conservation only oversees STATE listed species, whereas the U.S. Fish and Wildlife Service reserves authority FEDERALLY listed species. For this reason, if you are concerned about species of federal interest, we urge you to consult with the Tulsa Ecological Service Office of the U.S. Fish and Wildlife Service (918-581-7458), as they may have additional information of which we are unaware.

We appreciate the opportunity to review this project and submit comments. If you have any questions, or if I can be of any assistance, please contact me at either (580)762-2248 or ashley.nealis@odwc.ok.gov.

Sincerely,
Ashley Nealis
North Central Region Fisheries Supervisor
Oklahoma Department of Wildlife Conservation
417 S. Silverdale Lane
Ponca City, OK 74604

Attachment E-3a

We manage and protect fish and wildlife, along with their habitats, while also growing our community of hunters and anglers, partnering with those who love the outdoors, and fostering stewardship with those who care for the land.

RE: Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK

"Fagin, Todd D." [tfagin@ou.edu]

Sent: 4/21/2020 2:20 PM

To: ""kevin.carel@thecarelcorporation.com"" <kevin.carel@thecarelcorporation.com>

Mr. Carel,

I have checked the Oklahoma Natural Heritage Inventory database for the occurrence of relevant species in the vicinity of the provided location. Whereas the DEQ regulations state within a 1, our database search typically reflects occurrences within 5 miles of a project location. The occurrence listed on the attached report was approximately 1.5 miles due east of the provided location.

Thank you,

Todd Fagin

Oklahoma Natural Heritage Inventory/
Oklahoma Biological Survey

Resent-From: <lara.souza@ou.edu>
From: kevin.carel@thecarelcorporation.com
Date: April 18, 2020 at 11:13:14 AM CDT
To: "lara.souza@ou.edu" <lara.souza@ou.edu>
Subject: Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK

I am writing to seek a determination as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31 regarding a proposed landfill expansion. The determination involves an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County and is outlined in red on the attached drawing.

The ODEQ regulation states the following: "*a statement from the Oklahoma Department of Wildlife Conservation (ODWC) and from the Oklahoma Biological Survey (OBS), shall be submitted regarding current information about endangered or threatened wildlife or plant species listed in state and federal laws, that exist within one mile of the permit boundary or expansion area*". Please review the attached drawing and provide this determination as required by the ODEQ.

If you have any questions or need additional information please contact me at Kevin.Carel@TheCarelCorportion.com or at (817) 991-7370. Thank you.

Kevin T. Carel, P.G.

O - 817-337-0112 C - 817-991-7370

Attachment E-3b

OBS Ref. 2020-206-BUS-CAR

Dear Mr. Carel, Apr. 18, 2020

We have reviewed occurrence information on federal and state threatened, endangered or candidate species, as well as non-regulatory rare species and ecological systems of importance currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 28-T18N-R12E, Creek County

We found 1 occurrence(s) of relevant species within the vicinity of the project location as described.

Species Name	Common Name	Federal Status
Haliaeetus leucocephalus	**Bald Eagle**	**Protected**
County	***TRS***	***Count***
Tulsa	Sec. 27-T18N-R13E	1

Additionally, absence from our database does not preclude such species from occurring in the area.

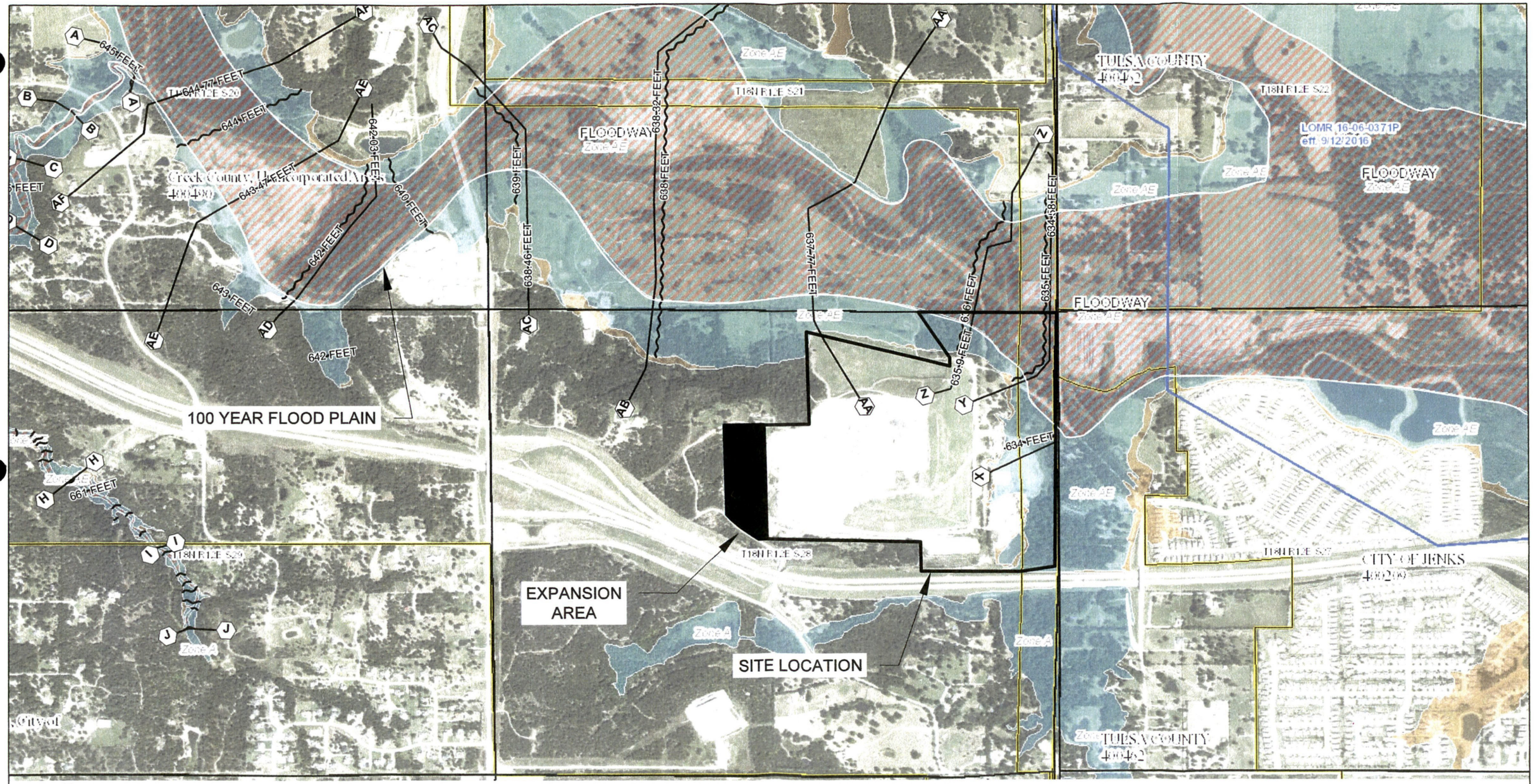
If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following links helpful.

ONHI, guide to ranking codes for endangered and threatened species:
http://vmpincel.ou.edu/heritage/ranking_guide.html

Information regarding the Oklahoma Natural Areas Registry:
http://www.oknaturalheritage.ou.edu/registry_faq.htm

Todd Fagin
Oklahoma Natural Heritage Inventory
(405) 325-4700
tfagin@ou.edu



N

SCALE:

0 500 1000

FEET

FLOOD HAZARD INFORMATION

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) — Zone A, V, A99; With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee — See Notes, Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS

- NO SCREEN — Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood HazardZone D

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall
- B 20.2 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- Base Flood Elevation Line (BFE)

OTHER FEATURES

- Limit of Study
- Jurisdiction Boundary

NOTES:

1. Flood Insurance Rate Map Published by the Federal Emergency Response Management Agency, Creek County, Oklahoma 2009

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

FLOOD PLAIN MAP`

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

ATTACHMENT E-4

Public Water Supply Wells in Creek County, OK

"Mark Stasyszen" [Mark.Stasyszen@deq.ok.gov]

Sent: 4/27/2020 12:56 PM

To: ""kevin.carel@thecarelcorporation.com"" <kevin.carel@thecarelcorporation.com>

Cc: ""Travis Archer"" <Travis.Archer@deq.ok.gov>

Dear Mr. Carel,

As we discussed this morning, according to Oklahoma Department of Environmental Quality (DEQ) records, there are no community public water supply wells within 2 miles of Section 28, T 18 N, R 12 E near Sapulpla in Creek County, OK. This determination was made based on the best information available through the DEQ ARC GIS Web Application and the Oklahoma Water Resources Board (OWRB) website. Please let me know if there's anything further I can do to assist.

Thank you,

Mark Stasyszen, P.E., Engineering Manager
PWS Engineering and Enforcement Section
mark.stasyszen@deq.ok.gov | (405) 702-8245

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Attachment E-5a

Proposed Sapulpa Landfill Expansion

"Byron Waltman" [Byron.Waltman@owrb.ok.gov]

Sent: 4/27/2020 11:49 AM

To: ""Kevin.Carel@TheCarelCorportion.com"" <Kevin.Carel@TheCarelCorportion.com>

Cc: ""Kent Wilkins"" <Kent.Wilkins@owrb.ok.gov>

Mr. Carel,

Per our conversation, there does not appear to be either 1) a public water supply surface water intake within 1 mile or 2) a public water supply well within 2 miles of the area described in your email. However, the area is close to a floodplain within the unincorporated city limits of Sapulpa. If you have not already done so, please contact the city floodplain administrator Bill Smith at 918-224-2924 for any determinations involving the floodplain. Feel free to contact me with any questions you may have.

You may view both the public water supply and floodplain information on our website at the following address.
https://owrb.maps.arcgis.com/apps/webappviewer/index.html?id=d735090843144751b7373a9b5b8db3bc

Thank You,

Byron Waltman

P. Byron Waltman | Water Resources Geologist
OKLAHOMA WATER RESOURCES BOARD
405.530.8800 • owrb.ok.gov • Facebook • Twitter

OKLAHOMA

Inquiry ID (copy to response form): 100
Name: Kevin Carel
Question/Comment: I am writing to seek a determination regarding a proposed landfill expansion area as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31. The determination involves an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County and is outlined in red on the attached drawing. The ODEQ regulation states the following: "no new waste management or disposal areas of a solid waste disposal facility shall be located within: (1) one mile upgradient of an existing public water supply surface water intake, or one that is permitted for construction when a complete application has been filed with the DEQ; or (2) a one year time of travel of a public water supply well. A wellhead delineation shall be performed and submitted to the DEQ if one has not already been performed." Please provide this determination as required by the ODEQ. If you have any questions or need additional information please contact me at Kevin.Carel@TheCarelCorportion.com or at (817) 991-7370.

Attachment E-5b

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RE: Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK

"Robert Petitt" [rpetitt@cityofsapulpa.net]

Sent: 4/20/2020 8:59 AM

To: ""Kevin Carel"" <kevin.carel@thecarelcorporation.com>

Good Morning.

The City of Sapulpa currently does not have or operate any publicly owned water wells. We are strictly a surface water system, and we pull off of Skiatook Lake and Sahoma Lake.

I hope this is what you were looking for, however, if you need anything else, please feel free to contact me.

Robert Petitt
City of Sapulpa
Water Treatment Plant
PO Box 1130
Sapulpa, OK 74067
Phone: 918/224-5006
Fax: 918/227-5123

From: Kevin Carel [mailto:kevin.carel@thecarelcorporation.com]
Sent: Saturday, April 18, 2020 9:27 AM
To: rpetitt@cityofsapulpa.net
Subject: Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK

I am writing to seek a determination regarding a proposed landfill expansion area as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31. The determination involves an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County and is outlined in red on the attached drawing.
The ODEQ regulation states the following: *"If any new waste management or disposal areas will be located within two miles of a public water supply well, a wellhead protection area shall be identified".* I would appreciate it if you could please review the attached drawing and let me know if the City of Sapulpa has any public water supply wells within a two mile radius y the ODEQ.
If you have any questions or need additional information please contact me at Kevin.Carel@TheCarelCorportion.com or at (817) 991-7370.

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Attachment E-5c

SWT-2020-257; Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK (UNCLASSIFIED)

"Hoffmann, Robert B CIV USARMY CESWT (USA)" [Robert.B.Hoffmann@usace.army.mil]

Sent: 5/13/2020 3:31 PM

To: ""kevin.carel@thecarelcorporation.com"" <kevin.carel@thecarelcorporation.com>

Mr. Carel,

Our office reviews proposed projects for the placement of dredge or fill material pursuant to Section 404 of the Clean Water Act (CWA) into waters of the United States (WOUS). If a proposed project requires the placement of dredge or fill material into a WOUS, then a permit would be required from our office. WOUS includes certain rivers, streams, wetlands, impoundments, etc. When a request for Corps jurisdiction, per Section 404 of the CWA, over potential wetlands is needed, the attached form needs to be completed. Additionally, a preliminary waters and wetlands delineation needs to be performed for the subject area. These are usually completed by an environmental consultant company. I have included a link of consultant's from our website. This list is provided as a courtesy to the general public without endorsement, recommendation, or certification of any the listed consultants or their work products. Consultants listed herein appear at their request.

https://www.swt.usace.army.mil/Missions/Regulatory/Wetlands/

If a Department of the Army permit should be required, please see the following permit application link:

https://www.swt.usace.army.mil/Missions/Regulatory/Applications/

If you have any further questions, please just let me know.

Respectfully,

Rob Hoffmann
U.S. Army Corps of Engineers
Regulatory Project Manager
2488 East 81st Street
Tulsa, OK 74137-4290
Office: (918) 669-7481

http://www.swt.usace.army.mil/Missions/Regulatory.aspx

-----Original Message-----
From: noreply@dma.mil [mailto:noreply@dma.mil]
Sent: Tuesday, April 21, 2020 8:17 AM
To: Pawlik, Eugene A Jr CIV USARMY CEHQ (USA) <Eugene.A.Pawlik@usace.army.mil>
Subject: USACE website Contact Form: Proposed Lateral Expansion of the Creek County Landfill, ODEQ Permit No. 3519020, Sapulpa, OK

This message was sent from the USACE website website.

Message From: Kevin Carel

Email: kevin.carel@thecarelcorporation.com

Response requested: Yes

Message:

I am writing to seek a determination about wetlands as required by the Oklahoma Department of Environmental Quality regulation 252:515-5-31. The determination involves an 11.63 acre tract of land located immediately adjacent to the Creek County Landfill in Sapulpa Oklahoma. The subject property is located in portions of the Southeast ¼ of the Northwest 1/4 and the west 1/2 of the Southwest 1/4 Section 28, T 18 N, R 12 E, in Creek County.

The ODEQ regulation states the following: "no new waste management or disposal areas of a solid waste disposal facility shall be located in wetland areas as designated by the Oklahoma Conservation Commission." Please provide this determination as required by the ODEQ. It should be noted that the subject property is enrolled in the Oklahoma Corporation Commission Brownfield Program and a portion of the site has been excavated to remediate a historic oilfield reserve pit. Documentation can be provided if necessary.

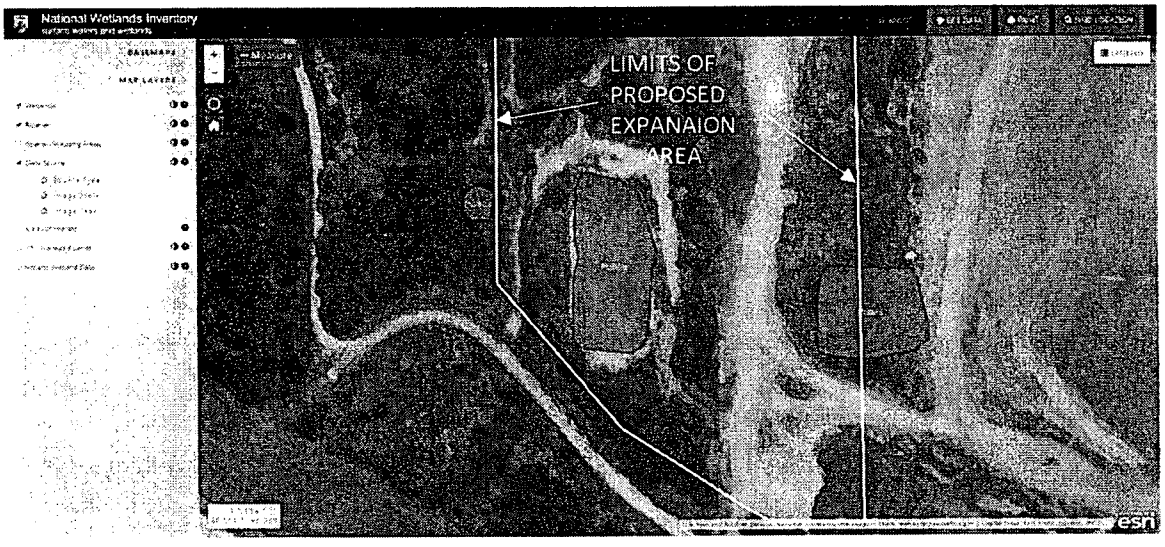
June 11, 2020
Project Number 20-04-23

Danny Rosencutter
Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74067

Re: Wetlands Evaluation; Creek County Landfill; Sapulpa, Oklahoma.

Dear Mr. Rosencutter:

Per your request, The Carel Corporation conducted a review of the United States Fish and Wildlife Service's current National Wetlands Inventory (NWI) Map for the proposed Creek County Landfill expansion area. The wetlands and deep-water habitats on the NWI map were photo interpreted using 1:58,000 scale, color infrared imagery from 1981. A portion of the map is provided below with the expansion area superimposed. Based on this map, three potential wetlands are illustrated.



The western most area is identified as a 0.03 acre freshwater pond habitat classified as a PUSCx. PUSCx are potential non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. The "x" modifier is used to identify potential wetlands or channels that were excavated by humans. This area is outside of the proposed expansion area and is a former crude oil sludge pit that has been remediated by the oil operation company.

The central potential wetland area is identified as a 0.47 acre freshwater pond habitat and is classified as a PUBFx. This area is also a former crude oil sludge pit. It was remediated by excavation through the Oklahoma Corporation Commission Brownfield Program in 2018, see

136 Pecan Street, Keller, Texas 76248
Telephone: 817.337.0112 ● Facsimile: 817.337.0041

Brownfield documentation in Attachment 1. Since excavating and backfilling the area it no longer exhibits the characteristics of a wetland and should not be considered as such.

The eastern most area is identified as a 0.34 acre freshwater pond habitat and is also classified as PUBFx. This area straddles the proposed expansion area and the current landfill permit area. This area was assessed in 2000 as part of a prior lateral expansion of the landfill by the United States Department of Agriculture (USDA) and no wetlands were identified, see documentation provided in Attachment 2. The assessment by the USDA was performed by an on-site inspection of the area by a District Conservationist and is considered more reliable than photo interpretation of older aerial imagery. As such, the eastern PUBFx area should not be considered a wetland.

We appreciate the opportunity to provide you with this service. Please call if you have any questions.

Sincerely,
THE CAREL CORPORATION

Kevin T. Carel, P.G.
President

Attachment 1: Brownfield Correspondence
Attachment 2: Wetlands Correspondence

ATTACHMENT 1

BROWNFIELD DOCUMENTATION

BOB ANTHONY
Commissioner

TODD HIETT
Commissioner

DANA MURPHY
Commissioner

OKLAHOMA
CORPORATION COMMISSION
P.O. BOX 52000
OKLAHOMA CITY, OKLAHOMA 73152-2000

255 Jim Thorpe Building
Telephone: (405) 521-2500
FAX: (405) 522-0757

OIL & GAS CONSERVATION DIVISION

POLLUTION ABATEMENT
Underground Injection Control

March 22, 2018

Danny Rosencutter
Rosencutter Bros., Inc./Creek County Landfill
10250 S. 33rd West Ave.,
Jenks, OK 74037

Re: Creek County Landfill (Site ID: 18509OGDO10111)

Mr. Rosencutter,

Congratulations! Your property located at 10250 S. 33rd West Ave. that has been enrolled in the Oklahoma Corporation Commission (Corp Comm) Brownfield Program is now listed as closed, and no further action is needed at this site. Enclosed is a Certificate of Completion for your property.

According to Brownfield Program rules, when the OCC has approved a No Further Action determination for a site on which remediation activities were performed, a Certificate of Completion shall be issued to the applicant. This Certificate includes environmental liability protection that shields the landowner from prosecution and penalty by the Corp Comm or the EPA for pollution related to OCC-regulated contaminants from the former oil reserve pit located on this site.

In order for this certificate to provide the liability protections guaranteed in the certificate, you must:

1. **file the Certificate of Completion in the office of the Creek County Clerk, located at 317 E. lee Ave., Sapulpa, OK 74066**
2. **and mail a file-stamped copy (or email a scanned PDF) to Corp Comm within 30 days.**

The certificate will state whether or not any continuing care of institutional controls or any long term monitoring of the site is to occur after the issuance of any certificate.

The OCC is pleased to have assisted the landowners with this site.

Sincerely,

Jeff Myers
Brownfields Manager
j.myers@occemail.com
405-522-2764

Form 2006BF
Rev. 2015

Oklahoma Corporation Commission Brownfields Program
CERTIFICATE OF COMPLETION

Site Name: **Creek County Landfill**

Street Address: **10250 S. 33rd Ave.**

Legal Location: **E/2 SE/4 NW/4 Section 28, Township 18N, Range 12E**

City/town (if any): **Jenks** County: **Creek**

Site Size (acres): **12** Institutional Control(s): **Yes**

WHEREAS, The Oklahoma Corporation Commission (Corp Comm) has authority under:

- §27A-1-3-101 E. 1. j. for "spills of deleterious substances associated with facilities and activities specified in paragraph 1 of this subsection or associated with other oil and gas extraction facilities and activities, and
- §27A-1-3-101 E 2. "The exclusive jurisdiction, power and authority of Corp Comm shall also extend to the construction, operation, maintenance, site remediation, closure and abandonment of the facilities and activities described in paragraph 1 of this subsection"; and
- §27A-1-3-101 E 5, petroleum storage tanks.
- The Oklahoma Corporation Commission is a "State program that specifically governs response actions for the protection of public health and the environment" in accordance with SEC. 128 (b) (1) `(A) `(ii) of the Federal Small Business Liability Relief and Brownfields Revitalization Act of 2002 such that
- SEC. 128 (b) (1) `(A) the Federal Government will "not use authority under this Act to take an administrative or judicial enforcement action under section 106(a) or to take a judicial enforcement action to recover response costs under section 107(a) against the person regarding the specific release that is addressed by the response action" for a "response action that is in compliance with the State program"; and

WHEREAS, the Oklahoma Corporation Commission concluded that the remediation planned for this site would suffice under its risk-based remediation/cleanup guidance; and

WHEREAS, the Oklahoma Corporation Commission agrees that the remediation implemented at this site meets applicable Commission rules and standards, and all applicable state and federal laws as determined by Corp Comm; reducing deleterious pollutant concentrations such that the property does not present an unreasonable risk, as determined by Corp Comm, to human health and safety or to the environment based upon the property's proposed use; and

WHEREAS, this certification applies only to conditions caused by pollution with deleterious substances on the property by activities under Corp Comm's jurisdiction, governed by applicable state or federal laws and to applicable rules and standards promulgated by the Oklahoma Corporation Commission that existed at the time of submission of the Brownfields application; and

WHEREAS, the Oklahoma Corporation Commission determined that requirements specified have been successfully completed,

NOW, THEREFORE, in accordance with the Federal Brownfields Revitalization Act [Public Law 107-118 (H.R. 2869)] the Oklahoma Corporation Commission issues this Certificate of Completion to Rosencutter Bros., Inc; dba: Creek County Landfill.

The Certificate is issued in regards to remediation completed for a historic oilfield reserve pit. The land use specified is 100% Commercial (landfill). Institutional controls are required for this property. The groundwater is restricted from use as a potable water source or irrigation source, and subject to the area indicated on page three (3) of this certificate.

The Oklahoma Corporation Commission shall not pursue administrative penalties and civil actions against the applicant, lenders, lessees, and successors and assignees associated with actions taken to remediate the pollution caused by activities and substances regulated by Oklahoma Corporation Commission known at this site. The applicant and all lenders, lessees, and successors and assignees shall not be subject to civil liability with regard to the remedial actions at this site taken by the applicant for environmental pollution caused by activities and substances regulated by Corp Comm if the remedial action was not performed in a reckless or negligent manner. The Certificate of Completion shall remain effective as long as the property is in substantial compliance with Commission rules. The Oklahoma Corporation Commission shall not assess against an applicant administrative penalty or pursue civil action associated with the pollution found to be present and remediated at this site if the applicant is in compliance with Commission rules and guidance during remediation and the applicant is in compliance with any post-certification conditions or requirements specified.

After issuance of the Certificate of Completion, the Oklahoma Corporation Commission shall not assess administrative penalties or pursue civil actions associated with the pollution at this Brownfields site against any lender, lessee, or successor or assignee if the lender, lessee, or successor or assignee is in compliance with any post-certification conditions or requirements as specified in the remediation plan and/or this Certificate. Failure of the applicant and any lenders, lessees, or successors or assigns to materially comply shall render the Certificate of Completion voidable.

In those cases where an applicant conducts a voluntary remediation in conjunction with a party responsible for the pollution, the responsible party may also receive a closure letter from the appropriate Oklahoma Corporation Commission authority for remediation done at this Brownfield Site. An applicant to whom a Certificate of Completion has been issued and such applicant's lenders, lessees, or successors or assignees shall not be subject to civil liability with regard to the remedial actions taken by the responsible party for environmental pollution.

Submission of any false or materially misleading information by the applicant knowing such information to be false or misleading shall render the Certificate of Completion voidable. Except as otherwise provided in this subsection, nothing shall be construed to limit or negate any other rights of any person from pursuing or receiving legal or equitable relief from the applicant or any other person or legal entity causing or contributing to the environmental pollution. The release of liability from administrative penalties and any civil actions authorized by the Brownfields Revitalization Act shall not apply to any environmental pollution and consequences thereof that the applicant causes or has caused outside the scope of the certificate issued by the Oklahoma Corporation Commission, any pollution caused or resulting from any subsequent redevelopment of the property, existing pollution not addressed prior to issuance of the Certificate of Completion, or any person responsible for pollution who has not participated in the voluntary remediation and Corp Comm Brownfields process.

Jeff Myers
Brownfields Manager

3/22/2018
Date

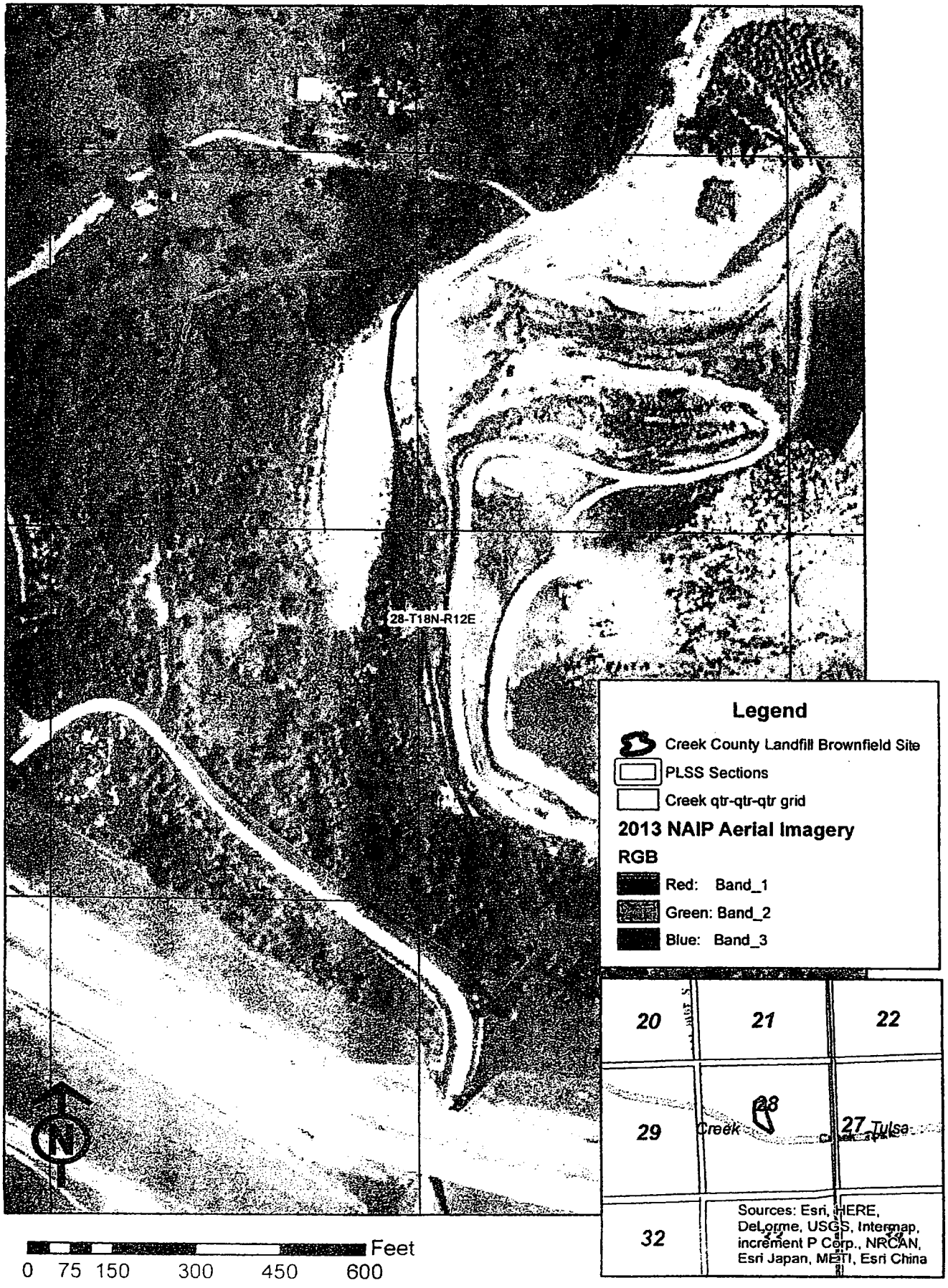
Subscribed and sworn to before me
on this 22nd day of March,
2018

My Commission Expires: July 3, 2020

Debora J. Curry
Notary Public

DEBORA J. CURRY NOTARY # 08006581 EXP. 07/03/20 PUBLIC STATE OF OKLAHOMA

Creek County Landfill Brownfield Site
SE/4 NW/4 Section 28-T18N-R12E



ATTACHMENT 2

WETLANDS DOCUMENTATION

United States Department of Agriculture

Natural Resources Conservation Service

Bristow Field Office
128 E. 3rd
Bristow, OK 74010

(918) 367-2113

October 17, 2000

Mr. Bob Rosencutter
Creek County Landfill
7312 S. Union
Tulsa, OK 74132

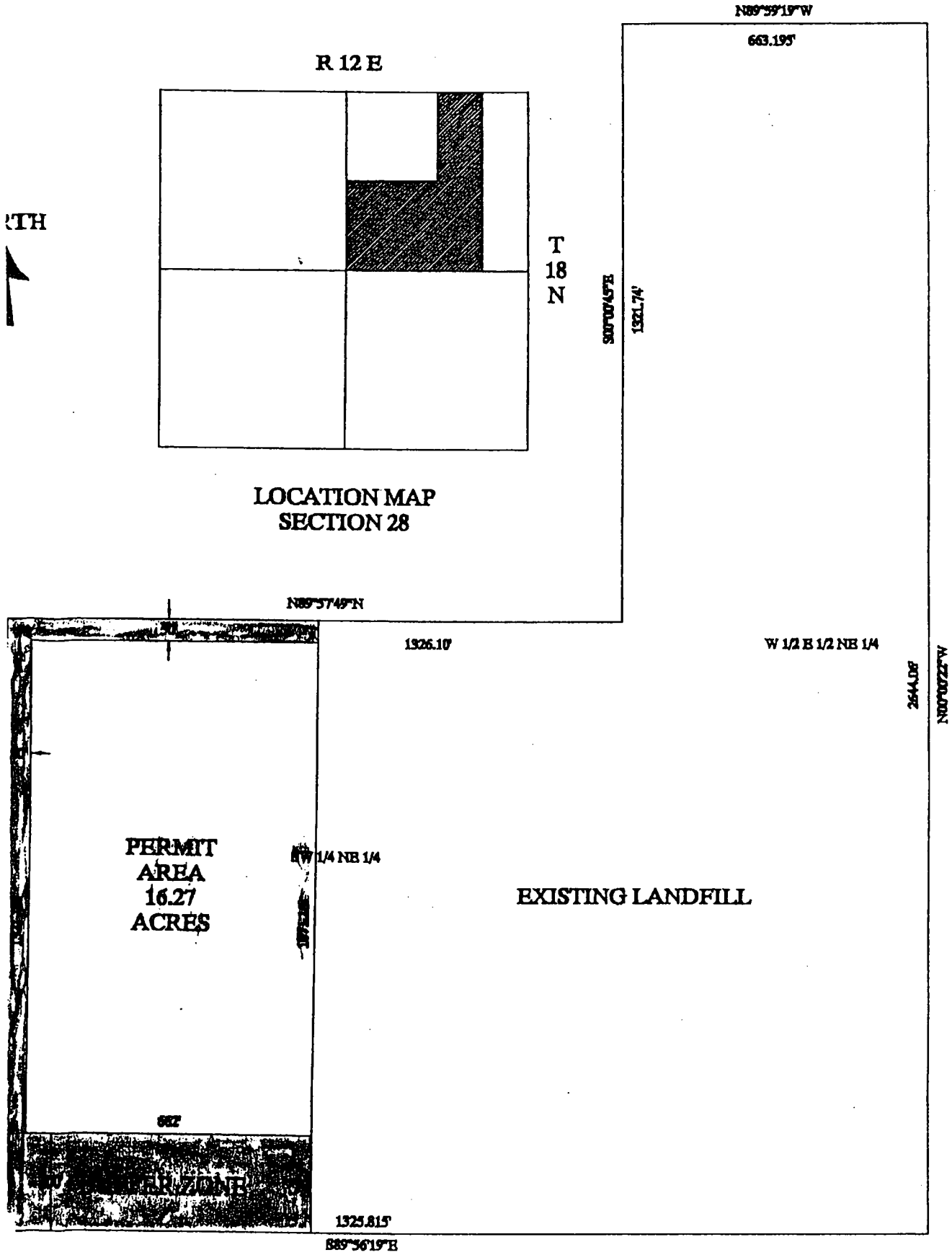
Dear Mr. Rosencutter:

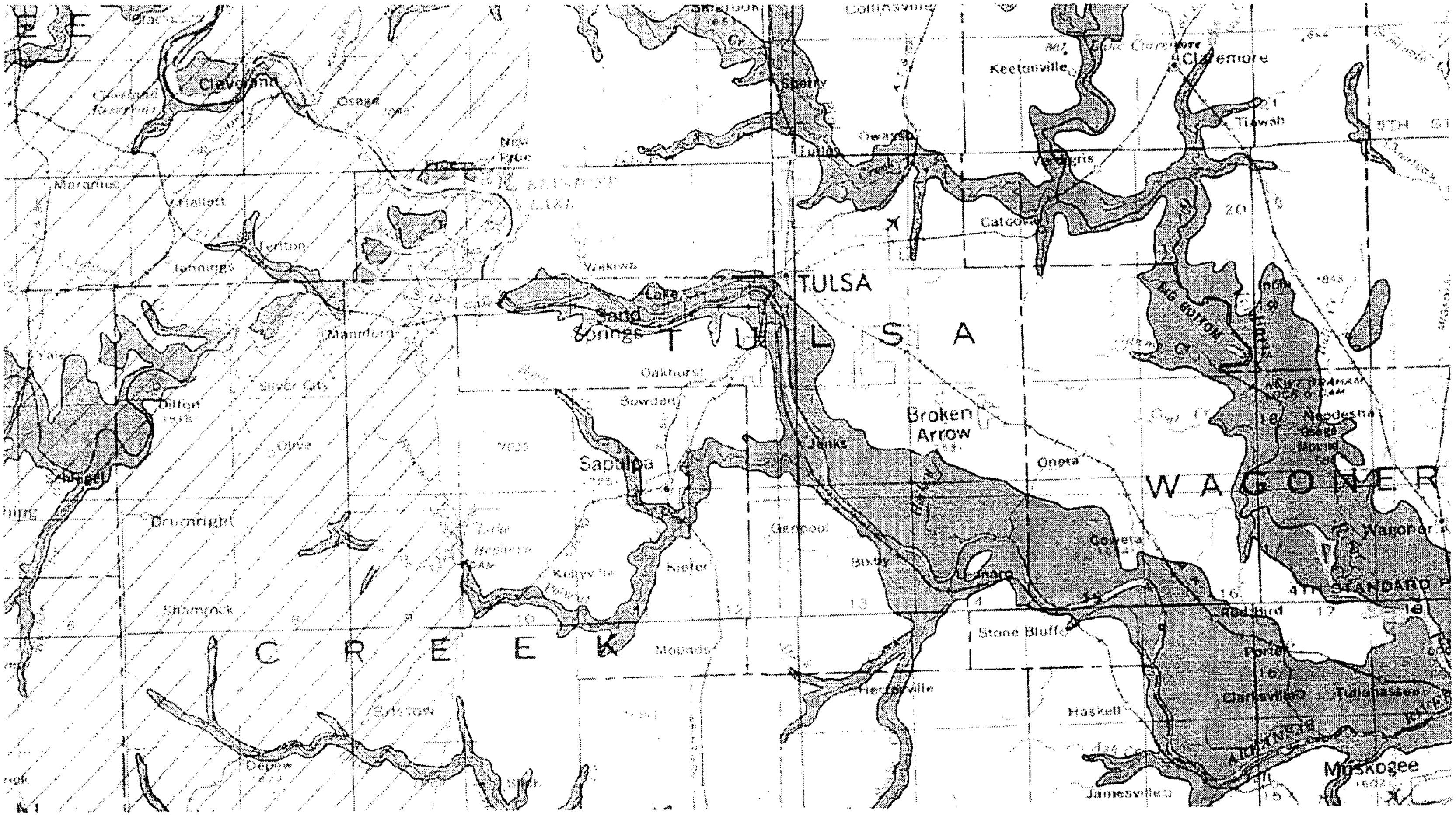
I have examined the area in question (see attached map permit area 16.27 acres) and find no hydric soils on this acreage. This area is not a wetland. If you have further questions please feel free to contact me.

Sincerely,

Ronald Goedecke
District Conservationist

Attachment


N89°59'19"W
663.195'
R 12 E
T
18
N
S00°00'45"E
1321.74'
LOCATION MAP
SECTION 28
N89°57'49"N
1326.10'
W 1/2 E 1/2 NE 1/4
2644.06'
N00°00'22"W
PERMIT
AREA
16.27
ACRES
1/4 NE 1/4
EXISTING LANDFILL
662'
1325.815'
S89°56'19"E



MAP OF AQUIFERS AND RECHARGE AREAS IN OKLAHOMA

Compiled by
Kenneth S. Johnson
Oklahoma Geological Survey
1991

Scale 1:500,000
10 0 10 20 30 40 Miles
10 0 10 20 30 40 50 60 Kilometers

Base map modified from U.S. Geological Survey, 1:500,000 Series, dated 1972

Attachment E-7

7017 1070 0000 6359 0017

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.
OKLAHOMA CITY, OK 73106
OFFICIAL USE

Certified Mail Fee $3.55
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $ $2.85
- Return Receipt (electronic) $ $0.00
- Certified Mail Restricted Delivery $ $0.00
- Adult Signature Required $ $0.00
- Adult Signature Restricted Delivery $ $0.00

Postage $0.55
Total Postage and Fees $6.95

0648
11

Postmark Here

04/22/2020

Doug Schooley, Deputy Director
State of Oklahoma Dept of Mines
2915 N. Classen Blvd., Suite 213
Oklahoma City, OK 73106

See Reverse for Instructions

PS Form 3811, July 2015 PSN 7530-02-000-9053 Domestic Return Receipt

SECTION ON DELIVERY

of Mines

☐ Agent
☐ Addressee

Printed Name) C. Date of Delivery
19

ress different from item 1? ☐ Yes
delivery address below: ☐ No

stricted Delivery
icted Delivery
Restricted Delivery
cted Delivery

☐ Priority Mail Express®
☐ Registered Mail™
☐ Registered Mail Restricted Delivery
☐ Return Receipt for Merchandise
☐ Signature Confirmation™
☐ Signature Confirmation Restricted Delivery

Attahment E-8

MARY ANN PRITCHARD
DIRECTOR

J. KEVIN STITT
GOVERNOR

STATE OF OKLAHOMA
DEPARTMENT OF MINES

May 4, 2020

Kevin Carel
The Carel Corporation
136 Pecan Street
Keller, Texas 76248

Re: Rosencutter Brothers, Inc. dba Creek County Landfill – L.E.-2561
Section 28 – Township 18 North – Range 12 East – Creek County
80 Acres Permitted and 4.7 Acres Bonded.

Dear Mr. Carel:

Per attached enclosure, the above-referenced mining permit received a Phase II, Completed Reclamation Release on December 20, 2019. If we can be of any further assistance, do not hesitate to contact us.

Respectfully,

Richard Shore, Administrator of Minerals Program

Enclosure

2915 N. CLASSEN, SUITE 213, OKLAHOMA CITY, OKLAHOMA 73106 TEL:405/427-3859 FAX: 405/427-9646

MARY ANN PRITCHARD
DIRECTOR

J. KEVIN STITT
GOVERNOR

STATE OF OKLAHOMA
DEPARTMENT OF MINES

NOTICE OF BOND RELEASE: MINERALS DIVISION

DATE: December 20, 2019

PERMITTED COMPANY:

Rosencutter Bros., Inc. dba Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74066

BONDING COMPANY:

American Heritage Bank
12120 S. Vancouver Ave.
Sapulpa, OK 74067

RE: Permit #L.E.-2561 Section 28/Township 18N/Range 12E/Creek County
80 Acres Permitted and 4.7 Acres Bonded.

THE FOLLOWING RELEASE ON THE AREA DESCRIBED ABOVE IS APPROVED:

NUMBER OF ACRES 80 permitted and 4.7 bonded

PERCENT OF RELEASE 100%

REASON FOR RELEASE Phase II Completed Reclamation
Site Inspected 12-03-19; Approved 12-20-19

AMOUNT OF RELEASE $7,050.00

BOND IDENTIFICATION NUMBER Certificate of Deposit #1300012753

NOTICE IS HEREBY GIVEN THAT RELEASE IS MADE ON THE ABOVE MENTIONED BOND. PLEASE RETAIN THIS FORM FOR YOUR FILES FOR ANY FUTURE REFERENCE. IF YOU MIGHT HAVE ANY QUESTIONS CONCERNING THIS RELEASE, PLEASE CONTACT THIS OFFICE.AND FOR ASSISTANCE PLEASE REFER TO THE OPERATOR AND PERMIT NUMBER AND LEGAL DESCRIPTION MENTION IN THIS FORM.

APPROVED:

☑ DIRECTOR -OR- ☐ DEPUTY DIRECTOR

REVIEWED BY:

EXECUTIVE ASSISTANT

2915 N. CLASSEN, SUITE 213, OKLAHOMA CITY, OKLAHOMA 73106 TEL:405/427-3859 FAX: 405/427-9646

APPENDIX F

HYDROGEOLOGIC INFORMATION

APPENDIX F-1

DRILLING PLAN

SCOTT A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

MARY FALLIN
Governor

March 2, 2016

Mr. Danny Rosencutter
Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74067

Re: Drilling Plan for Proposed 11.63 Acre Lateral Expansion, Creek County Landfill, Creek County, Permit Number 3519020

Dear Mr. Rosencutter:

The Oklahoma Department of Environmental Quality (DEQ) is in receipt of the Drilling Plan for the proposed 11.63 acre lateral expansion dated February 2, 2016. The drilling plan will be incorporated into the Tier III Permit Modification to expand the landfill.

The drilling plan includes the completion of five (5) new borings, three (3) of which will be advanced at least 10 feet below the top of the saturated zone and converted to piezometers. One (1) boring will extend 100 feet below ground surface. In addition, one existing boring (B-4) is incorporated into the drilling plan in accordance with Oklahoma Administrative Code (OAC) 252:515-7-4(b)(3)(D).

The drilling plan complies with OAC 252:515-7-4. Please notify DEQ with written notice of intent to drill at least two (2) weeks prior to initiating drilling. A qualified groundwater scientist shall supervise all drilling operations. Please submit the borehole logs and as-builts of the piezometers to DEQ at completion of drilling operations. Should you have any questions or require additional information, please contact Martha Grafton of my staff at (405) 702-5144.

Sincerely,

Hillary Young, P.E.
Chief Engineer
Land Protection Division

HY/mg

Joe B. Ramey, P.E.
6533 East 11th Street
Tulsa, Oklahoma 74112
Phone 918-836-0021
Fax 918-836-2793

DRILLING PLAN

Creek County Landfill
11.63 Acre Extension
MSW PERMIT NO. 3519020

Project No. 2016-2500
January 19, 2016

Prepared for: Creek County Landfill

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APPENDIX - **District Conservationist Letter**
Test Boring Log from 1999 – B-4

Tables and Figures

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3. Quadrangle Topographic Map
4. Site Map
5. Existing Contour Map
6. Seismic Impact Map
7. Unconsolidated Alluvium and Terrace Deposits Map
8. Typical Piezometer Construction
9. Boring Log B-4 from 1999 Drilling adjacent (east)

1.0 INTRODUCTION

This drilling plan is provided to the Oklahoma Department of Environmental Quality (ODEQ) per Oklahoma Administrative Code (OAC) 252:515-7-4. The proposed expansion area is located west of the existing site and is approximately 11.63 acres. The purpose of this drilling plan and subsurface characterization is to further delineate the uppermost saturated zone(s) in accordance with OAC 252:515-7-2(a)(1). A total of six (6) completed borings will be utilized for the subsurface characterization per OAC 252:515-7-4(b)(3)(C) and OAC 252:515 Appendix D. In accordance with OAC 252:515-7-53, three (3) of the six (6) borings will be converted to piezometers. In accordance with OAC 252:515-7-4(b)(2), a general location map, flood plain map, topographic quadrangle map, and existing contour map are attached to this report.

2.0 DRILLING PLAN DETAIL

2.1 General Information

The following information is provided in accordance with OAC 252:515-7-4(b)(1)

(A). Owner/operator's name, address, and telephone number

Creek County Landfill:

Mr. Danny Rosencutter
P. O. Box 1597
Sapulpa, Oklahoma 74067
Phone: 918-299-3755
Fax: 918-299-3793

(B). Engineering Firm's Name, address and telephone number

Mr. Joe B. Ramey, P.E.
6533 East 11th Street
Tulsa, OK 74112
Phone: 918-836-0021
Fax: 918-836-2793

2.2 Drilling Plan Maps

The following information is provided in accordance with OAC 252:515-7-4(b)(2)

(A). General Location Map, Flood Plain Map, and Topographic Map

The Creek County Landfill is located at 10250 South 33rd West Avenue, about one (1) mile west of the intersection of Okmulgee Expressway and Creek Turnpike in Sapulpa, Oklahoma (see Figure 1).

A floodplain map is shown on Figure 2. Figure 2 is the Flood Insurance Rate Map (FIRM) as published by the Federal Emergency Management Agency (FEMA). As shown on Figure 2, the 100-year floodplain limits are limited to the Polecat Creek area on the north portion of the site. The proposed expansion area will not encroach on the 100-year floodplain and no soil borings will be completed within the 100-year floodplain.

The site boundaries are illustrated on a portion of the U.S. Geological Survey 7.5-minute Sapulpa North topographic quadrangle map as Figure 3. The map also illustrates routes of access to the site, houses, buildings, wastewater treatment facilities, receiving waters, surface variations, surface drainage, water wells within one mile of the landfill, wetlands, and topography.

Three (3) potential wetland areas are illustrated on figure 3 within the proposed expansion area. The wetlands were identified on the National Wetlands Inventory map obtained by the OWRB from the U.S. Fish and Wildlife Service. Using the Cowardin System, two (2) of the potential wetlands are labeled as PUBFx and one (1) of the potential wetlands is labeled as PUBCx. The meaning of these labels is provided in the table below:

Table 1 - Cowardin System

	System	Subsystem	Class	Subclass	Modifier
PUBFx	P	None	UB	None	Fx
	Palustrine	None	Unconsolidated bottom	None	Semi-permanently flooded/excavated
PUBCx	P	None	Ub	None	Cx
	Palustrine	None	Unconsolidated Bottom	None	Seasonally flooded/excavated

A special note on the National Wetlands Inventory map states the document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. The wetlands were identified on the photographs based on vegetation, visible hydrology, and geography. The aerial photographs typically reflect conditions during the specific year and season they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis pf a single site may result in a revision of the wetland boundaries established through photographic interpretation. A District Conservationist examined the area in the year 2000. The District Conservationist found no hydric soils and determined the area was not a wetland. A letter dated October 17, 2000 from the District Conservationist is provided in Appendix A.

(B). Existing Contour Map (Locations of Borings and Piezometers)

A site map with existing contour is provided as Figure 4. An existing contour map focusing on the proposed expansion area is provided as Figure 5. The locations of the proposed borings/piezometers are illustrated on Figure 5. The proposed borings/piezometers are spaced on a grid which is also

illustrated. Proposed 2016 boring designations are preceded by "B14-". Proposed 2016 borings to be converted to piezometers are proceeded by "BPZ14-". Further, the symbol for borings to be converted to piezometers is distinctive and in the shape of a triangle. The estimated elevations and total depths of the proposed borings area located in Table 3 of this report.

(C). Site Specific Maps

The Creek County Landfill area is classified as Category 2 (Peak Horizontal Acceleration 2 with 10% Probability of Exceedance in 50 Years). Category 2 areas have a very low earthquake hazard probability (see Figure 6 (Seismic Impact Map)).

Unconsolidated alluvium and terrace deposits are illustrated on Figure 7. Figure 7 is a portion of the "Map of aquifers and recharge Areas in Oklahoma" compiled by Kenneth S. Johnson, Oklahoma geological Survey (1991). As shown on Figure 7, the proposed expansion area is not located within an area designated as alluvium or terrace deposits and their recharge areas.

(D). Piezometer Construction

Typical piezometer detail is illustrated on Figure 8. Construction of each piezometer will be in accordance with the requirements of the Oklahoma Water Resources Board (OWRB) per OAC 252:515-7-3. Piezometers are further discussed in Section 2.5 of this report.

2.3 Spacing of Borings

In accordance with OAC 252:515-7-4(b)(3), the proposed borings have been spaced within a grid. Figure 5 depicts the grid spacing and boring locations.

2.4 Number and Depth of Borings

Boring identifications and calculated depths are presented in Table 3. Six (6) borings are required for a study area of 11.63 acres. Six (6) borings are proposed for this subsurface characterization. Details are provided below.

2.4.1 Previous Borings

Multiple borings have been drilled in the vicinity of the proposed expansion area in October 1999. One (1) of the borings, B-4 was approximately 170 feet east of the proposed expansion area (see Figure 5). The boring log for B-4 is provided in Appendix B. Per OAC 252:515-7-3 (D) and approval by the ODEQ, up to one-fourth of the required borings may be replaced with existing borings located within 200 feet of the proposed boundary. As six (6) borings are required, on (1) of the October 1999 borings (B-4) is requested for replacement in this Subsurface Characterization. Boring B-4 was drilled a minimum of 30 feet below the deepest proposed placement of waste as required by OAC 252:515-7-4(b)(4)(A) (See Table 3).

2.4.2 Proposed Borings

Five (5) additional borings (See Table 3 and Figure 5) are proposed for the groundwater study. Boring depths are a minimum of 30 feet below eh deepest proposed placement of waste as required by OAC 252:515-7-4(b)(4)(A). Three (3) borings will be drilled a minimum of ten feet into the uppermost saturated zone in accordance with OAC 252:515-7-4(b)(4)(B) and OAC 252:515 Appendix D. One (1) of the proposed borings will be drilled 100 feet below ground surface fulfilling the requirement listed in OAC 252:515-7-4(b)(4)(C).

Depth to water will be measured in each boring at the time of drilling and again 24 hours later per OAC 252:515-7-32(C).

2.5 Piezometer Installations

In accordance with OAC 252:515-7-53, three (3) of the borings will be converted to Piezometers to determine the seasonal high groundwater elevations in the area of interest per OAC 252:515-7-54(1). Anticipated piezometer construction details are provided in the table below.

Table 2 - Anticipated Piezometer Constriction Details

Borehole Diameter	A minimum of 3" greater than the diameter of the casing and screen from surface to the total depth (OWRB 785:35-7-2 b)(1)).
Well Materials	2" Diameter sched. 40 PVC, flush threaded with screw joints, and O-rings (OWRB 785:35-7-2(b)(3)).
Sediment Trap	1 to 2 foot section (OWRB 785:35-7-2(b)(3)).
Screen	5 Ft section, factory slotted with 0.010" slots (OWRB 785:35-7-2(b)(4)).
Filter Pack	Inert 20-40 silica sand extending approx. 2 ft. above top of screen (OWRB 785:35-7-2(b)(5)).
Filter Pack Seal	A minimum of two feet hydrated sodium bentonite pellets (OWRB 785:35-7-2(b)(6)(B)).
Annular Seal	Cement grout, bentonite grout, cement/bentonite grout, or bentonite chips from top of filter pack seal to within two feet of ground surface (OWRB 785:35-7-2(b)(6)(C)).
Concrete Pad	A 3'x3'x4" steel-reinforced concrete pad extending to grout below surface (OWRB 785:35-7-2(b)(7)).
Top Cap, Protective Casing and Bollards	Two inch compression seal top cap, locking aluminum or steel protective casing, and two yellow bollards (OWRB 785:35-7-2(b)(8) – (9)).

2.6 Department Authorization

Drilling activities will not be initiated until the Owner receives written approval from the ODEQ in accordance with OAC 252:515-7(4(a)(2).

2.7 Notice of Intent to Drill

The Owner will provide written notice to the ODEQ at least two (2) weeks prior to drilling in accordance with OAC 252:515-7-5(a). Provided proper notification is given to the ODEQ, drilling may proceed in accordance with the approved drilling plan even if a representative of the DEQ is no present as scheduled per OAC 252:515-7-5(b).

2.8 Groundwater Scientist

Per OAC 252:515-7-5©, a qualified groundwater scientist will supervise all drilling operations record the subsurface lithology, and describe other pertinent characteristics at each borehole location.

2.9 Data Collection and Boring Logs

The borings will be continuously sampled to log the geologic setting of the borings per OAC 252:515-7-32 and OAC 252:515-7-33. The boring logs will include information regarding the identification and characterization of soil and rock types, the depth at which groundwater was encountered and other relevant geologic observations. Depth to water will be measured in each boring at the time of drilling and again 24 hours later per OAC 252:515-7-32(c).

2.10 Geophysical Logs

Gamma ray/neutron geophysical logging will be conducted for the borings to be converted to piezometers per OAC 252:515-7-32(a) and OAC 252:515-7-34(a). The minimum number of required geophysical logs for waste disposal area of 20 acres or less is three (3), one of which must be run on the deepest drilled borehole. As previously discussed, the total number of proposed piezometers is three (3) and , as shown in Table 3, the deepest drilled borehole will be one (1) of the proposed piezometers.

Geophysical logs will be obtained from total depth to the surface in either open hole or behind casing per OAC 252:515-7-34(c).

2.11 Soil and Rock Sampling

The borings will be continuously sampled to log the geologic setting of the wells. Samples will be collected and stored by the Creek County Landfill until final action on the permit application is taken by the ODEQ per OAC 252:515-7-35(b). All borings will be advanced using auger or rotary methods to total depth and continuously sampled utilizing sampling method(s) listed in OAC 252:515-7-35(c).

Dry methods of drilling such as hollow stem auger or air rotary will be utilized per OAC 252:515-7-2(b). Hollow stem auger drilling will be attempted initially, however, auger refusal prior to total depths may be encountered depending on formation hardness. In the event of auger refusal, air rotary drilling will commence in lieu of hollow stem augers.

Encountered formation water during air rotary drilling and sampling can cause the cuttings to stick together, making them heavier and harder to blow out of the borehole, or the cuttings may stick to the borehole wall, causing constriction. This constriction may cause loss of air circulation, damage to the borehole, alteration of the sample competence, and/or reduction in sample recovery.

In the event of hollow stem auger refusal and air rotary drilling failure, wet rotary drilling and sampling methods are requested per OAC 252:515-7-2(b).

2.12 Soils Testing and Report

Pursuant to OAC 252:515-7-36 and OAC 252:515-7-37, soil samples may be collected and analyzed. Earthen materials to be used as liner and cover materials will be laboratory tested as directed by the design engineer. A soils report may be prepared by the testing laboratory and sealed by the design engineer that describes the techniques and results of the earthen material sampling and analysis.

2.13 Groundwater Study

A groundwater study will be conducted pursuant to OAC 252:515 Subchapter 7 Part 5.

2.14 Groundwater Elevation Survey Report

In accordance with OAC 252:515-7-54, a groundwater elevation survey will be completed to determine the relationship between highest water table and lowest waste placement elevations. Following the installation of the piezometers and in accordance with OAC 252:515-7-54(b), a continuous water level monitor system will be installed in one (1) piezometer. Groundwater elevations in the remaining piezometers will be measured each month for a period of 12 months. Additionally, available daily and monthly climatological data will be collected per OAC 252:515-7-55(a) to aid in the determination of the seasonal high groundwater elevation. A 30-year mean precipitation will also be obtained to project future precipitation data in accordance with OAC 252:515-7-55(b).

2.15 Shallow Saturated Zone

Per OAC 252:515-7-56, if a saturated zone is encountered above the depth where groundwater was anticipated, drilling shall cease and the following actions taken:

(1) note on the borehole lithologic sample log, the initial depth at which the shallow zone was encountered;

(2) install and screen a piezometer in the shallow zone; and ,

(3) drill a new boring, to the original proposed total depth, within ten feet of the piezometer.

If a shallow saturated zone is encountered in the next three (3) adjacent borehole locations in the approved drilling plan:

(1) the drilling plan and preliminary landfill design shall be revised to take into consideration the shallow water table;

(2) the subsurface investigation shall be updated and revised as hydrogeological information becomes available; and

(3) a revised drilling plan shall be submitted to the ODEQ for approval, with explanation of any changes made to the original plan.

2.16 Penetration Plugging

Pursuant to OAC 252:515-7-71, all boreholes not converted to piezometers will be plugged within 30 days of drilling. All boreholes shall be plugged in accordance with OWRB rules and regulations. Following the decision of the permit, all piezometers that will not become a part of the groundwater monitoring system shall be plugged in accordance with OWRB rules and regulations.

2.17 Conclusion

The drilling plan presented herein is sufficient and fulfills all the requirement of the ODEQ regulations.

3. REFERENCES

Federal Insurance Rate Map, May 18, 2009. Federal Emergency Management Agency. Creek County, Oklahoma.

Oklahoma Administration Code Title 252. Department of Environmental Quality Chapter 515. Management of Solid Waste (effective July11, 2010).

Oklahoma Department of Transportation.

Oklahoma State Department of Health, 1991, Maps of Aquifers and Recharge Areas in Oklahoma, Compiled by Kenneth S. Johnson, Oklahoma Geological Survey.

Oklahoma Water Resources Board, Title 785, Chapter 35. Well Driller and Pump Installer Licensing.

United States Geological Survey (USGS), 1983. 7.5-Minute Series (Topographic Map). Sapulpa North Quadrangle, Oklahoma.

TABLES AND FIGURES

Boring and Piezometer Details

Creek County Landfill Expansion Area

TABLE 3

Boring and Piezometer details

2016 Creek County Landfill Expansion Area 11.63 Acres

Notes:

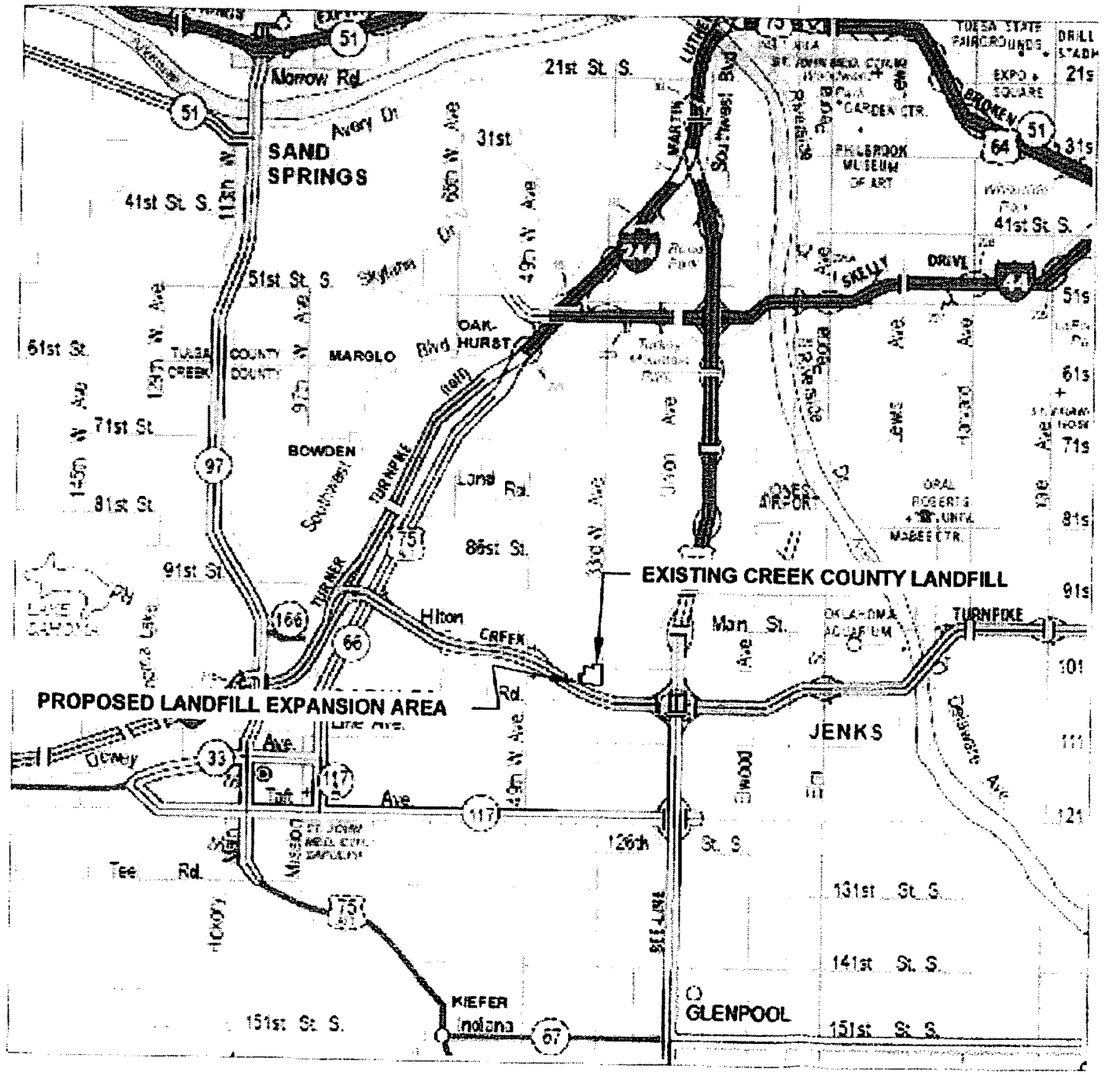
B – Boring: BPZ – Boring/Piezometer
DPW – Deepest Placement of Waste
All elevations are in feet Mean sea Level
All depths are in feet below the ground surface
Surface elevations are approximate
n/a – not applicable

Proposed Boring/Piezometer ID	Approximate Surface Elevation	DPW Elevation	Proposed Boring Depth	Bore Bottom Elevation	Boring Depth Below DPW	Estimated Top Elevation of Satureated Zone	Anticipated Piezometer Depth
BPZ14-1	701	675	96	605	70	615	96
B14-2	690	675	45	645	30	630	n/a
BPZ14-3	720	675	80	640	35	650	80
B14-4	708	675	63	645	30	635	n/a
BPZ14-5	720	675	100	620	55	630	100

October 1999 Boring ID	Approximate Surface Elevation	DPW Elevation	Boring Depth	Bore Bottom Elevation	Boring Depth Below DPW
B-4	684	675	60	624	51

FIGURES

Figure 1	General Location Map
Figure 2	Flood Plain Map
Figure 3	Quadrangle Topographic Map
Figure 4	Site Map
Figure 5	Existing Contour Map – Bore Hole Locations
Figure 6	Seismic Impact Map
Figure 7	Soils Map (Unconsolidated alluvium and terrace deposits)
Figure 8	Typical Piezometer Detail



Source: Oklahoma Department of Transportation.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

PROPOSED LANDFILL EXPASION AREA

N

SCALE:

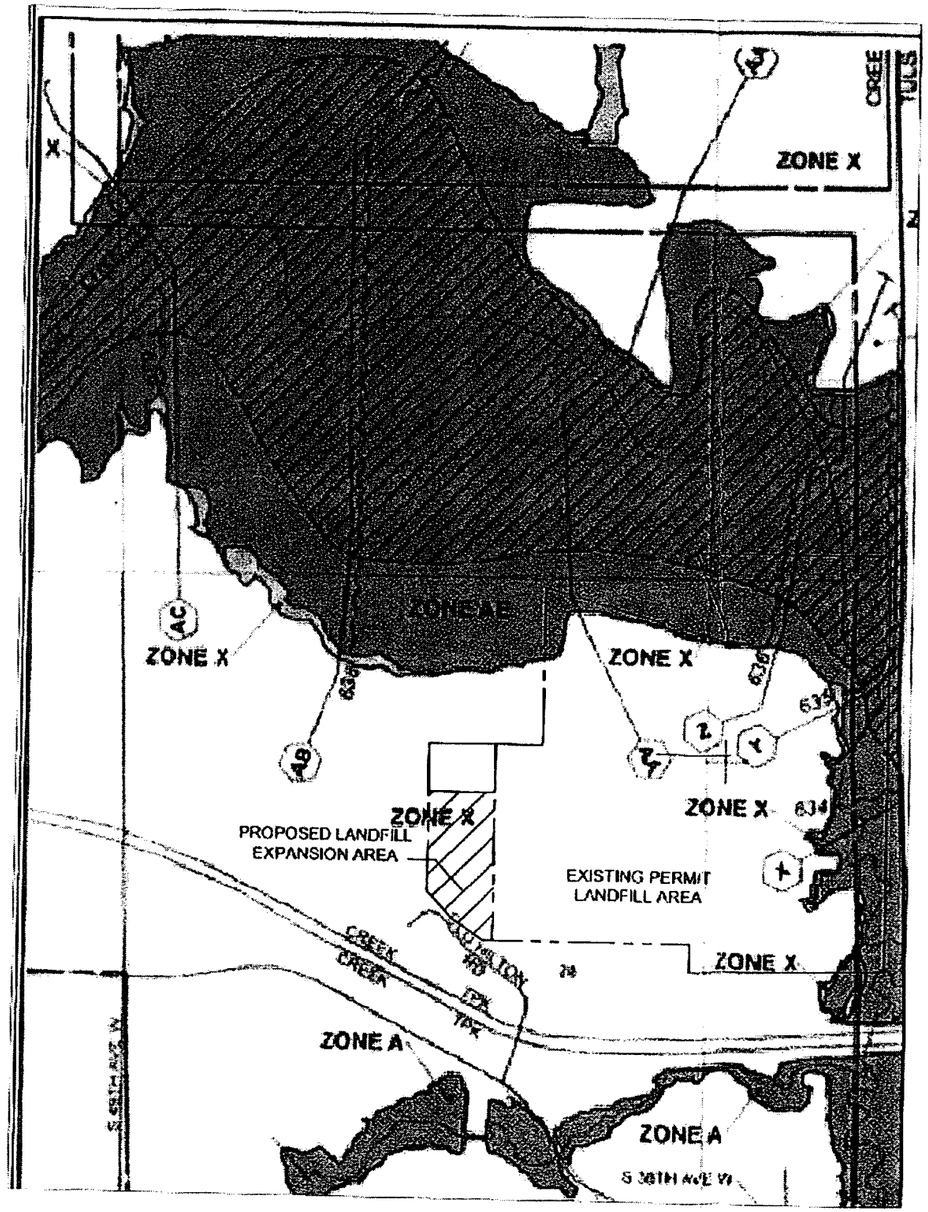
0 1 2 3 4 MILES

GENERAL LOCATION MAP

CREEK COUNTY LANDFILL

SAPULPA OKLAHOMA

DATE:	April 22, 2014	
FILENAME:		
DESIGNED BY:	SMG	FIGURE:
DRAWN BY:	SMG	1
CHECKED BY:	SJW	
APPROVED BY:		



SOURCE: FLOOD INSURANCE RATE MAP PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, CREEK COUNTY, OKLAHOMA. MAY 18, 2009.

SCALE:
0 500 1000
FEET

N

The CAREL CORPORATION

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LEGEND:

PROPERTY BOUNDARY

EXISTING PERMIT BOUNDARY

PROPOSED LANDFILL EXPASION AREA

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations Determined
ZONE AE	Base Flood Elevations determined
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevation determined
ZONE AO	Flood depths of 1 to 3 feet (usually street flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provid protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachments so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1% annual chance flood

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain
ZONE D	Areas in which flood hazards are undetermined, but possible

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

FLOODPLAIN BOUNDARY

FLOODPLAIN BOUNDARY

ZONE D BOUNDARY

CBRS AND OPA BOUNDARY

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities

Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

CROSS SECTION LINE

TRANSECT LINE

* Referenced to the North American Vertical Datum of 1988

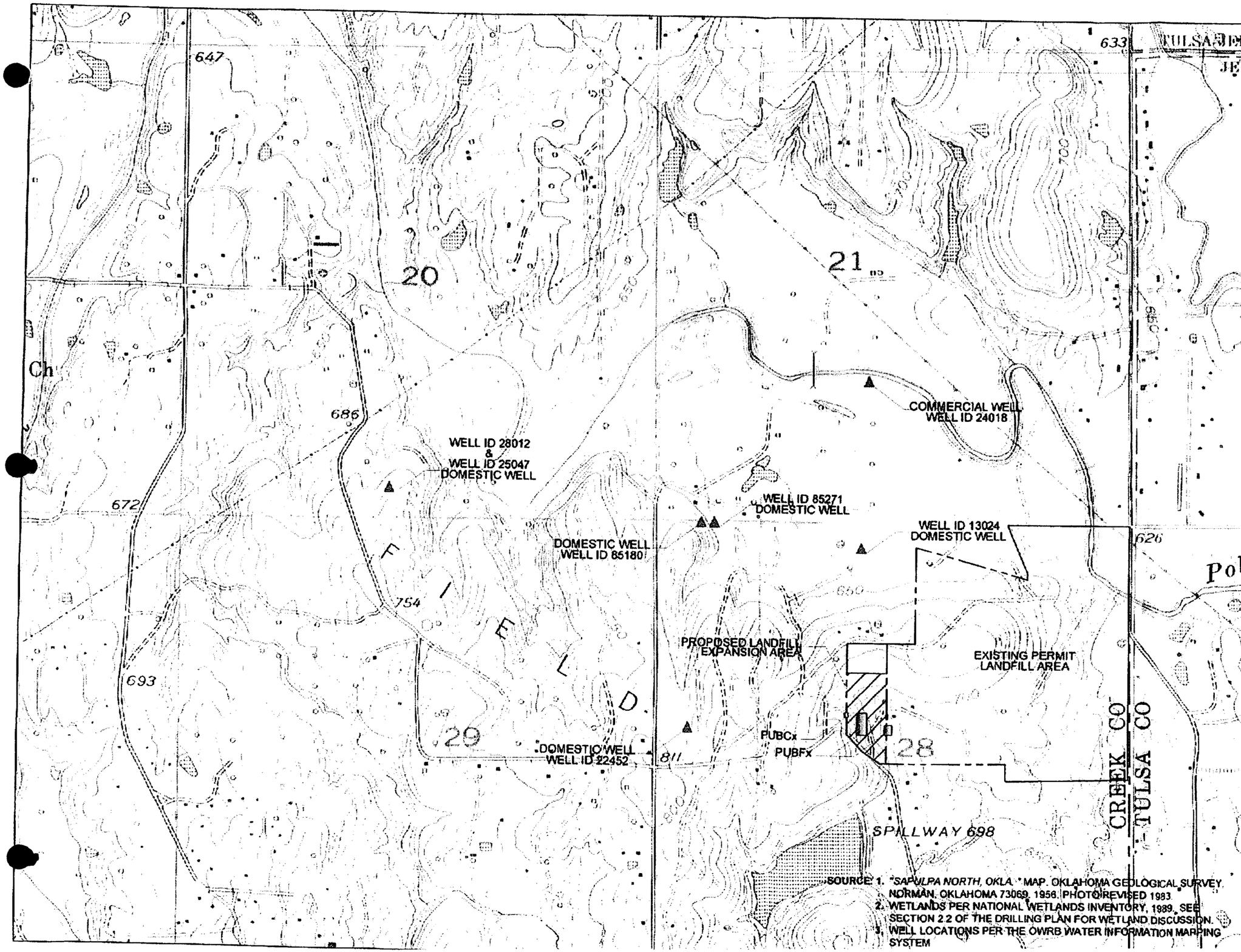
FLOOD PLAIN MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE: April 29, 2014

FILENAME:

DESIGNED BY:	SMG	FIGURE:
DRAWN BY:	SMG	2
CHECKED BY:	SJW	
APPROVED BY:		



SOURCE: 1. "SAPULPA NORTH, OKLA." MAP. OKLAHOMA GEOLOGICAL SURVEY, NORMAN, OKLAHOMA 73069, 1956, PHOTOREVISED 1983.
2. WETLANDS PER NATIONAL WETLANDS INVENTORY, 1989. SEE SECTION 2.2 OF THE DRILLING PLAN FOR WETLAND DISCUSSION.
3. WELL LOCATIONS PER THE OWRB WATER INFORMATION MAPPING SYSTEM

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136 Pecan Street, Keller, TX 76248

LEGEND:

- EXISTING PERMIT BOUNDARY
- PROPOSED PERMIT BOUNDARY
- EXISTING PROPERTY BOUNDARY
- WATER WELLS WITHIN ONE MILE OF THE FACILITY
- PROPOSED LANDFILL EXPANSION AREA
- WETLANDS

N

SCALE:

250 500
1,000 0 1,000

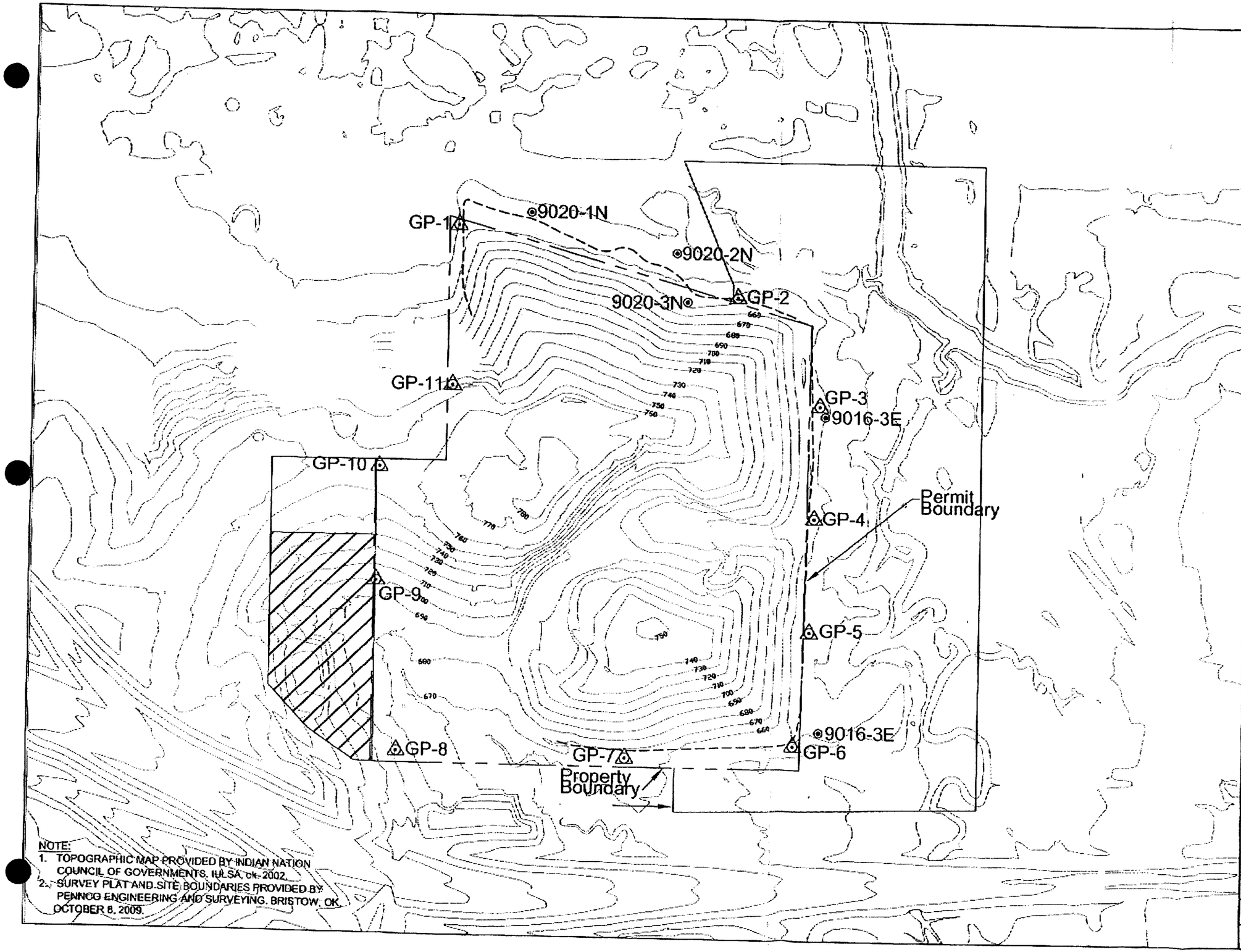
QUADRANGLE TOPOGRAPHIC MAP

CREEK COUNTY LANDFILL

Sapulpa, Oklahoma

DATE:	April 28, 2014
FILENAME:	
DESIGNED BY:	SJW
DRAWN BY:	SMG
CHECKED BY:	KTC
APPROVED BY:	

FIGURE: 3



NOTE:
1. TOPOGRAPHIC MAP PROVIDED BY INDIAN NATION COUNCIL OF GOVERNMENTS, TULSA, OK- 2002.
2. SURVEY PLAT AND SITE BOUNDARIES PROVIDED BY PENNCO ENGINEERING AND SURVEYING, BRISTOW, OK, OCTOBER 8, 2009.

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136 Pecan Street, Keller, TX 76248

LEGEND:

- PROPTERY BOUNDARY
- PERMIT BOUNDARY
- WASTE BOUNDARY
- METHANE MONITORING PROBE
- GROUNDWATER MONITORING WELL
- PROPOSED EXPANSION AREA

N

SCALE:

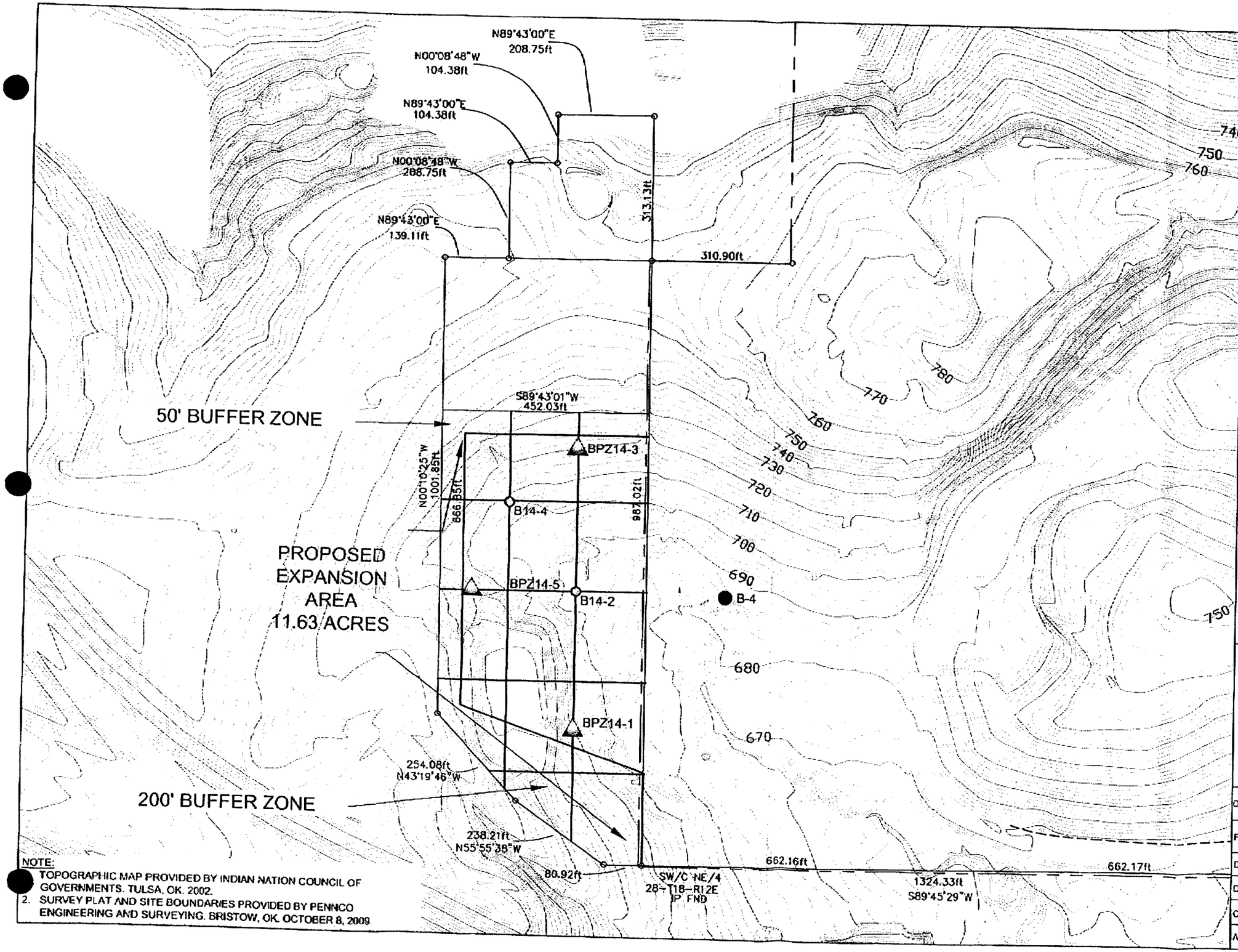
0 200 400 FEET

SITE MAP

CREEK COUNTY LANDFILL

SAPULPA, OKLAHOMA

DATE DRAFTED: April 30, 2014	REV. NO.:
FILENAME:	
DESIGNED BY: KTC	FIGURE:
DRAWN BY: SMG	4
CHECKED BY: KTC	
APPROVED BY:	



NOTE:
1. TOPOGRAPHIC MAP PROVIDED BY INDIAN NATION COUNCIL OF GOVERNMENTS. TULSA, OK. 2002.
2. SURVEY PLAT AND SITE BOUNDARIES PROVIDED BY PENNCO ENGINEERING AND SURVEYING. BRISTOW, OK. OCTOBER 8, 2009.

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LEGEND:

- PROPTERY BOUNDARY
- PERMIT BOUNDARY
- WASTE BOUNDARY
- TURNING POINT
- PROPOSED PIEZOMETER
- PROPOSED BORING
- PREVIOUS BORING - OCTOBER 18, 1999

N

SCALE:

0 100 200 FEET

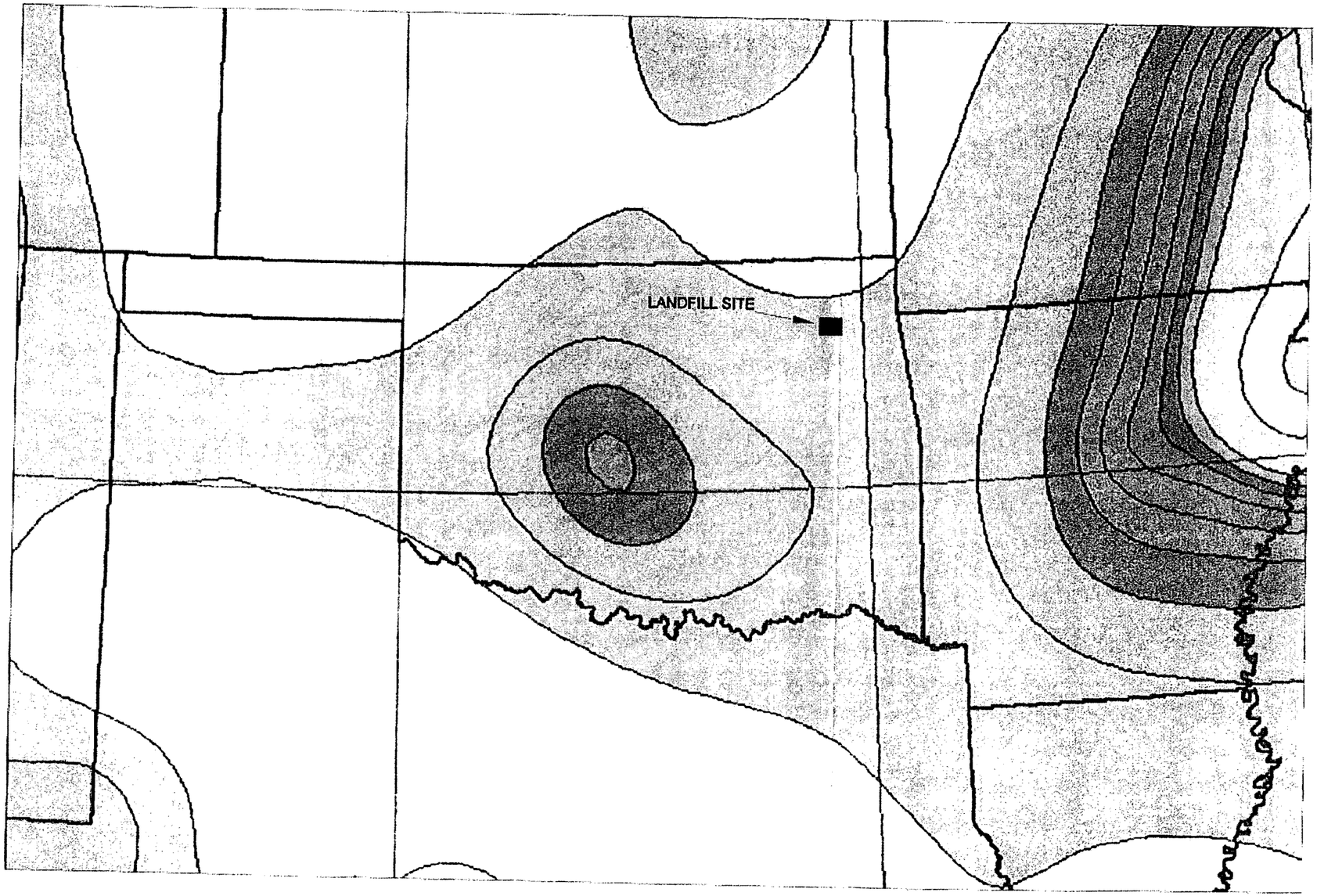
EXISTING CONTOUR MAP

CREEK COUNTY LANDFILL

SAPULPA, OKLAHOMA

DATE DRAFTED: Apr 22, 2014	REV. NO.:
FILENAME:	
DESIGNED BY: SJW	FIGURE:
DRAWN BY: SMG	5
CHECKED BY: KTC	
APPROVED BY:	

625
212-7310



Source: U.S. Geological Survey

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

Peak Acceleration (% g) with 10% Probability of Exceedance in 50 Years

N Peak Horizontal Acceleration (% g)

100	8
80	7
60	6
40	5
30	4
25	3
20	2
15	1
10	0
9	

LANDFILL SITE

N

SEISMIC IMPACT MAP

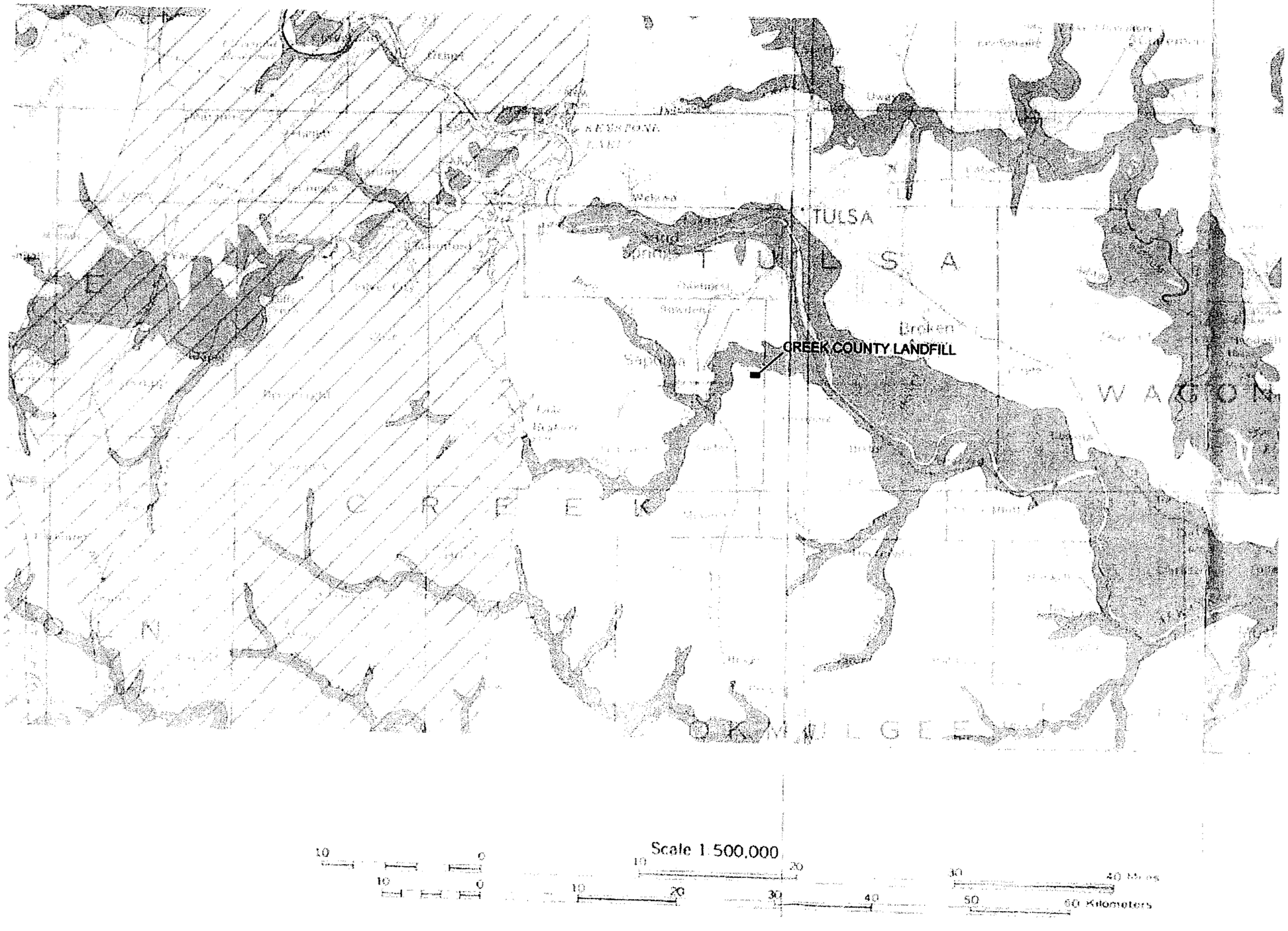
CREEK COUNTY LANDFILL

Sapulpa, Oklahoma

DATE: April 23, 2014

FILENAME:

DESIGNED BY:	SJW	FIGURE:
DRAWN BY:	SMG	6
CHECKED BY:	KTC	
APPROVED BY:		



SOURCE: UNCONSOLIDATED ALLUVIUM AND TERRACE DEPOSITS COMPILED BY KENNETH S. JOHNSON, OKLAHOMA GEOLOGICAL SURVEY, 1991.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

- LANDFILL SITE
- ALLUVIUM AND TERRACE DEPOSITS AND THEIR RECHARGE AREAS
- BEDROCK AQUIFERS AND THEIR RECHARGE AREAS

N

UNCONSOLIDATED ALLUVIUM AND TERRACE DEPOSITS

CREEK COUNTY LANDFILL

Sapulpa, Oklahoma

DATE:	April 23, 2014	
FILENAME:	[illegible]	
DESIGNED BY:	SJW	FIGURE:
DRAWN BY:	SMG	7
CHECKED BY:	KTC	
APPROVED BY:		

APPENDIX

October 17, 2000 District Conservationist Letter

October 1999 Boring Log – B-4

APPENDIX A

OCTOBER 17, 2000 DISTRICT CONSERVATIONIST LETTER

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Bristow Field Office
128 E. 3rd
Bristow, OK 74010

(918) 367-2113

October 17, 2000

Mr. Bob Rosencutter
Creek County Landfill
7312 S. Union
Tulsa, OK 74132

Dear Mr. Rosencutter:

I have examined the area in question (see attached map permit area 16.27 acres) and find no hydric soils on this acreage. This area is not a wetland. If you have further questions please feel free to contact me.

Sincerely,

Ronald Goedecke
District Conservationist

Attachment

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

APPENDIX B

OCTOBER 1999 BORING LOG – B-4

B-4

Surface Elevation: 683.8
Boring Date: 10/18/99
Boring Location: East Middle
Drilling Method: HS Auger

Depth	Remarks	Moisture (%)	Dry Density	Blow Counts	Sample Type	Water Table		
1				18	■ ⧄		CL	Brown silty, sandy clay, with sandstone gravel, trace organics
							CL	Inorganic Brown Sandy Clay
10					□		TS	Tan Shale, clayey
					□		TS	Tan Shale, thin seam of smutty coal at 17.2 feet
20					□		GS	Gray Shale
30								
40						▼		
50						▽		
60							END	Boring completed at depth of 60
1								

LOG OF BORING

APPENDIX F-2

GROUNDWATER STUDY REPORT

ROSENCUTTER BROS., INC.
dba Creek County Landfill

Mail:
P.O. Box 1597
Sapulpa, OK 74067

Site: 10250 S. 33rd W. Ave
Jenks, OK 74037
TEL (918)-299-3755
FAX (918)-299-3793

July 30, 2018

RECEIVED
JUL 31 2018
LAND PROTECTION DIVISION
DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ
PO Box 1677
Oklahoma City, OK 73101-1677

Attention: Martha Grafton

Dear Ms. Grafton:

Attached please find our engineers report for Creek County Landfill Groundwater Study on the adjacent 11.6 acres.

Please review this plan and we ask for your approval.

Upon completion and your approval of the results, we would proceed with the expansion application in accordance with your regulations 252:515-7-51.

We await your timely response.

Best Regards,

Danny Rosencutter
Creek County Landfill

C/3: 3 Copies - Groundwater Study

238207 CD___ #c 3 c/o HY

Solid Waste

3519020

RECEIVED
JUL 31 2018
LAND PROTECTION DIVISION
DEPARTMENT OF ENVIRONMENTAL QUALITY

Groundwater Study

Prepared for:

AIMRIGHT Testing
2120 S. 130th East Avenue
Tulsa, Oklahoma 74134

July 2018

Prepared by:

BLACKSHARE
ENVIRONMENTAL SOLUTIONS
5121 S. Wheeling Ave.
Tulsa, OK 74105
918-388-0970

www.blackshare-env.com

Regarding:

Creek County Landfill
11.63 Acre Extension
MSW Permit No. 3519020

Conducted by:

BLACKSHARE ENVIRONMENTAL SOLUTIONS

5121 S. Wheeling Ave.
Tulsa, OK 74105
918-388-0970

Blackshare Project #

Prepared by:

Murray Verbonitz, Environmental Specialist

Reviewed by:

Derek Blackshare, CEO and President

LICENSED PROFESSIONAL ENGINEER
Derek Tod Blackshare
17181
OKLAHOMA

7.27.18
Date

TABLE OF CONTENTS

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2.0	Piezometer Installation and Readings	1
3.0	Historical Rainfall Measurements	1
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Attachments

Attachment A – Piezometer Location and Drill Logs

Attachment B – Bixby, OK Mesonet Station Location

Attachment C – Historical Monthly Precipitation

Attachment D – Oklahoma 30-year Annual Precipitation

Attachment E – Precipitation vs Groundwater Elevation Graphs

Attachment F – Daily Groundwater Elevation and Precipitation Data

1.0 Introduction and Scope of Work

Jeff Coates with AIMRIGHT Testing (AIMRIGHT) authorized Blackshare Environmental Solutions (Blackshare) to produce a Groundwater Study report in accordance with OAC 252:515-7-51. This report seeks to evaluate any significant effect precipitation may have on local groundwater elevation at Creek County Landfill and to ensure there is adequate separation between the water table and bottom of the proposed landfill expansion liner.

The report includes data collected from a continuous water level monitoring system installed in one piezometer, and daily/monthly climatological data was collected per OAC 252:515-7-55(a) to aid in the determination of the seasonal high groundwater elevation. A 30-year mean precipitation will also be obtained to project future precipitation data in accordance with OAC 252:515-7-55(b).

2.0 Piezometer Installation and Readings

AIMRIGHT installed three piezometers in accordance with OAC 252:515-7-52 between the dates of March 31, 2016 and April 4, 2016. One piezometer (B-3) was equipped with a continuous data logger (Geokon 4500 series) recording the depth to groundwater from July 8, 2016 to March 26, 2017. Piezometer locations and construction logs are located in Attachment A.

The depth to groundwater was recorded between the referenced dates at either one or four minute intervals. Data gaps registered between July 19, 2016 to September 26, 2016, November 23, 2016 to December 1, 2017, and January 17, 2017 to February 28, 2017. The reason for the different time intervals and data gaps is unknown.

The study utilized a series of groundwater readings, taken at 12:00pm each day, for the analysis. When a reading at 12:00pm was unavailable for a specific day, the data was replaced by the next closest time on the same day. Depth to groundwater readings were converted to groundwater elevations (Attachment F) using top of well casing elevation (707.65 ft) recorded on April 1, 2016.

3.0 Historical Rainfall Measurements

Historical precipitation data was accessed through the Oklahoma Climatological Survey – OK Mesonet data portal. The Bixby Mesonet Weather Station dataset was utilized because it was determined to be in close proximity to the Creek County Landfill (approx. 10.2 miles east-southeast, Attachment B). In accordance with OAC 252:515-7-55, the data utilized was daily and

monthly precipitation (Attachments C and F) for the time the data logger was recording and the 12 months prior. This data determined the yearly rainfall totals at the Bixby Mesonet Station to be:

- 67.55 inches – 2015
- 29.73 inches – 2016
- 48.05 inches – 2017

Because Attachment C does not contain 30 years of historical precipitation data, the interactive map located on the Oklahoma Climatological Survey for normal annual precipitation (Attachment D) was used to obtain the 30-year mean precipitation. The red dot on the map in Attachment D represents the location of the landfill and the number resulting from the scale on the map, which is the 30-year mean precipitation, was determined to be approximately 41.7 inches per year.

4.0 Precipitation vs Groundwater Elevation Readings

Based on the data presented in Attachment F, the local precipitation had no measurable effect on groundwater elevations at the Creek County Landfill during the study period. The data is also shown graphically in Attachment E.

The groundwater elevations (one reading/day) utilized for the study had a variability of 0.02 ft. The raw data from the data logger (approx. 44,000 readings) had a variability of 0.03 ft. These readings fluctuated on a daily/weekly basis and demonstrated no correlation to periods of high precipitation or seasonal fluctuation. Furthermore, the recorded variability falls within the manufacturer's listed accuracy percentage error of 0.01%.

5.0 Groundwater / Waste Separation

The bottom of the clay liner at the Creek County Landfill expansion is at an elevation of 660 ft according to information supplied by the client. The highest groundwater elevation recorded during the study (between September 28, 2015 and March 25, 2017) was 641.33 ft. This shows that the minimum distance between the highest groundwater elevation and the lowest elevation of the waste to be 18.67 ft.

6.0 Conclusion

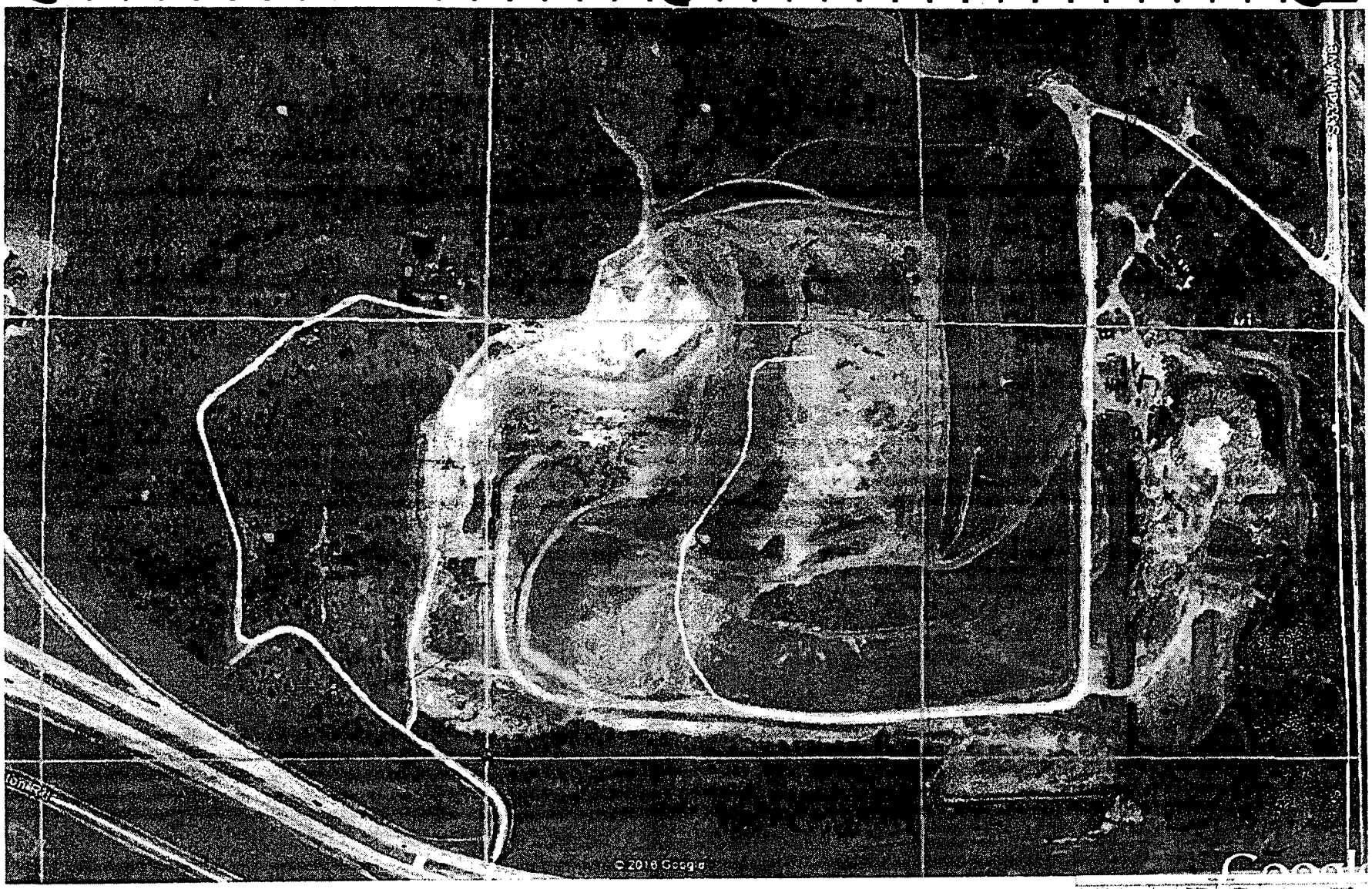
Independent of rainfall, there is adequate separation of groundwater (>15') and the bottom of the clay liner.

7.0 References

1. Aimright Testing and Engineering – Report Summary of Monitoring Well Construction. Project No. 2520316. November 17, 2016.
2. Drilling Plan. Joe B. Ramey. Project No. 2016-2500.
3. Geokon Products Piezometers Specifications. http://www.geokon.com/4500-Series.
4. Oklahoma Administrative Code Title 252. Department of Environmental Quality Chapter 515. Management of Solid Waste.
5. Oklahoma Climatological Survey. http://www.mesonet.org/index.php/weather/local/.

Attachment A

Piezometer Location and Drill Logs



SURVEY PLAN

CLIENT: Creek County Landfill
PROJECT: Creek County Landfill Expansion
LOCATION: Creek County, OK

PROJECT NO.: 2530316
SOURCE: Trout Surveying, LLC
SCALE: Not to Scale

AIMRIGHT
TESTING & ENGINEERING

FIGURE 1

APPROXIMATE MONITORING WELL OR BORING LOCATION

NORTH

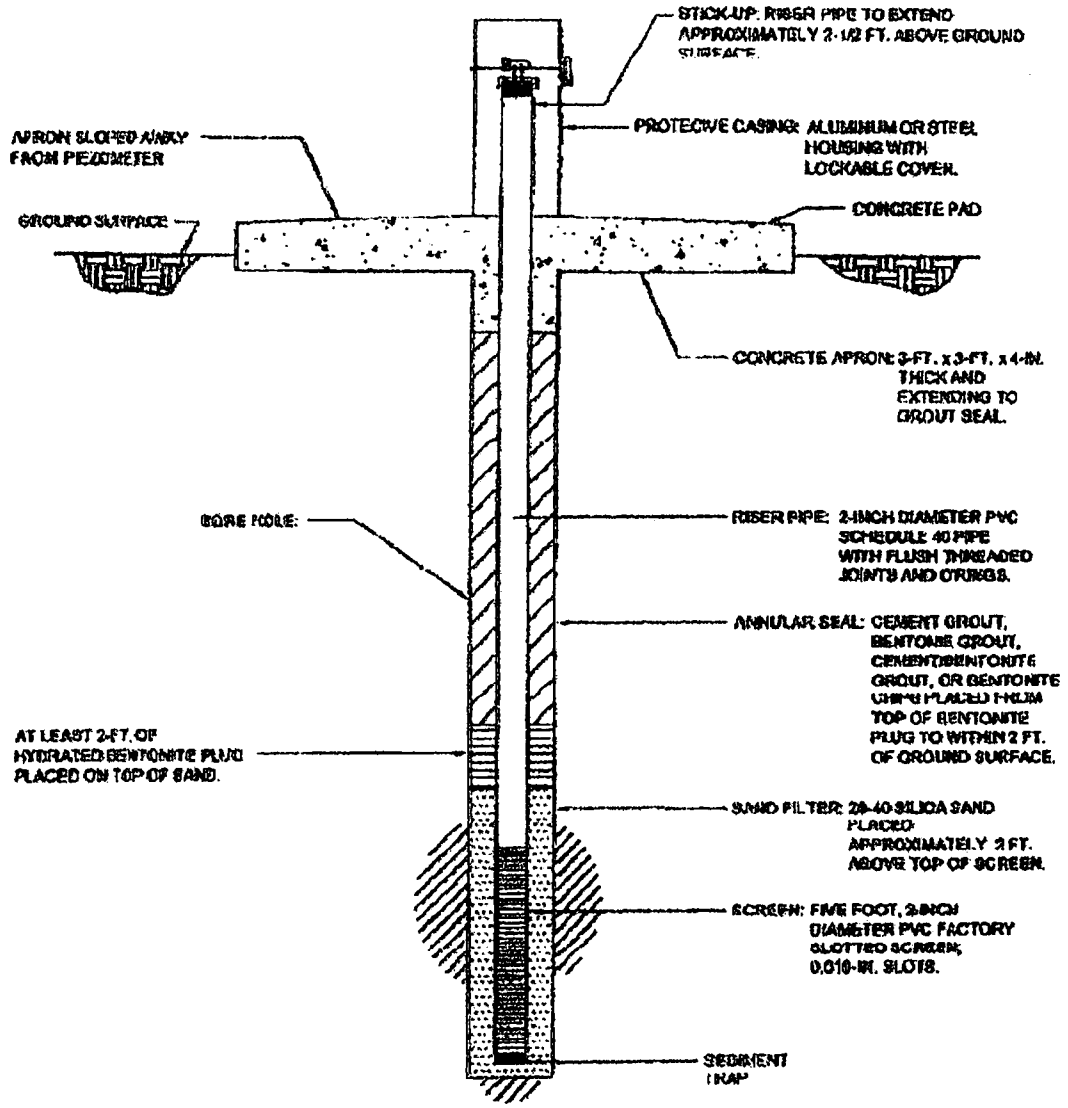
MONITORING WELL AND BORING LOCATION PLAN

CLIENT: Creek County Landfill
PROJECT: Creek County Landfill Expansion
LOCATION: Creek County, OK

PROJECT NO.: 2530316
SOURCE: Aerial Imagery
SCALE: Not to Scale

AIMRIGHT
TESTING & ENGINEERING

FIGURE 2



NOT TO SCALE

MONITORING WELL AND CONSTRUCTION TYPICAL DETAIL PLAN

CLIENT: Creek County Landfill
PROJECT: Creek County Landfill Expansion
LOCATION: Creek County, OK

PROJECT NO.: 2530316
SOURCE: N/A
SCALE: Not to Scale

AMRIGHT
TESTING & ENGINEERING

FIGURE 3

AIMRIGHT
TESTING & ENGINEERING

MONITORING WELL LOG
WELL NO. BPZ14-1

PROJECT: Creek County Landfill Expansion **PROJECT NO.:** 2520316

LOCATION: B-2 (36.01095, -96.03885) (N 373859.78, E 2548483.46) **ELEVATION:** 693.06

DRILLER: B. Guinn **DATE DRILLED:** 3/31/16 **DRILLING:** CME 550/6-in hollow-stem auger/air rotary

WATER DEPTH at DRILLING: 64 ft **WATER DEPTH at END:** 80 ft **COMPLETION DEPTH:** 96 ft

DEPTH (feet)	ELEVATION (feet)	Well Construction Diagram	Groundwater	Sampler	Soil Graphic	DESCRIPTION
-2	694					
0	692					FAT CLAY w/ SAND, SANDSTONE fragments brown
2	690					
4	688					
6	686					
8	684					
10	682					
12	680					
14	678					
16	676					
18	674					SHALE highly weathered light to dark gray
20	672					
22	670					
24	668					
26	666					
28	664					
30	662					
32	660					
34	658					
36	656					
38	654					
40	652					
42	650					
44	648					
46	646					
48	644					
50	642					
52	640					
54	638					
56	636					
58	634					
60	632					
62	630					thin LIMESTONE seam
64	628					
66	626					
68	624					
70	622					
72	620					
74	618					
76	616					
78	614					
80	612					SHALE slightly to moderately weathered dark gray
82	610					
84	608					
86	606					
88	604					
90	602					
92	600					
94	598					
96	596					
98	594					
100	592					
102	590					
104	588					
106	586					
108						

PROTECTIVE COVER TYPE:
Capped w/ Locking Riser

GROUT:
Type: Type II Portland Cement
Quantity: 5 bags (92.6 lb ea)
Total Depth: 83.5 ft

BACKFILL:
Type: Premier Silica Sand
Top Depth: 87 ft
Bottom Depth: 96 ft

CASING:
Diameter: 2 in
Length: 76.5 ft
Stick Up: 2.5 ft

SEAL:
Type: 3/8 in Sodium Bentonite
Quantity: 1 bag (40 lb ea)
Top Depth: 84.5 ft
Bottom Depth: 87 ft

SCREEN:
Type: Schedule 40 PVC
Diameter: 2 in
Slot Size: 0.010
Top Depth: 90 ft
Bottom Depth: 95 ft

COMMENTS:
N/A

AIMRIGHT
TESTING & ENGINEERING

MONITORING WELL LOG
WELL NO. B14-2

PROJECT: Creek County Landfill Expansion **PROJECT NO.:** 2520316

LOCATION: B-4 (36.01177, -96.03884) (N 374159.29, E 2548479.88) **ELEVATION:** 695.3

DRILLER: B. Guinn **DATE DRILLED:** 4/1/16 **DRILLING:** CME 550/6-in hollow-stem auger/air rotary

WATER DEPTH at DRILLING: N/A **WATER DEPTH at END:** N/A **COMPLETION DEPTH:** 45 ft

DEPTH (feet)	ELEVATION (feet)	Well Construction Diagram	Groundwater	Sampler	Soil Graphic	DESCRIPTION
0	694					
2	692					
4	690					
6	688					LEAN CLAY w/ SANDSTONE and SHALE fragments medium brown
8	686					
10	684					
12	682					
14	680					
16	678					
18	676					
20	674					
22	672					
24	670					
26	668					
28	666					SHALE w/ SANDSTONE seams, highly to slightly weathered dark gray
30	664					
32	662					
34	660					
36	658					
38	656					
40	654					
42	652					
44	650					
46	648					
48	646					
50	644					NO WELL CONSTRUCTION AT THIS LOCATION.
52	642					
54	640					
56	638					
58	636					
60	634					
62	632					
64	630					
66	628					
68	626					
70	624					
72	622					
74	620					
76	618					
78	616					
80	614					
82	612					
84	610					
86	608					
88	606					
90	604					
92	602					
94	600					
96	598					
98	596					
100	594					
102	592					
104	590					
106	588					
108	586					
110						

PROTECTIVE COVER TYPE: N/A

GROUT:
Type: N/A
Quantity:
Total Depth:

BACKFILL:
Type: N/A
Top Depth:
Bottom Depth:

CASING:
Diameter: N/A
Length:
Stick Up:

SEAL:
Type: N/A
Quantity:
Top Depth:
Bottom Depth:

SCREEN:
Type: N/A
Diameter:
Slot Size:
Top Depth:
Bottom Depth:

COMMENTS:
N/A

AIMRIGHT
TESTING & ENGINEERING

MONITORING WELL LOG
WELL NO. BPZ14-3

PROJECT: Creek County Landfill Expansion **PROJECT NO.:** 2520316

LOCATION: B-3 (36.01262, -96.03883) (N 374469.62, E 2548475.38) **ELEVATION:** 707.65

DRILLER: B. Guinn **DATE DRILLED:** 4/1/16 **DRILLING:** CME 550/6-in hollow-stem auger/air rotary

WATER DEPTH at DRILLING: 44 ft **WATER DEPTH at END:** 75 ft **COMPLETION DEPTH:** 80 ft

DEPTH (feet)	ELEVATION (feet)	Well Construction Diagram	Groundwater	Sampler	Soil Graphic	DESCRIPTION
-2	710					
0	708					
2	706					
4	704					
6	702					
8	700					
10	698					
12	696					
14	694					FAT CLAY medium to dark brown
16	692					
18	690					
20	688					
22	686					
24	684					
26	682					
28	680					
30	678					thin LIMESTONE seam
32	676					
34	674					
36	672					
38	670					
40	668					
42	666					
44	664					
46	662					
48	660					
50	658					
52	656					
54	654					SHALE moderately to highly weathered dark gray
56	652					
58	650					
60	648					
62	646					
64	644					
66	642					
68	640					
70	638					
72	636					
74	634					
76	632					
78	630					
80	628					
82	626					
84	624					
86	622					
88	620					
90	618					
92	616					
94	614					
96	612					
98	610					
100	608					
102	606					
104	604					
106	602					
108	600					

PROTECTIVE COVER TYPE:
Capped w/ Locking Riser

GROUT:
Type: Type II Portland Cement
Quantity: 4 bags (92.6 lb ea)
Total Depth: 68 ft

BACKFILL:
Type: Premier Silica Sand
Top Depth: 72 ft
Bottom Depth: 80 ft

CASING:
Diameter: 2 in
Length: 76.5 ft
Stick Up: 2.5 ft

SEAL:
Type: 3/8 in Sodium Bentonite
Quantity: 1 bag (40 lb ea)
Top Depth: 69 ft
Bottom Depth: 72 ft

SCREEN:
Type: Schedule 40 PVC
Diameter: 2 in
Slot Size: 0.010
Top Depth: 74 ft
Bottom Depth: 79 ft

COMMENTS:
N/A

ATMRIGHT
TESTING & ENGINEERING

MONITORING WELL LOG
WELL NO. B14-4

PROJECT: Creek County Landfill Expansion **PROJECT NO.:** 2520316

LOCATION: B-5 (36.01231, -96.03935) (N 374351.39, E 2548325.65) **ELEVATION:** 695.19

DRILLER: B. Guinn **DATE DRILLED:** 4/4/16 **DRILLING:** CME 550/6-in hollow-stem auger/air rotary

WATER DEPTH at DRILLING: 45 ft **WATER DEPTH at END:** N/A **COMPLETION DEPTH:** 65 ft

DEPTH (feet)	ELEVATION (feet)	Well Construction Diagram	Groundwater	Sampler	Soil Graphic	DESCRIPTION
0	694					LEAN CLAY w/ SANDSTONE fragments mottled light and medium brown
2	692					
4	690					
6	688					
8	686					
10	684					SHALE highly weathered olive gray
12	682					
14	680					
16	678					
18	676					
20	674					
22	672					
24	670					
26	668					
28	666					
30	664					
32	662					
34	660					
36	658					SHALE highly weathered light gray
38	656					
40	654					
42	652					
44	650		▽			
46	648					
48	646					
50	644					
52	642					
54	640					
56	638					
58	636					
60	634					SHALE moderately to slightly weathered dark gray
62	632					
64	630					
66	628					NO WELL CONSTRUCTION AT THIS LOCATION.
68	626					
70	624					
72	622					
74	620					
76	618					
78	616					
80	614					
82	612					
84	610					
86	608					
88	606					
90	604					
92	602					
94	600					
96	598					
98	596					
100	594					
102	592					
104	590					
106	588					
108	586					
110						

PROTECTIVE COVER TYPE: N/A

GROUT:
Type: N/A
Quantity:
Total Depth:

BACKFILL:
Type: N/A
Top Depth:
Bottom Depth:

CASING:
Diameter: N/A
Length:
Stick Up:

SEAL:
Type: N/A
Quantity:
Top Depth:
Bottom Depth:

SCREEN:
Type: N/A
Diameter:
Slot Size:
Top Depth:
Bottom Depth:

COMMENTS:
N/A

AIMRIGHT
TESTING & ENGINEERING

MONITORING WELL LOG
WELL NO. BPZ14-5

PROJECT: Creek County Landfill Expansion **PROJECT NO.:** 2520316

LOCATION: B-1 (36.01175, -96.03966) (N 374146.06, E 2548235.88) **ELEVATION:** 724.69

DRILLER: B. Guinn/C. Guinn **DATE DRILLED:** 3/31/16 **DRILLING:** CME 550/6-in hollow-stem auger/air rotary

WATER DEPTH at DRILLING: 46 ft **WATER DEPTH at END:** 82 ft **COMPLETION DEPTH:** 100 ft

DEPTH (feet)	ELEVATION (feet)	Well Construction Diagram	Groundwater	Sampler	Soil Graphic	DESCRIPTION
-2	726					
0	724					FAT CLAY mottled brown and reddish brown
2	722					
4	720					
6	718					LEAN CLAY w/ SHALE and SANDSTONE fragments light brown to brown
8	716					
10	714					
12	712					
14	710					
16	708					
18	706					
20	704					SHALE w/ SANDSTONE seams, highly weathered dark gray
22	702					
24	700					
26	698					
28	696					thin LIMESTONE seam
30	694					
32	692					
34	690					
36	688					
38	686					
40	684					
42	682					
44	680					
46	678					
48	676					
50	674					
52	672					
54	670					
56	668					
58	666					
60	664					SHALE slightly to highly weathered gray
62	662					
64	660					
66	658					
68	656					
70	654					
72	652					
74	650					
76	648					
78	646					
80	644					
82	642					
84	640					
86	638					
88	636					
90	634					
92	632					
94	630					
96	628					
98	626					
100	624					
102	622					
104	620					
106	618					
108						

PROTECTIVE COVER TYPE:
Capped w/ Locking Riser

GROUT:
Type: Type II Portland Cement
Quantity: 6 bags (92.6 lb ea)
Total Depth: 89 ft

BACKFILL:
Type: Premier Silica Sand
Top Depth: 92 ft
Bottom Depth: 100 ft

CASING:
Diameter: 2.0 in
Length: 97.5 ft
Stick Up: 2.5 ft

SEAL:
Type: 3/8 in Sodium Bentonite
Quantity: 1 bag (40 lb ea)
Top Depth: 90 ft
Bottom Depth: 92 ft

SCREEN:
Type: Schedule 40 PVC
Diameter: 2 in
Slot Size: 0.010
Top Depth: 94 ft
Bottom Depth: 99 ft

COMMENTS:
N/A

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	High Plasticity Clay
	Low Plasticity Clay
	Shale
	Limestone
Misc. Symbols	
	Water Table at Boring Completion
	Water Table during Drilling
Soil Samplers	
	5 ft, 3 in Outside Diameter Split-Spoon Sampler
Monitor Well Details	
	Capped Riser w/ Locking Cover
	Grouted Seal
	Bentonite Seal
	PVC Pipe w/ Sand Backfill
	Slotted PVC Pipe w/ Sand Backfill
	Endcap on Pipe Packed in Sand

B-4

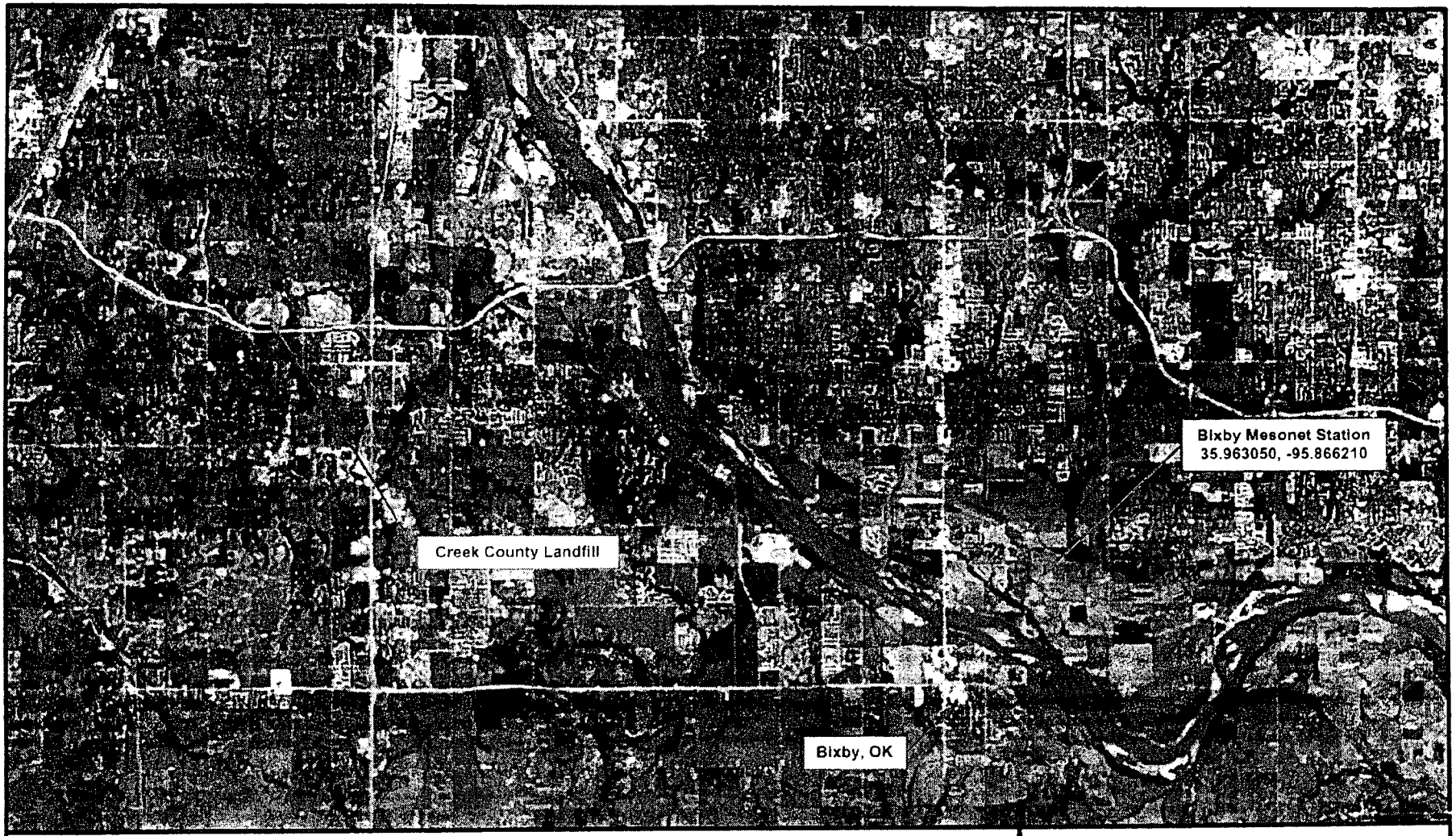
Surface Elevation: 683.8
Boring Date: 10/18/99
Boring Location: East Middle
Drilling Method: HS Auger

Depth	Remarks	Moisture (%)	Dry Density	Blow Counts	Sample Type	Water Table		
			18				CL	Brown silty, sandy clay, with sandstone gravel, trace organics
							CL	Inorganic Brown Sandy Clay
10							TS	Tan Shale, clayey
							TS	Tan Shale, thin seam of smutty coal at 17.2 feet
20							GS	Gray Shale
30								
40								
50								
60							END	Boring completed at depth of 60

LOG OF BORING

Attachment B

Bixby, OK Mesonet Station Location



0.0 5.0

APPROXIMATE SCALE (MILES)

N
W E
S

BLACKSHARE
ENVIRONMENTAL SOLUTIONS

Bixby Mesonet Station

PROJECT NO.: 3684-17 DATE: 05/03/2018 BY: MJV

Attachment C

Historical Monthly Precipitation

Monthly and Yearly Precipitation Totals (inches)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
1981 - 2010 Normal	1.94	2.05	3.75	3.49	6.08	4.64	2.96	2.59	4.38	4.24	3.16	2.47	41.74
Mesonet Average	1.4	1.96	3.28	4.25	5.53	4.51	3.7	3.71	3.57	3.34	2.65	2.31	40.21
1994	0.63	2.49	3.39	4.28	3.33	2.01	7.07	3.83	--	--	5.1	0.88	--
1995	0.76	0.83	0.71	4.36	6.84	5.63	3.98	0.21	3.37	1.01	0.56	1.69	29.95
1996	2.16	0.12	--	1.67	--	5.91	3.29	1.45	5.43	--	6.05	0.14	--
1997	0.27	3.99	2.38	4.46	2.96	5.31	3.11	9.07	3.61	3.48	1.66	4.72	45.02
1998	4.08	0.34	5.86	3.33	3.67	2.98	--	1.18	3.32	9.85	3.92	1.73	--
1999	2.65	1.38	3.91	8.46	8.09	9.83	0.23	--	5.43	2.13	1.7	3.97	--
2000	0.87	2.13	3.2	3.55	7.67	7.38	4.69	0	1.05	4.6	5.29	1.13	41.56
2001	--	4.44	1.06	--	6.76	2.97	0.23	1.82	2.72	3.51	3.75	2.38	--
2002	2.02	1.09	--	3.39	6.7	4.19	--	3.07	0.81	3.72	--	3.7	--
2003	0.15	2.5	3.66	1.43	3.77	5.6	--	10.5	2.6	3.07	--	2.35	--
2004	1.83	1.33	5.35	2.71	2.05	6.12	6.6	1.2	1.1	5.19	4.32	1.11	38.91
2005	3.82	2.35	1.25	2.15	2.42	--	3.2	7.58	1.72	1.46	0.01	0.47	--
2006	0.81	0.51	2.46	4.67	4.2	2.64	4.44	5.68	3.48	1.57	2.05	5.08	37.59
2007	2.62	1.18	3.01	1.91	7.55	--	3.67	4.99	5.57	--	0.53	--	--
2008	1.22	2.34	6.55	8.34	9.57	8.06	4.68	2.06	4.63	2.02	1.63	1.98	53.08
2009	0.93	2.1	3.97	4.79	4.59	2.23	3.27	4.14	9.72	6.61	0.63	2.18	45.16
2010	1.84	2.84	2.8	2.49	5.59	4.2	4.62	1.16	5.57	1.29	3.13	0.44	35.97
2011	0.26	2.47	0.72	6.48	4.7	2.59	0.69	3.14	3.9	2.11	5.03	1.82	33.91
2012	0.82	1	6.06	2.55	1.57	2.64	0.68	3.94	4.53	0.14	0.81	1.17	25.91
2013	2.1	3.47	4	5.83	4.32	4.83	4.7	2.82	2.03	3.33	1.21	1.84	40.48
2014	0.26	0.32	2.18	1.47	2.4	4.98	3.77	1.83	3.16	4.77	1.73	1.52	28.39
2015	0.77	0.87	3.79	4.38	18.5	8.62	7.16	2.02	3.15	1.82	7.59	10.88	67.55
2016	0.49	1.6	2.96	5.72	3.72	0.82	4.2	2.63	3.77	2.34	0.99	0.49	29.73
2017	1.9	1.58	1.56	11.03	6.25	1.75	3.45	11.01	1.35	6.1	0.67	1.4	48.05
2018	0.38	5.81	4.65	2.62	--	--	--	--	--	--	--	--	--

Bixby, OK Mesonet Station

Yearly Average: 40.1

Monthly and Yearly Precipitation Totals (inches)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
1981 - 2010 Normal	1.94	2.05	3.75	3.49	6.08	4.64	2.96	2.59	4.38	4.24	3.16	2.47	41.74
Mesonet Average	1.52	1.96	3.26	4.18	5.38	4.78	3.58	3.58	3.54	3.36	2.53	2.32	40
1994	0.63	2.49	3.39	4.28	3.33	2.01	7.07	3.83	2.97	2.57	5.1	0.88	38.55
1995	0.76	0.83	0.71	4.36	6.84	5.63	3.98	0.21	3.37	1.01	0.56	1.69	29.95
1996	2.16	0.12	3.04	1.67	1.98	5.91	3.29	1.45	5.43	4.99	6.05	0.14	36.23
1997	0.27	3.99	2.38	4.46	2.96	5.31	3.11	9.07	3.61	3.48	1.66	4.72	45.02
1998	4.08	0.34	5.86	3.33	3.67	2.98	4.4	1.18	3.32	9.85	3.92	1.73	44.66
1999	2.65	1.36	3.91	8.46	8.09	9.83	0.23	0.56	5.43	2.13	1.7	3.97	48.32
2000	0.87	2.13	3.2	3.55	7.67	7.38	4.69	0	1.05	4.6	5.29	1.13	41.56
2001	4.39	4.44	1.06	2.52	6.78	2.97	0.23	1.82	2.72	3.51	3.75	2.38	36.57
2002	2.02	1.09	2.89	3.39	6.7	4.19	3.3	3.07	0.81	3.72	0.6	3.7	35.48
2003	0.15	2.5	3.66	1.43	3.77	6.6	0.51	10.5	2.6	3.07	1.82	2.35	37.96
2004	1.83	1.33	5.35	2.71	2.05	6.12	6.6	1.2	1.1	5.19	4.32	1.11	38.91
2005	3.82	2.35	1.25	2.15	2.42	4.41	3.2	7.58	1.72	1.48	0.01	0.47	30.84
2006	0.81	0.51	2.46	4.67	4.2	2.64	4.44	5.68	3.48	1.57	2.05	5.08	37.59
2007	2.62	1.18	3.01	1.91	7.55	10.97	3.67	4.99	5.57	3.05	0.53	2.65	47.7
2008	1.22	2.34	6.55	8.34	9.57	8.06	4.68	2.06	4.63	2.02	1.63	1.98	53.08
2009	0.93	2.1	3.97	4.79	4.59	2.23	3.27	4.14	9.72	6.61	0.63	2.18	45.16
2010	1.84	2.84	2.8	2.49	5.59	4.2	4.62	1.16	5.57	1.29	3.13	0.44	35.97
2011	0.26	2.47	0.72	6.48	4.7	2.59	0.69	3.14	3.9	2.11	5.03	1.82	33.91
2012	0.82	1	6.06	2.55	1.57	2.64	0.68	3.94	4.53	0.14	0.81	1.17	25.91
2013	2.1	3.47	4	5.83	4.32	4.83	4.7	2.82	2.03	3.33	1.21	1.84	40.48
2014	0.26	0.32	2.18	1.47	2.4	4.98	3.77	1.83	3.16	4.77	1.73	1.52	28.39
2015	0.77	0.87	3.79	4.38	18.5	6.62	7.16	2.02	3.15	1.82	7.59	10.88	67.55
2016	0.49	1.6	2.96	5.72	3.72	0.82	4.2	2.63	3.77	2.34	0.99	0.49	29.73
2017	1.9	1.58	1.56	11.03	6.25	1.75	3.45	11.01	1.35	6.1	0.67	1.4	48.05
2018	0.38	5.81	4.65	2.62	--	--	--	--	--	--	--	--	--

Bixby, OK Mesonet Staion

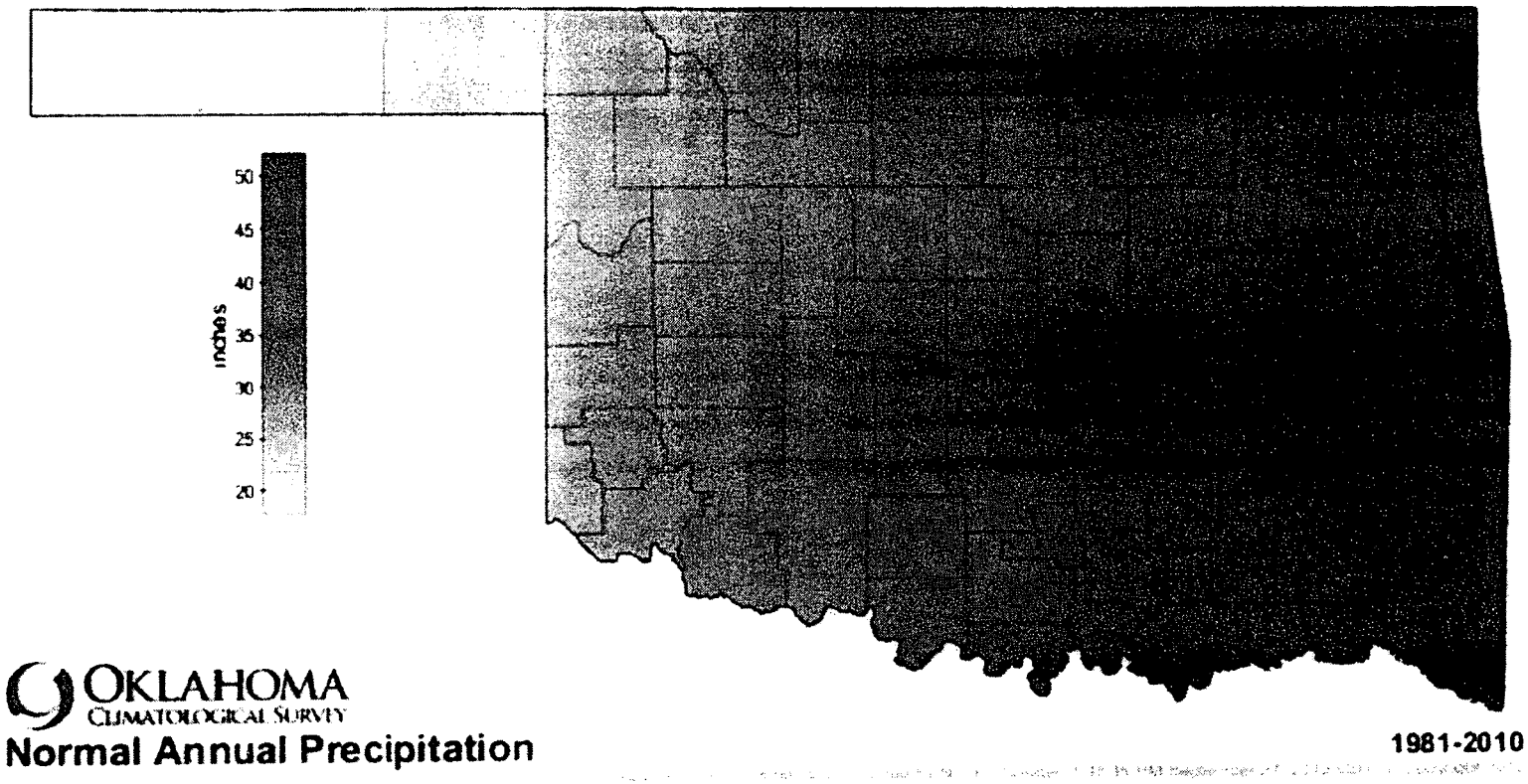
*Red data indicates estimate by OK Climatological Survey.

Yearly Average: 39.9

Attachment D

Oklahoma 30-year Annual Precipitation

Normal Annual Precipitation for a 30-year peroid.

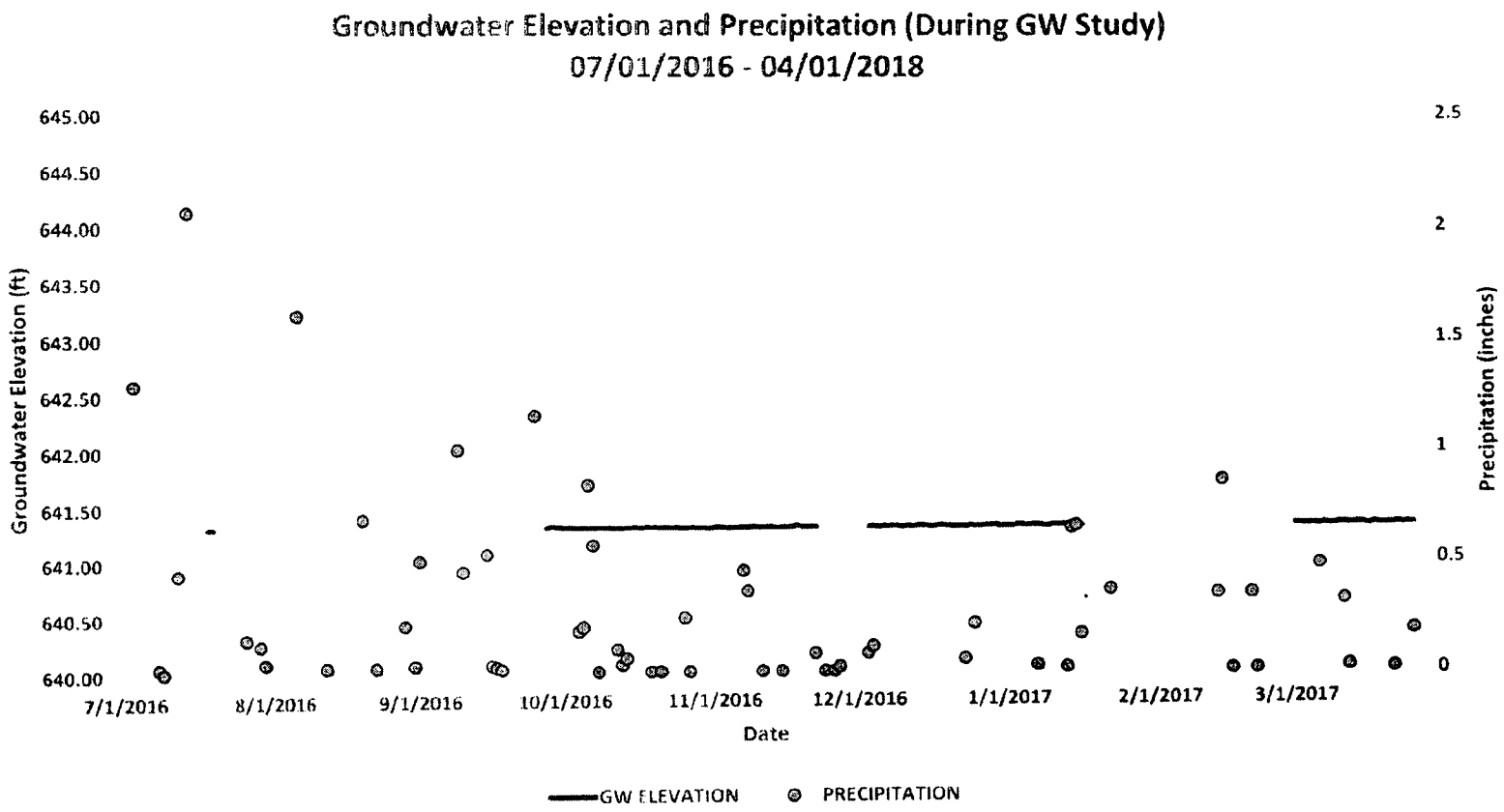


Oklahoma Climatological Survey

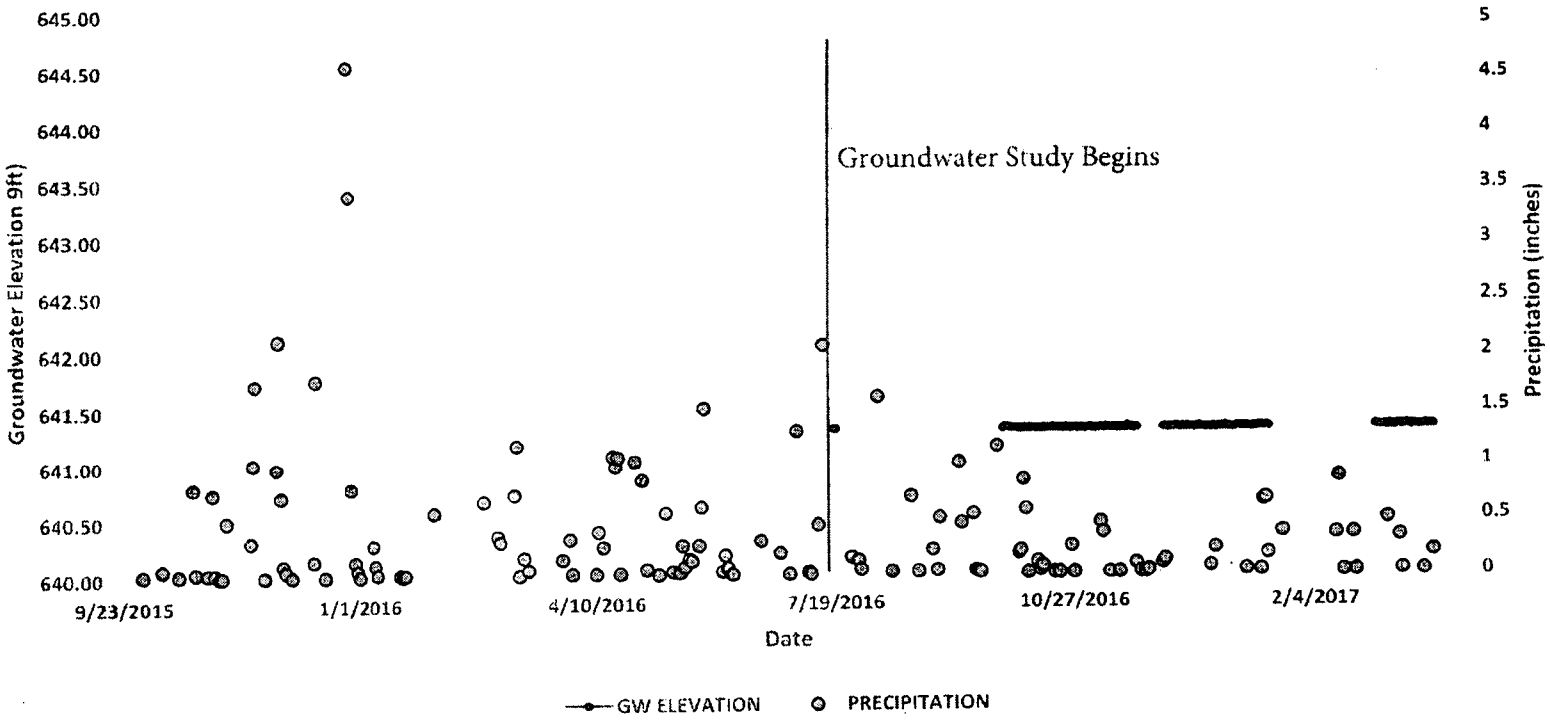
http://climate.ok.gov/index.php/climate/map/normal_annual_precipitation/oklahoma_climate

Attachment E

Precipitation vs Groundwater Elevation Graphs


Groundwater Elevation and Precipitation (During GW Study)
07/01/2016 - 04/01/2018
Groundwater Elevation (ft)
645.00
644.50
644.00
643.50
643.00
642.50
642.00
641.50
641.00
640.50
640.00
Precipitation (inches)
2.5
2
1.5
1
0.5
0
7/1/2016
8/1/2016
9/1/2016
10/1/2016
11/1/2016
12/1/2016
1/1/2017
2/1/2017
3/1/2017
Date
GW ELEVATION
PRECIPITATION

Groundwater Elevation and Precipitation (Icluding Precipitation from Prior Year)
09/28/2015 - 03/25/2017



Attachment F

Daily Groundwater Elevations and Precipitation Data

Groundwater Elevations and Precipitation (9/28/2015 – 3/25/2017)

Date	GW Elevation	Precipitation
9/28/2015		
9/29/2015		
9/30/2015		
10/1/2015		0.03
10/2/2015		
10/3/2015		
10/4/2015		
10/5/2015		
10/6/2015		
10/7/2015		
10/8/2015		
10/9/2015		0.08
10/10/2015		
10/11/2015		
10/12/2015		
10/13/2015		
10/14/2015		
10/15/2015		
10/16/2015		0.03
10/17/2015		
10/18/2015		
10/19/2015		
10/20/2015		
10/21/2015		
10/22/2015		0.8
10/23/2015		0.05
10/24/2015		
10/25/2015		
10/26/2015		
10/27/2015		
10/28/2015		0.04
10/29/2015		
10/30/2015		0.75
10/31/2015		0.04
11/1/2015		
11/2/2015		0.01
11/3/2015		0.01
11/4/2015		
11/5/2015		0.5

11/6/2015		
11/7/2015		
11/8/2015		
11/9/2015		
11/10/2015		
11/11/2015		
11/12/2015		
11/13/2015		
11/14/2015		
11/15/2015		0.32
11/16/2015		1.02
11/17/2015		1.73
11/18/2015		
11/19/2015		
11/20/2015		
11/21/2015		0.01
11/22/2015		
11/23/2015		
11/24/2015		
11/25/2015		
11/26/2015		0.98
11/27/2015		2.12
11/28/2015		0.72
11/29/2015		0.11
11/30/2015		0.06
12/1/2015		
12/2/2015		
12/3/2015		0.01
12/4/2015		
12/5/2015		
12/6/2015		
12/7/2015		
12/8/2015		
12/9/2015		
12/10/2015		
12/11/2015		
12/12/2015		0.15
12/13/2015		1.77
12/14/2015		
12/15/2015		
12/16/2015		

12/17/2015		0.01
12/18/2015		
12/19/2015		
12/20/2015		
12/21/2015		
12/22/2015		
12/23/2015		
12/24/2015		
12/25/2015		
12/26/2015		4.55
12/27/2015		3.4
12/28/2015		0.79
12/29/2015		
12/30/2015		0.14
12/31/2015		0.06
1/1/2016		0.01
1/2/2016		
1/3/2016		
1/4/2016		
1/5/2016		
1/6/2016		
1/7/2016		0.29
1/8/2016		0.11
1/9/2016		0.03
1/10/2016		
1/11/2016		
1/12/2016		
1/13/2016		
1/14/2016		
1/15/2016		
1/16/2016		
1/17/2016		
1/18/2016		
1/19/2016		0.02
1/20/2016		0.01
1/21/2016		0.02
1/22/2016		
1/23/2016		
1/24/2016		
1/25/2016		
1/26/2016		

1/27/2016		
1/28/2016		
1/29/2016		
1/30/2016		
1/31/2016		
2/1/2016		
2/2/2016		0.57
2/3/2016		
2/4/2016		
2/5/2016		
2/6/2016		
2/7/2016		
2/8/2016		
2/9/2016		
2/10/2016		
2/11/2016		
2/12/2016		
2/13/2016		
2/14/2016		
2/15/2016		
2/16/2016		
2/17/2016		
2/18/2016		
2/19/2016		
2/20/2016		
2/21/2016		
2/22/2016		
2/23/2016		0.67
2/24/2016		
2/25/2016		
2/26/2016		
2/27/2016		
2/28/2016		
2/29/2016		0.36
3/1/2016		0.31
3/2/2016		
3/3/2016		
3/4/2016		
3/5/2016		
3/6/2016		
3/7/2016		0.73

3/8/2016		1.18
3/9/2016		0.01
3/10/2016		
3/11/2016		0.17
3/12/2016		
3/13/2016		0.06
3/14/2016		
3/15/2016		
3/16/2016		
3/17/2016		
3/18/2016		
3/19/2016		
3/20/2016		
3/21/2016		
3/22/2016		
3/23/2016		
3/24/2016		
3/25/2016		
3/26/2016		
3/27/2016		0.15
3/28/2016		
3/29/2016		
3/30/2016		0.33
3/31/2016		0.02
4/1/2016		
4/2/2016		
4/3/2016		
4/4/2016		
4/5/2016		
4/6/2016		
4/7/2016		
4/8/2016		
4/9/2016		
4/10/2016		0.02
4/11/2016		0.4
4/12/2016		
4/13/2016		0.26
4/14/2016		
4/15/2016		
4/16/2016		
4/17/2016		1.08

4/18/2016		0.98
4/19/2016		1.07
4/20/2016		0.02
4/21/2016		
4/22/2016		
4/23/2016		
4/24/2016		
4/25/2016		
4/26/2016		1.03
4/27/2016		
4/28/2016		
4/29/2016		0.86
4/30/2016		
5/1/2016		0.06
5/2/2016		
5/3/2016		
5/4/2016		
5/5/2016		
5/6/2016		0.01
5/7/2016		
5/8/2016		
5/9/2016		0.56
5/10/2016		
5/11/2016		
5/12/2016		0.04
5/13/2016		
5/14/2016		
5/15/2016		0.03
5/16/2016		0.27
5/17/2016		0.08
5/18/2016		
5/19/2016		0.15
5/20/2016		0.13
5/21/2016		
5/22/2016		
5/23/2016		0.27
5/24/2016		0.61
5/25/2016		1.51
5/26/2016		
5/27/2016		
5/28/2016		

5/29/2016		
5/30/2016		
5/31/2016		
6/1/2016		
6/2/2016		0.04
6/3/2016		0.18
6/4/2016		0.07
6/5/2016		
6/6/2016		0.01
6/7/2016		
6/8/2016		
6/9/2016		
6/10/2016		
6/11/2016		
6/12/2016		
6/13/2016		
6/14/2016		
6/15/2016		
6/16/2016		
6/17/2016		
6/18/2016		0.31
6/19/2016		
6/20/2016		
6/21/2016		
6/22/2016		
6/23/2016		
6/24/2016		
6/25/2016		
6/26/2016		0.2
6/27/2016		
6/28/2016		
6/29/2016		
6/30/2016		0.01
7/1/2016		
7/2/2016		
7/3/2016		1.3
7/4/2016		
7/5/2016		
7/6/2016		
7/7/2016		
7/8/2016		0.03

7/9/2016		0.01
7/10/2016		
7/11/2016		
7/12/2016		0.45
7/13/2016		
7/14/2016		2.07
7/15/2016		
7/16/2016		
7/17/2016		
7/18/2016	641.32	
7/19/2016	641.32	
7/20/2016		
7/21/2016		
7/22/2016		
7/23/2016		
7/24/2016		
7/25/2016		
7/26/2016		0.16
7/27/2016		
7/28/2016		
7/29/2016		0.13
7/30/2016		0.05
7/31/2016		
8/1/2016		
8/2/2016		
8/3/2016		
8/4/2016		
8/5/2016		
8/6/2016		1.61
8/7/2016		
8/8/2016		
8/9/2016		
8/10/2016		
8/11/2016		
8/12/2016		0.03
8/13/2016		
8/14/2016		
8/15/2016		
8/16/2016		
8/17/2016		
8/18/2016		

8/19/2016		
8/20/2016		0.7
8/21/2016		
8/22/2016		
8/23/2016		0.03
8/24/2016		
8/25/2016		
8/26/2016		
8/27/2016		
8/28/2016		
8/29/2016		0.22
8/30/2016		
8/31/2016		0.04
9/1/2016		0.51
9/2/2016		
9/3/2016		
9/4/2016		
9/5/2016		
9/6/2016		
9/7/2016		
9/8/2016		
9/9/2016		1.01
9/10/2016		0.46
9/11/2016		
9/12/2016		
9/13/2016		
9/14/2016		
9/15/2016		0.54
9/16/2016		0.04
9/17/2016		0.03
9/18/2016		0.02
9/19/2016		
9/20/2016		
9/21/2016		
9/22/2016		
9/23/2016		
9/24/2016		
9/25/2016		1.16
9/26/2016		
9/27/2016	641.32	
9/28/2016	641.33	

9/29/2016	641.33	
9/30/2016	641.32	
10/1/2016	641.32	
10/2/2016	641.32	
10/3/2016	641.32	
10/4/2016	641.32	0.19
10/5/2016	641.32	0.21
10/6/2016	641.32	0.85
10/7/2016	641.32	0.58
10/8/2016	641.32	0.01
10/9/2016	641.32	
10/10/2016	641.32	
10/11/2016	641.32	
10/12/2016	641.32	0.11
10/13/2016	641.31	0.04
10/14/2016	641.32	0.07
10/15/2016	641.32	
10/16/2016	641.32	
10/17/2016	641.32	
10/18/2016	641.32	
10/19/2016	641.32	0.01
10/20/2016	641.32	
10/21/2016	641.32	0.01
10/22/2016	641.32	
10/23/2016	641.32	
10/24/2016	641.32	
10/25/2016	641.31	
10/26/2016	641.32	0.25
10/27/2016	641.32	0.01
10/28/2016	641.31	
10/29/2016	641.32	
10/30/2016	641.31	
10/31/2016	641.31	
11/1/2016	641.32	
11/2/2016	641.32	
11/3/2016	641.32	
11/4/2016	641.31	
11/5/2016	641.31	
11/6/2016	641.32	
11/7/2016	641.32	0.46
11/8/2016	641.32	0.37

11/9/2016	641.32	
11/10/2016	641.32	
11/11/2016	641.32	0.01
11/12/2016	641.32	
11/13/2016	641.32	
11/14/2016	641.31	
11/15/2016	641.32	0.01
11/16/2016	641.32	
11/17/2016	641.32	
11/18/2016	641.33	
11/19/2016	641.32	
11/20/2016	641.32	
11/21/2016	641.32	
11/22/2016	641.32	0.09
11/23/2016		
11/24/2016		0.01
11/25/2016		
11/26/2016		0.01
11/27/2016		0.03
11/28/2016		
11/29/2016		
11/30/2016		
12/1/2016		
12/2/2016		
12/3/2016	641.32	0.09
12/4/2016	641.32	0.12
12/5/2016	641.32	
12/6/2016	641.32	
12/7/2016	641.32	
12/8/2016	641.32	
12/9/2016	641.32	
12/10/2016	641.31	
12/11/2016	641.32	
12/12/2016	641.32	
12/13/2016	641.32	
12/14/2016	641.32	
12/15/2016	641.32	
12/16/2016	641.31	
12/17/2016	641.32	
12/18/2016	641.33	
12/19/2016	641.32	

12/20/2016	641.32	
12/21/2016	641.31	
12/22/2016	641.32	
12/23/2016	641.31	0.06
12/24/2016	641.32	
12/25/2016	641.32	0.22
12/26/2016	641.32	
12/27/2016	641.32	
12/28/2016	641.32	
12/29/2016	641.33	
12/30/2016	641.32	
12/31/2016	641.32	
1/1/2017	641.32	
1/2/2017	641.32	
1/3/2017	641.33	
1/4/2017	641.32	
1/5/2017	641.32	
1/6/2017	641.32	
1/7/2017	641.33	0.03
1/8/2017	641.32	
1/9/2017	641.32	
1/10/2017	641.33	
1/11/2017	641.32	
1/12/2017	641.33	
1/13/2017	641.33	0.02
1/14/2017	641.32	0.65
1/15/2017	641.33	0.66
1/16/2017	641.32	0.17
1/17/2017		
1/18/2017		
1/19/2017		
1/20/2017		
1/21/2017		
1/22/2017		0.37
1/23/2017		
1/24/2017		
1/25/2017		
1/26/2017		
1/27/2017		
1/28/2017		
1/29/2017		

1/30/2017		
1/31/2017		
2/1/2017		
2/2/2017		
2/3/2017		
2/4/2017		
2/5/2017		
2/6/2017		
2/7/2017		
2/8/2017		
2/9/2017		
2/10/2017		
2/11/2017		
2/12/2017		
2/13/2017		0.35
2/14/2017		0.86
2/15/2017		
2/16/2017		0.01
2/17/2017		
2/18/2017		
2/19/2017		
2/20/2017		0.35
2/21/2017		0.01
2/22/2017		
2/23/2017		
2/24/2017		
2/25/2017		
2/26/2017		
2/27/2017		
2/28/2017		
3/1/2017	641.33	
3/2/2017	641.32	
3/3/2017	641.32	
3/4/2017	641.32	
3/5/2017	641.33	
3/6/2017	641.32	0.48
3/7/2017	641.33	
3/8/2017	641.32	
3/9/2017	641.32	
3/10/2017	641.33	
3/11/2017	641.33	0.32

3/12/2017	641.32	0.02
3/13/2017	641.32	
3/14/2017	641.33	
3/15/2017	641.33	
3/16/2017	641.31	
3/17/2017	641.33	
3/18/2017	641.32	
3/19/2017	641.32	
3/20/2017	641.32	
3/21/2017	641.32	0.01
3/22/2017	641.33	
3/23/2017	641.32	
3/24/2017	641.33	
3/25/2017	641.32	0.18

7017 0190 0000 3555 1011

[redacted] WOODS

Kristie Valtierra, LPD

Creek County

For delivery information, [redacted] s.com

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SEP 17 2018

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SEP 18 2018

LAND PROTECTION DIVISION

DEPARTMENT OF ENVIRONMENTAL QUALITY

Sent To Danny Rosencutter

Street and Apt. No. or PO Box No. PO BOX 1597

City, State, ZIP+4 Sapulpa, OK 74067

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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- Electronic verification of delivery or attempted delivery.
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  - Return receipt service, which provides a record of delivery (including the recipient's signature). You can request a hardcopy return receipt or an electronic version. For a hardcopy return receipt, complete PS Form 3811, *Domestic Return Receipt;* attach PS Form 3811 to your mailpiece; for an electronic return receipt, see a retail associate for assistance. To receive a duplicate return receipt for no additional fee, present this USPS®-postmarked Certified Mail receipt to the retail associate.
  - Restricted delivery service, which provides delivery to the addressee specified by name, or to the addressee's authorized agent.
  - Adult signature service, which requires the signee to be at least 21 years of age (not available at retail).
  - Adult signature restricted delivery service, which requires the signee to be at least 21 years of age and provides delivery to the addressee specified by name, or to the addressee's authorized agent (not available at retail).
- To ensure that your Certified Mail receipt is accepted as legal proof of mailing, it should bear a USPS postmark. If you would like a postmark on this Certified Mail receipt, please present your Certified Mail item at a Post Office™ for postmarking. If you don't need a postmark on this Certified Mail receipt, detach the barcoded portion of this label, affix it to the mailpiece, apply appropriate postage, and deposit the mailpiece.

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SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Danny Rosencutt
Creek County Landfill
PO BOX 1597
Sapulpa, OK 74067

9590 9402 3345 7227 1637 77

2. Article Number (Transfer from service label)

7017 0190 0000 3555 1011

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name): Danny Rosencutt

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes ☐ No
If YES, enter delivery address below:

RECEIVED SEP 27 2018 LAND PROTECTION DIVISION DEPARTMENT OF ENVIRONMENTAL QUALITY

SAPULPA OK 74066 SEP 25 2018 USPS

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- ☐ Adult Signature Restricted Delivery
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- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

USPS TRACKING #

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Department of Environmental Quality
P.O. Box 1677
Oklahoma City, Oklahoma 73101 – 1677
Attn: Kristie A. Valtierra – LPD

Woods

COPY

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

SCOTT A. THOMPSON
Executive Director

MARY FALLIN
Governor

September 14, 2018

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. Danny Rosencutter
Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74067

Re: Groundwater Study on Adjacent 11.6 acres, Creek County Landfill, Permit Number 3519020, Creek County

NOTICE OF DEFICIENCY

Dear Mr. Rosencutter:

The Department of Environmental Quality (DEQ) received the subject Report on July 31, 2018. The Report was submitted to comply with Oklahoma Administrative Code (OAC) 252:515-7 Part 5. DEQ has reviewed the Report and has the following comments:

1. OAC 252:515-7-54(b) specifies one piezometer is required to have a continuous water level monitoring system installed. The Report provides information on the piezometer with the continuous water level monitoring system; however, the data provided does not span the entire 12 months, nor is the data provided continuous.

2. OAC 252:515-7-54(b) also specifies water levels in all other piezometers be monitored once a month for 12 months. This monthly data was not included in the Report.

Please address these comments and submit an updated Report with the submittal of the Tier III permit application for the 11.6 acre expansion. If you have any questions, please contact Martha Grafton of my staff at (405) 702-5144.

Sincerely,

Hillary Young, P.E.
Chief Engineer
Land Protection Division

HY/mg

LAND PROTECTION DIVISION
CONTROL SHEET

Program Code 065

Subject: Creek Co. Landfill

Type of Letter: Groundwater Study

Date Draft Submitted: 5 Sep 2018

Send Copies to:

		Initials	Date
1.	Typist Martha Grafton	MG	5 Sep 18
2	Preparer (Add or mark through names below as appropriate for review)		

Letters to be submitted in draft (not on letterhead) form to the following:

3.	Preparer's Supervisor David Cates	DAC	9/6/18
4.	Compliance		
5.	Attorney/Legal		
6.	Clerical		
7.	Signatory Hillary Young	HY	9/12
8.	Patrick Riley	PR	9-10-18

Final letter (prepared on letterhead & ready for mailing) to be submitted to the following:

1.	Preparer (I have re-read this letter for content & quality)	MG	14 Sep 18
2.	Data Entry (if applicable)		
3.	Clerical Michele Woods		
4.	Preparer's Supervisor David Cates	DAC	9/14
5.	Signature Hillary Young	HY	
6.	Edoctus Barcode Preparation: Solid Waste 3519020		

Letter will be returned to clerical person for copying and mailing.

Date letter mailed/Initial: 9/14/18 KAW

Certified Mail # 7017 0190 0000 3555 1011

(This control sheet is to be attached to file copy of **final letter** and placed in facility file.)

Revised 5/5/14

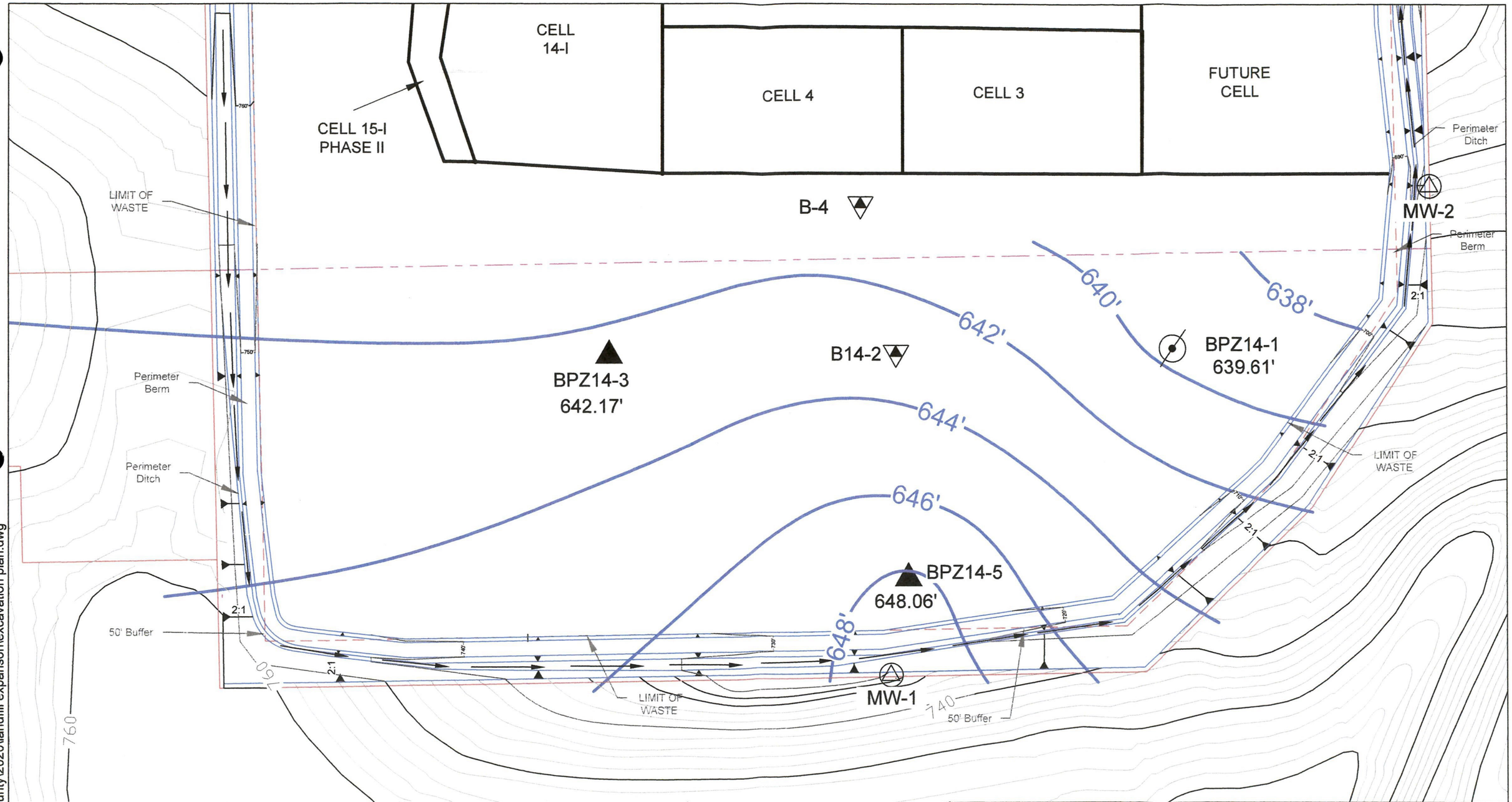
APPENDIX F-3

SUPPLEMENTAL MAPS, ILLUSTRATIONS AND WATER LEVEL MEASUREMENT DATA

TABLE 1
Summary of Monthly Water-Level Measurements BPZ14-1

Creek County Landfill

Piezometer	BPZ14-1		BPZ14-3		BPZ14-5	
Top of Casing Elevation, ft msl	*695.85*		*709.74*		*726.91*	
Measurement Date	**WATER LEVEL DEPTH (FT) / *ELEVATION (FT MSL)***					
10/16/2018	56.51	*639.34*	68.77	*640.97*	80.15	*646.76*
11/15/2018	56.57	*639.28*	69.24	*640.50*	80.62	*646.29*
12/14/2018	56.84	*639.01*	68.66	*641.08*	80.04	*646.87*
1/9/2019	56.97	*638.88*	68.71	*641.03*	80.09	*646.82*
2/13/2019	56.64	*639.21*	68.23	*641.51*	79.54	*647.37*
3/13/2019	56.24	*639.61*	67.57	*642.17*	78.85	*648.06*
4/2/2019	56.99	*638.86*	68.24	*641.50*	79.52	*647.39*
5/6/2019	56.34	*639.51*	68.94	*640.80*	79.30	*647.61*
6/17/2019	55.95	*639.90*	67.86	*641.88*	79.15	*647.76*
7/15/2019	56.39	*639.46*	67.68	*642.06*	79.18	*647.73*
8/7/2019	56.55	*639.30*	67.72	*642.02*	79.25	*647.66*
9/18/2019	56.42	*639.43*	67.90	*641.84*	79.31	*647.60*
10/15/2019	56.74	*639.11*	67.74	*642.00*	79.26	*647.65*
11/11/2019	56.49	*639.36*	68.49	*641.25*	79.53	*647.38*
Maximum		*639.90*		*642.17*		*648.06*
Min		*638.86*		*640.80*		*646.82*



N

SCALE:
0 50 100
FEET

LEGEND:
- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER
- PROPOSED MONITOR WELL

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

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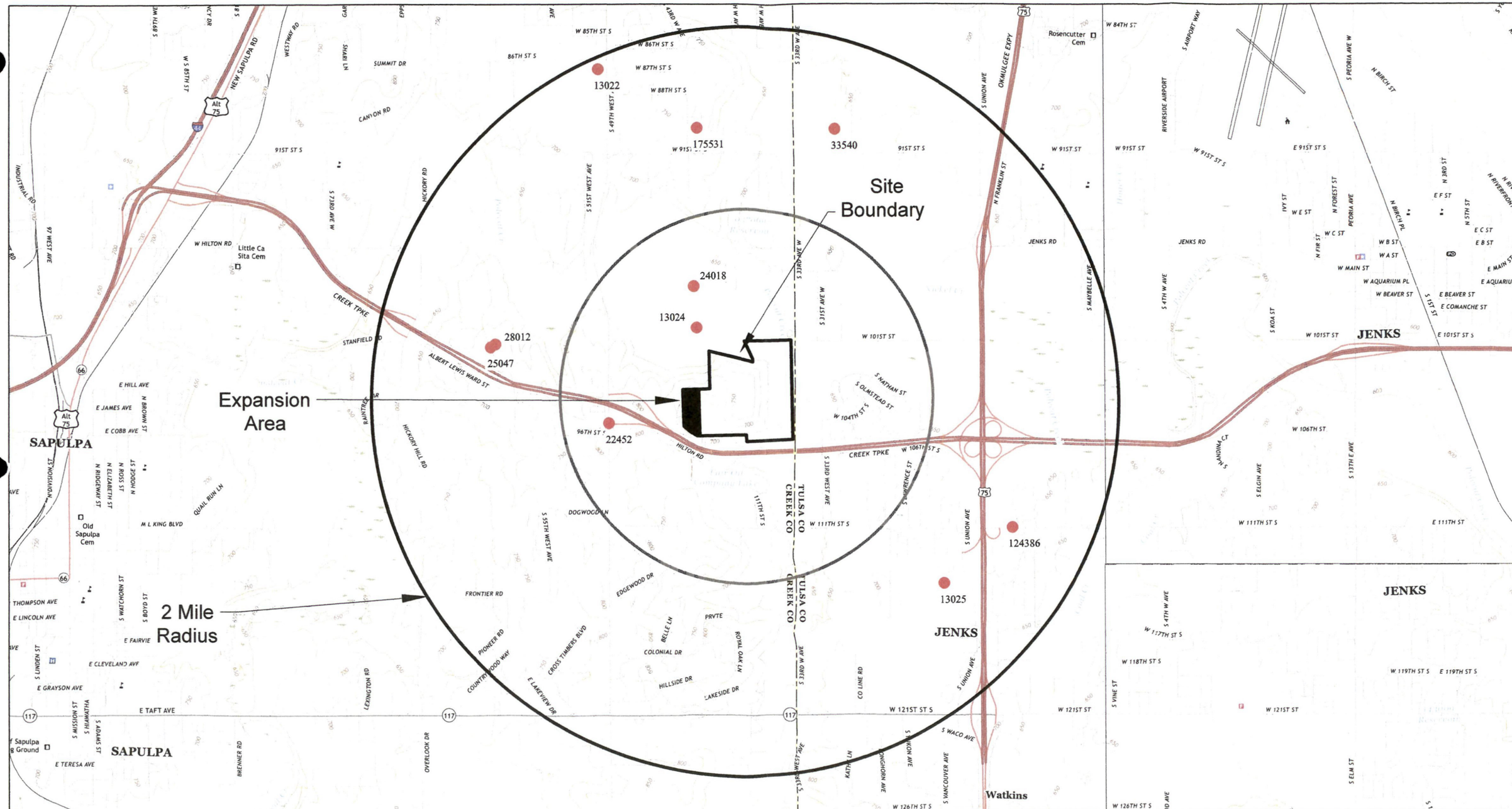
PROPOSED MONITOR WELL LOCATIONS

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: JULY 1, 2020

FIGURE 1

i:\oklaho creek county\2020\landfill expanson\excavation plan.dwg



N

SCALE:
0 0.25 0.5 MILES

LEGEND:
PROPTERY BOUNDARY
24018 WATER WELLS

NOTES:
1. Concentration of dissolved solids ranges from 500 to 1,000 mg/L. Refer to the Reconnaissance of the Water Resources of the Enid Quadrangle, North-Central Oklahoma
2. Compiled from USGS Quadrangle North Sapulpa, South Sapulpa, Jenks, and Brixby 2018.
3. Water Well locations obtained from the Oklahoma Water Resources Board, 2020.

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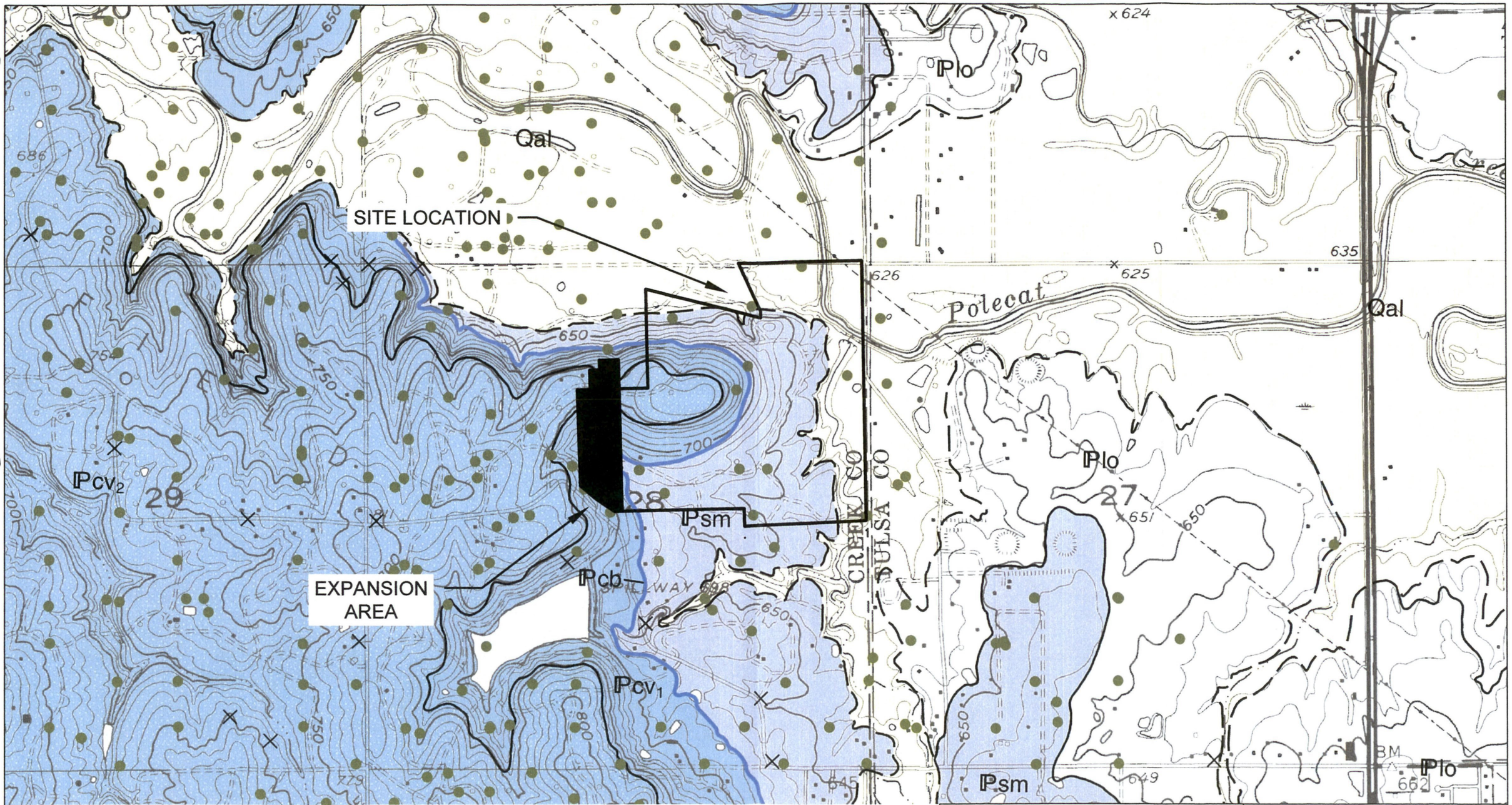
GROUNDWATER RESOURCES MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

FIGURE 2



SCALE:

0 500 1000 FEET

Qal — ALLUVIUM (Holocene) Clay, silt, sand, and gravel in channels and on flood plains of modern streams. Includes terrace deposits of similar composition located directly above and adjacent to modern channels and flood plains. Thickness: 0 to about 30 ft.

Pcv — COFFEYVILLE FORMATION (Pennsylvanian, Missourian) In the southern part of quad, the Coffeyville can be segregated into four informal units including the Dodds Creek Member (base designated by 'dc'). The overall thickness of the formation in this quad varies from about 235 ft to as much as 410 ft thick. The individual units are described in descending order:

Pcb — CHECKERBOARD LIMESTONE (Pennsylvanian, Missourian) The Checkerboard Limestone is medium gray (N5), greenish gray (5GY6/1), to dark greenish gray (5GY4/1), but weathers to a distinct moderate yellowish brown (10YR5/4) to dark yellowish orange (10YR6/6) color. Texturally, it is a skeletal to whole-fossil carbonate mudstone to wackestone; bedding is commonly absent in the formation at most exposures, although thin, planar to wavy beds of about 2" to 3" thick have been observed locally, occurring above the main, basal bed. Fossils include crinoid stems, corals, and bivalves. Thin calcite veins (~ 1 cm wide), are present in some exposures. Thickness a consistent 3 ft.

Psm — SEMINOLE FORMATION (Pennsylvanian, Missourian) Formation consists of a lower sandstone interval, called the Tulsa Sandstone, and a basal and upper suite of interbedded laminated, concretionary, silty clayshales, mudshales and siltstones. The Tulsa coal also occurs within the uppermost shale interval, just above the top of the Tulsa Sandstone.

Plo — LOST BRANCH FORMATION (Pennsylvanian, Desmoinesian) Poorly exposed, except for the Glenpool Limestone bed. Overall, a light brown (5YR6/4) to pale yellowish brown (10YR6/2), locally medium light gray (N6), laminated, slightly calcareous, micaceous, silty clayshale. Basal 3 ft of formation, just above the Dawson Coal, consists of a medium dark gray (N4) to dark gray (N3), well-laminated to fissile, phosphatic mudshale to clayshale called the Nuyaka Creek shale bed. The top of the formation is marked at the top the Glenpool Limestone, which is a dusky yellow (5Y6/4) to pale olive (10Y6/2), 1-1.5 ft thick, laminated, wavy-bedded packstone to whole fossil wackestone in upper half, grading down into an argillaceous unfossiliferous carbonate mudstone in lower part of bed; brachiopods, gastropods, and crinoid debris the most common fossils. Thickness of the Lost Branch ranges from 35 to 40 ft thick, but averages closer to 35 ft thick across the map area.

NOTES:
1. Compiled from Oklahoma Geological Survey, 2010-2011

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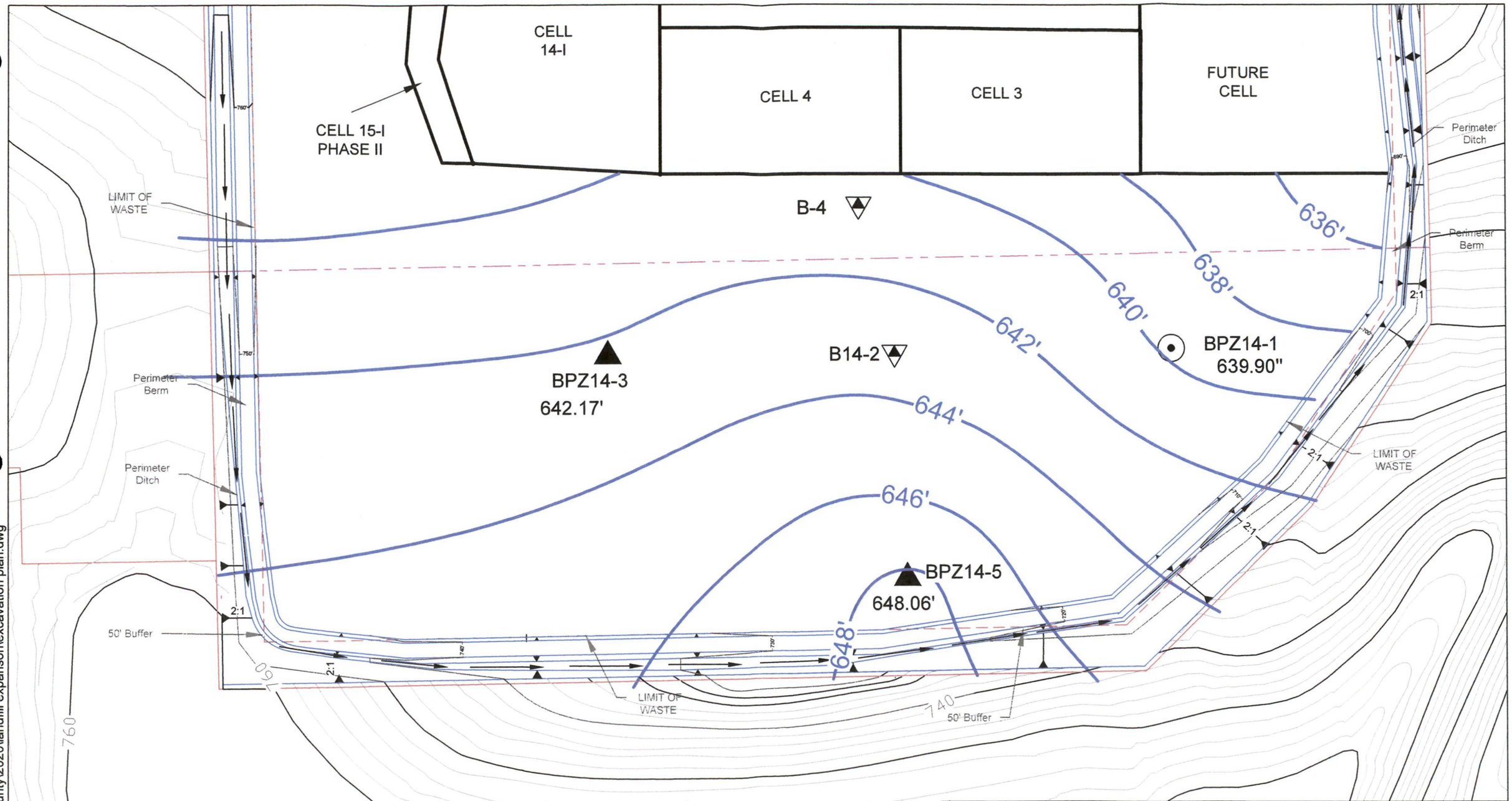
GEOLOGIC MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 27, 2020

FIGURE 3



LEGEND:
- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER

N

SCALE: 0 50 100 FEET

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

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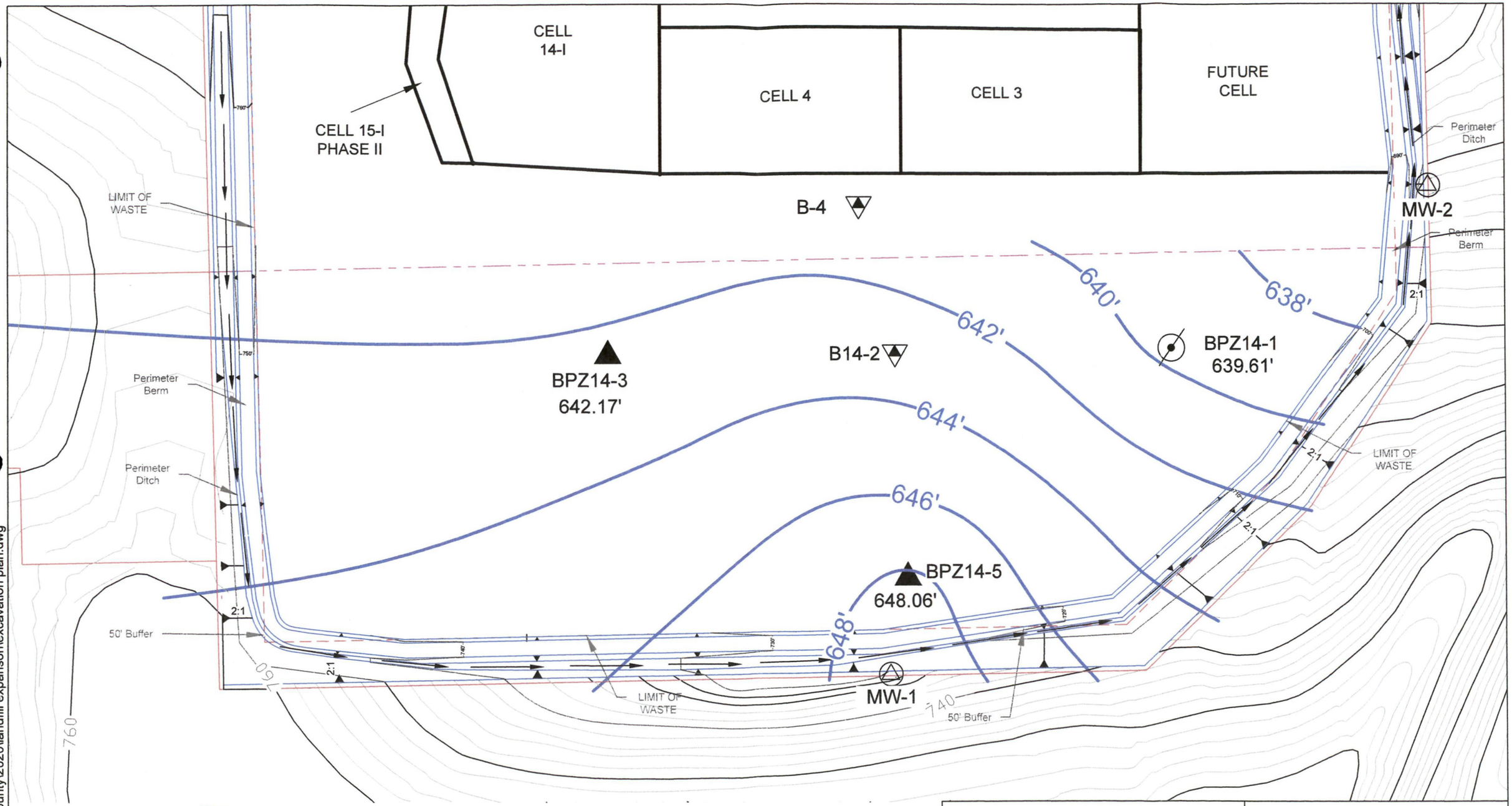
HIGHEST GROUNDWATER CONTOUR MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

FIGURE 4

i:\oklahoma\creek county\2020\landfill expansion\excavation plan.dwg



N

SCALE:

0 50 100 FEET

LEGEND:
- PROPERTY BOUNDARY
- DITCH FLOWLINE
- POTENTIOMETRIC CONTOUR
- EXISTING MONITOR WELL TO BE PLUGGED
- BORING
- PIEZOMETER
- PROPOSED MONITOR WELL

NOTES:
1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

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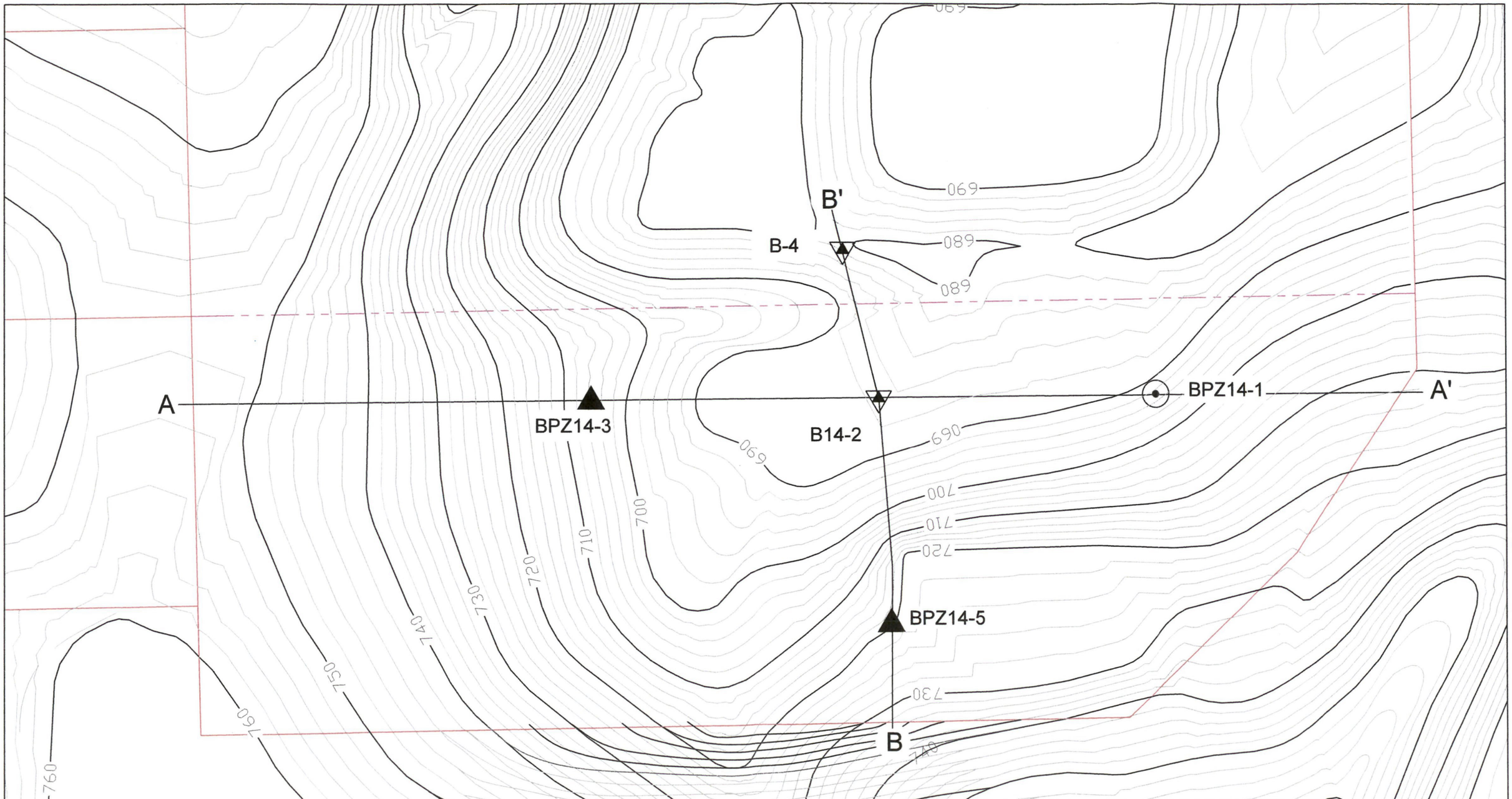
POTENTIOMETRIC MAP

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: JULY 1, 2020

FIGURE 5

i:\oklahoma\creek county\2020\landfill expansion\excavation plan.dwg



N

SCALE:

0 50 100 FEET

LEGEND:

- PROPTERY BOUNDARY
- PIEZOMETER
- BORING
- GROUNDWATER MONITOR WELL

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

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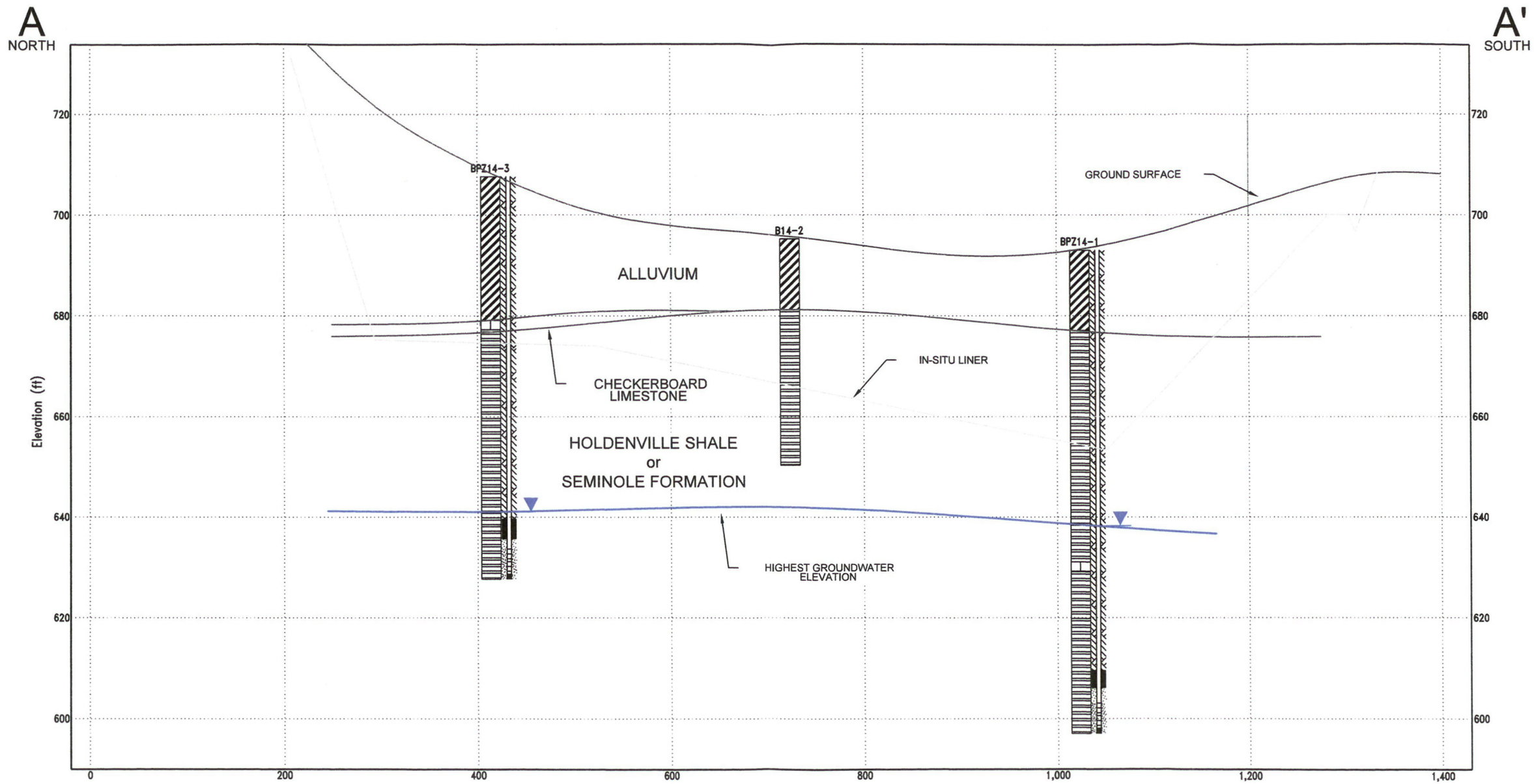
GEOLOGIC CROSS-SECTION LOCATIONS

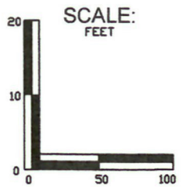
CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: April 9, 2020

FIGURE 6



SCALE:
FEET



LITHOLOGY GRAPHICS

- USCS High Plasticity Clay
- Shale
- USCS Low Plasticity Clay
- Clay or Clay Shale
- Limestone

NOTES:
1.

JOE B. RAMEY, P.E.

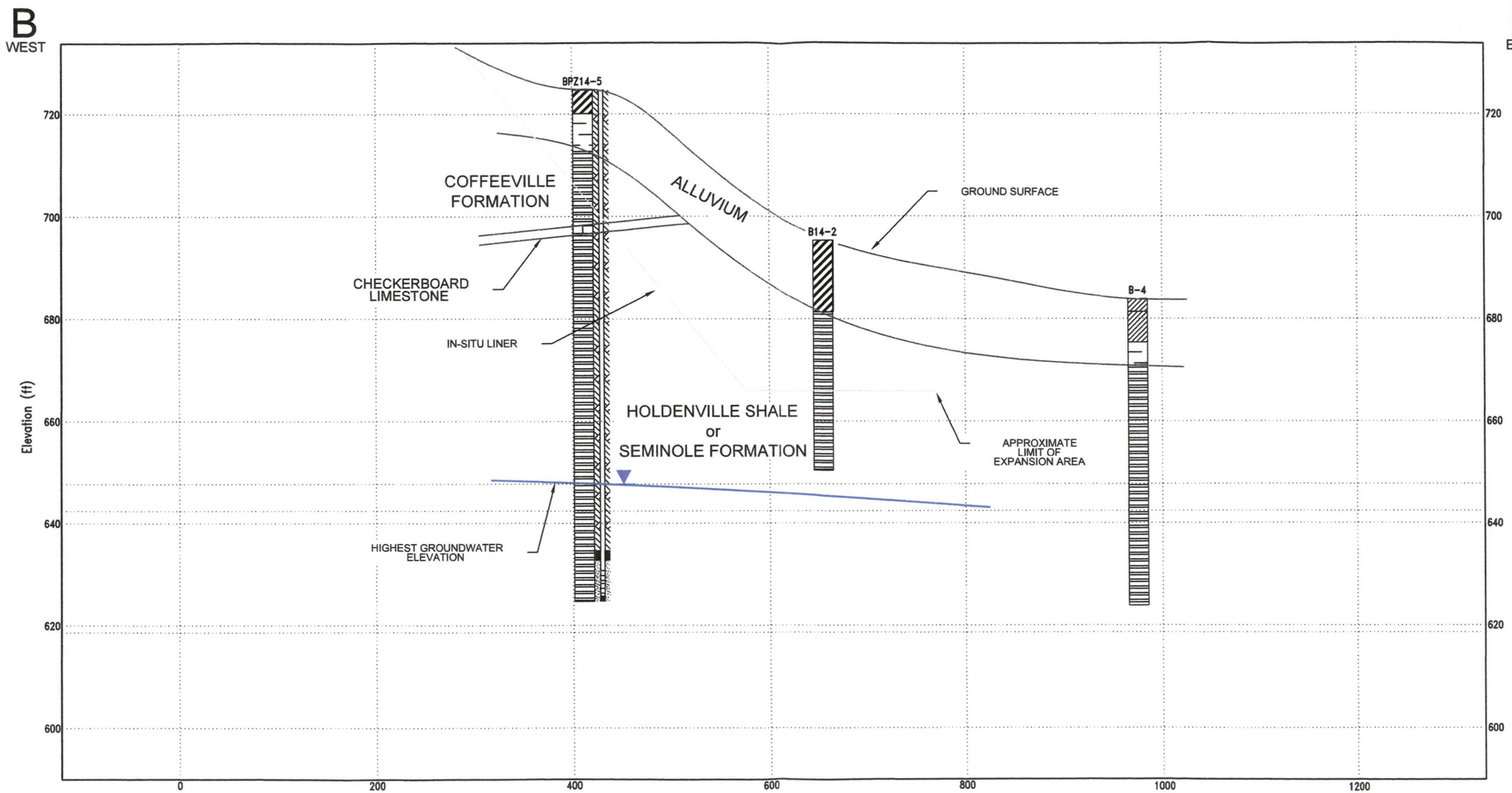
The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

CROSS-SECTION A-A'

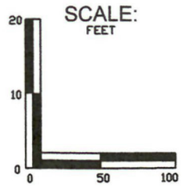
CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: June 25, 2020

FIGURE 7



SCALE:
FEET



LITHOLOGY GRAPHICS

- USCS High Plasticity Clay
- Shale
- USCS Low Plasticity Clay
- Clay or Clay Shale
- Limestone

NOTES:
1.

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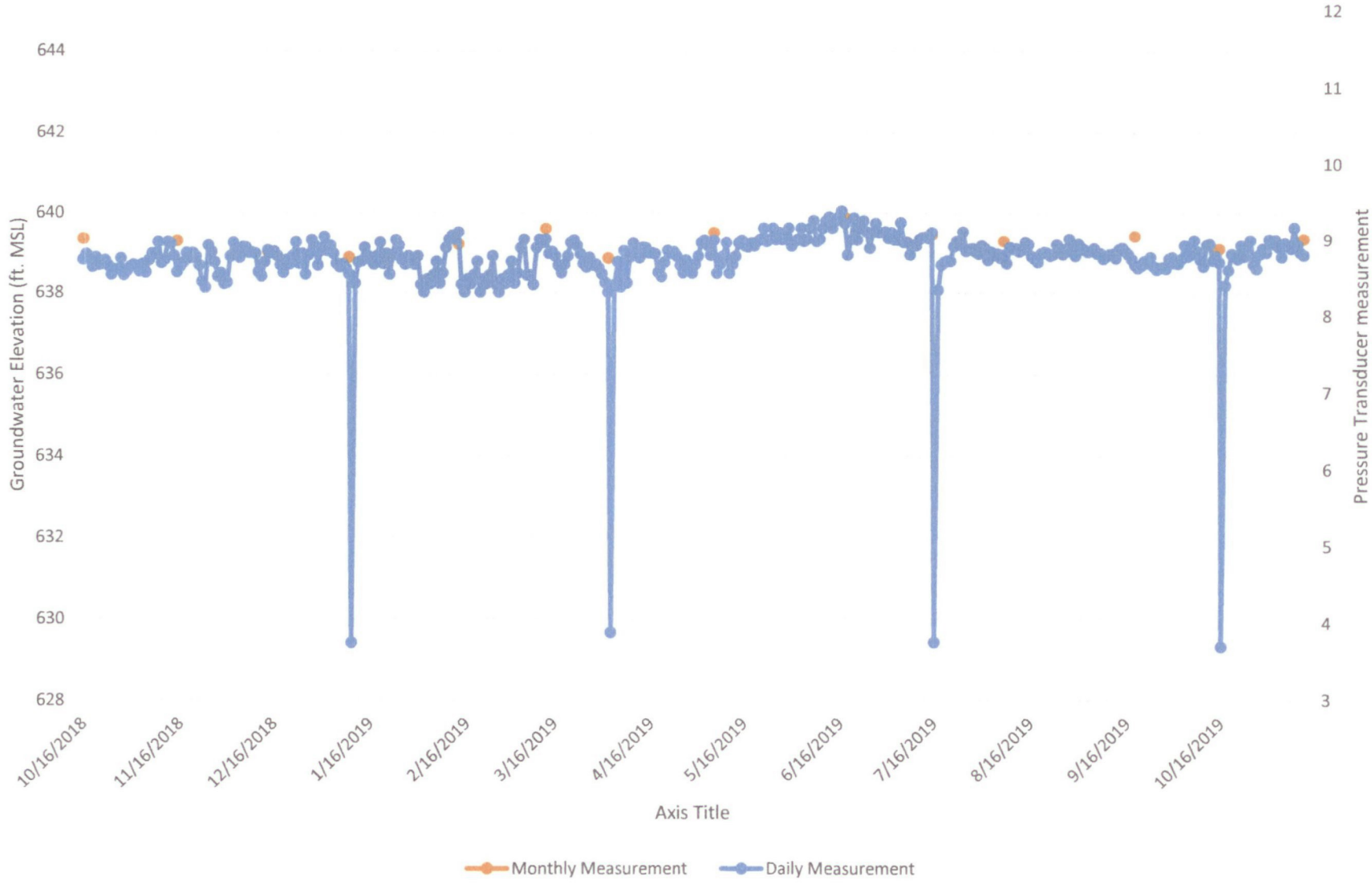
CROSS-SECTION B=B'

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: June 25, 2020

FIGURE 8

FIGURE 9
Hydrograph BPZ14-1
Creek County Landfill



FRONTIER LOGGING CORPORATION

Oklahoma City, Oklahoma 405-787-3952

TYPE LOG *Natural Gamma - Ray, Res.*

CLIENT	Horizon Environmental	DATE	Oct. 14, 1999
HOLE #	#1	PERM. DATUM	GL
FIELD	Creek County Landfill	DRILL MEAS FROM	GL
COUNTY	Creek	LOG MEAS FROM	GL
STATE	Oklahoma	G L ELEVATION	780'

LOCATION: SW/4, NE/4 SEC: 28 TWP: 18 N RNG: 12 E

Depth – Driller	100'	Fluid: In Hole	Formation
Depth – Logger	97.1'	Lbs. / Vis.	
Logged Interval	96.5' to surface	pH	
Casing – Size / TD	4" PVC / 15'	Time Since Circulation	
Witnessed By	Allan Brantly	Bit Size	3"

Recorded By: J. Just Equip. Unit # / Location: 117 / Oklahoma City

Probe S/N	104- 4436	K - Factor		Cal Source	
Probe OD	1.25"	Water Factor		Max. Cal Counts	
Detector	1/2" X 4" Scint	Dead Time			

REMARKS:

All interpretations are opinions based on inferences from electrical or other measurements and we cannot - and do not- guarantee the accuracy or correctness of any interpretations, and shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees.

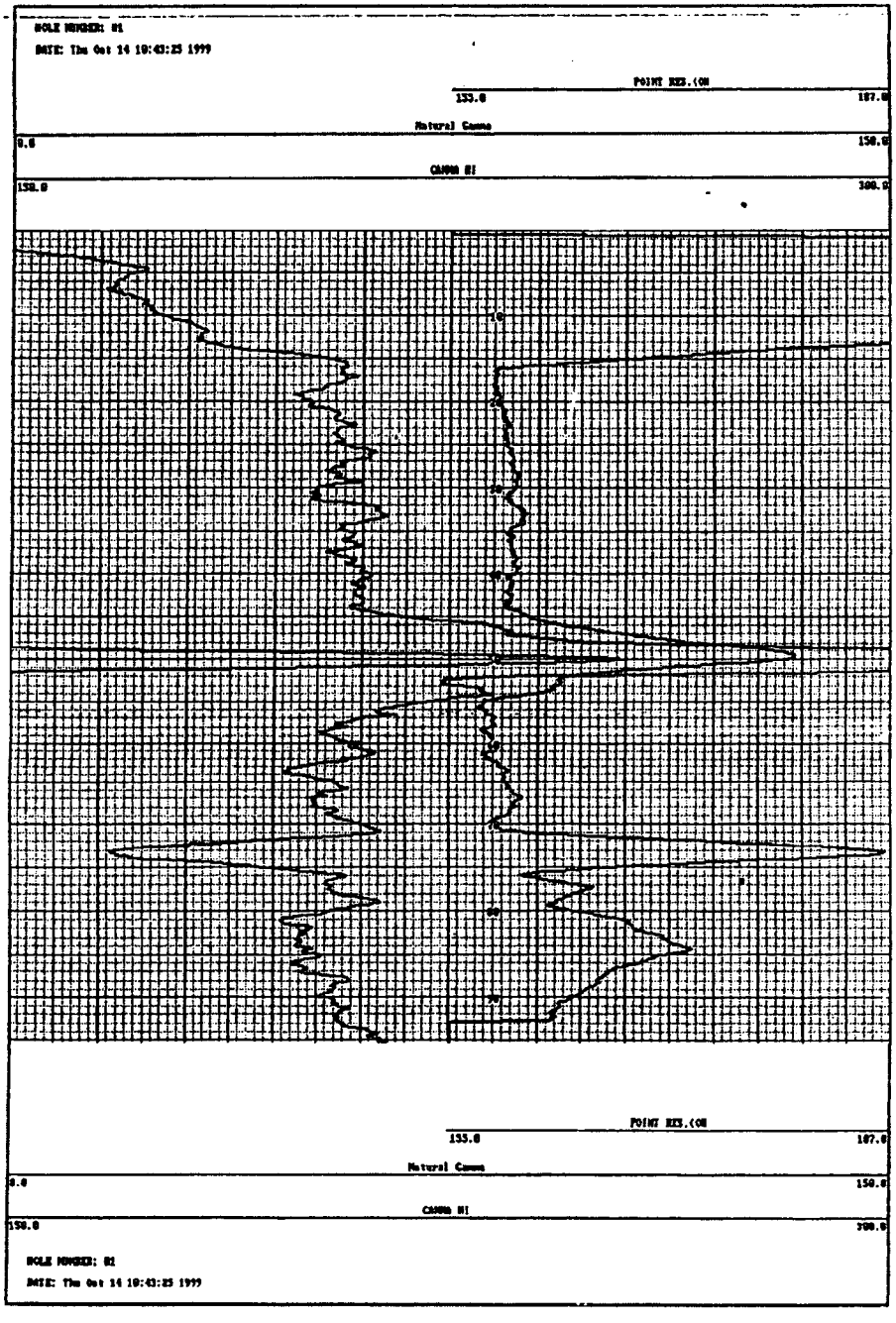


Figure 10a

FRONTIER LOGGING CORPORATION

Oklahoma City, Oklahoma 405-787-3952

TYPE LOG *Natural Gamma - Ray, Res.*

CLIENT	: Horizon Environmental	DATE	: Oct. 14, 1999
HOLE #	: #3	PERM. DATUM	: GL
FIELD	: Creek County Landfill	DRILL MEAS FROM	: GL
COUNTY	: Creek	LOG MEAS FROM	: GL
STATE	: Oklahoma	G L ELEVATION	: 720'

LOCATION: SW/4, NE/4 SEC: 28 TWP: 18 N RNG: 12 E

Depth – Driller	: 70'	Fluid: In Hole	: Formation
Depth – Logger	: 70.9'	Lbs. / Vis.	:
Logged Interval	: 70.1' to surface	pH	:
Casing – Size / TD	: 4" PVC / 20'	Time Since Circulation	:
Witnessed By	: Allen Brantly	Bit Size	: 3"

Recorded By : J. Just Equip. Unit # / Location : 117 / Oklahoma City

Probe S/N	: 104- 4436	K - Factor	:	Cal Source	:
Probe OD	: 1.25"	Water Factor	:	Max. Cal Counts	:
Detector	: 1/2" X 4" Scint	Dead Time	:		

REMARKS :

All interpretations are opinions based on inferences from electrical or other measurements and we cannot - and do not - guarantee the accuracy or correctness of any interpretations, and shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees.

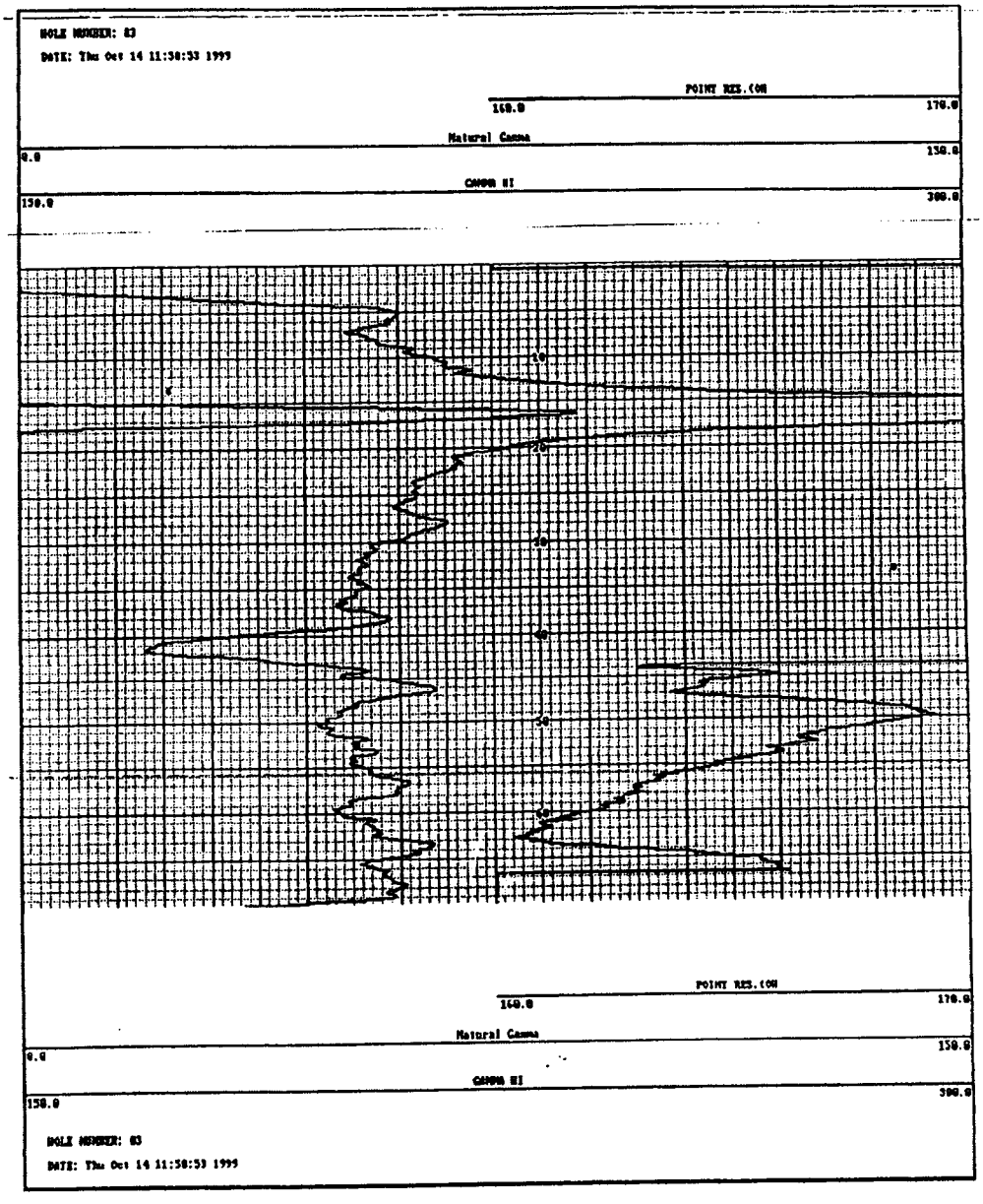


Figure 10b

FRONTIER LOGGING CORPORATION

Oklahoma City, Oklahoma 405-787-3952

TYPE LOG *Natural Gamma - Ray, Res.*

CLIENT	: Horizon Environmental	DATE	: Oct. 14, 1999
HOLE #	: #6	PERM. DATUM	: GL
FIELD	: Creek County Landfill	DRILL MEAS FROM	: GL
COUNTY	: Creek	LOG MEAS FROM	: GL
STATE	: Oklahoma	G L ELEVATION	: 630'

LOCATION: SW/4, NE/4 SEC: 28 TWP: 18 N RNG: 12 E

Depth -- Driller	: 60'	Fluid : In Hole	: Formation
Depth -- Logger	: 55.6'	Lbs. / Vis.	:
Logged Interval	: 54.8' to surface	pH	:
Casing-- Size / TD	: None	Time Since Circulation	:
Witnessed By	: Allan Brantly	Bit Size	: 6"

Recorded By	: J. Just	Equip. Unit # / Location	: 117 / Oklahoma City

Probe S/N	: 104- 4436	K - Factor	:	Cal Source	:
Probe OD	: 1.25"	Water Factor	:	Max. Cal Counts	:
Detector	: 1/2" X 4" Sclnt	Dead Time	:		

REMARKS :

All interpretations are opinions based on inferences from electrical or other measurements and we cannot - and do not- guarantee the accuracy or correctness of any interpretations, and shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees.

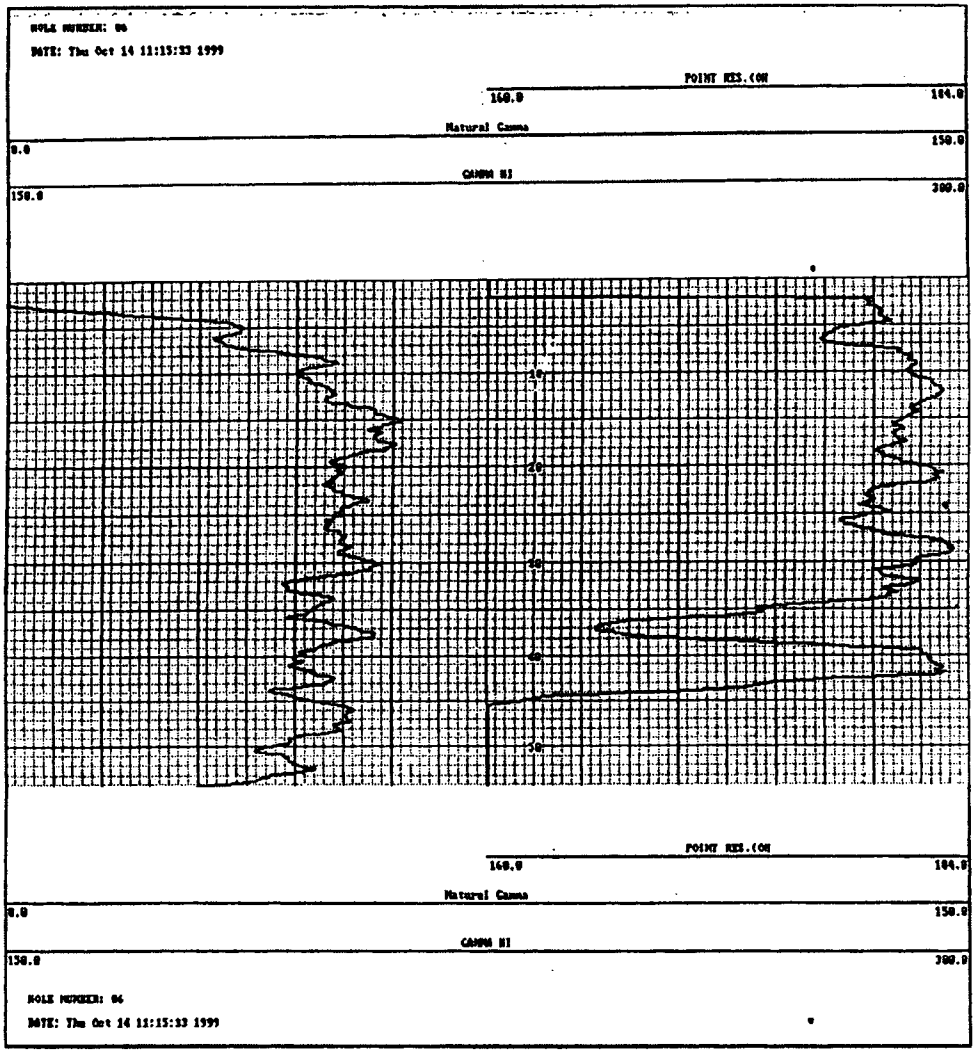


Figure 10c

APPENDIX F-4

GROUNDWATER SAMPLING AND ANALYSIS PLAN

CREEK COUNTY LANDFILL
CREEK COUNTY, OKLAHOMA
ODEQ PERMIT NO. 3519020

GROUNDWATER SAMPLING AND ANALYSIS PLAN (GWSAP)

Prepared for

Creek County Landfill

May 2020

Prepared by

136 Pecan Street
Keller, Texas 76248
(817) 337-0112

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Table 1 – Recommended Cotainerization and Preservation of Samples
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APPENDIX A
Sample Chain of Custidy

APPENDIX B
Sample Field Data Sheet

1 GROUNDWATER SAMPLING PROCEDURES

This Groundwater Sampling and Analysis Plan (GWSAP) has been prepared for the existing Creek County Landfill. The GWSAP is prepared in accordance with Oklahoma Administrative Code (OAC) OAC) 252:515 Management of Solid Waste Regulations. The Creek County Landfill is located at 10250 South 33rd West Avenue, Sapulpa, Oklahoma.

The following sampling procedures are designed to produce monitoring results that accurately represent the groundwater quality at each well location. These or equivalent procedures are to be followed by personnel conducting groundwater monitoring well sampling in order to ensure representative groundwater samples from the site.

1.1 Field Setup

The well head area should be examined for anything unusual such as damage to the well head, spilled materials, etc. and all observations recorded in the field data sheets.

Insect repellent or other topical skin applications, which contain organic compounds, should not be used by sampling personnel.

Sampling equipment should include a calibrated 5-gallon bucket for measuring bailed or purged well fluids and a small glass container for measuring pH, temperature, and specific conductance.

1.2 Groundwater Elevation

The depth to groundwater should be measured from the top of the well casing for use in determining the rate and direction of groundwater flow per OAC 252:515-9-3(d). In addition, the total depth of the well should be measured. Both measurements should be recorded on the field data sheets. The water level measuring device should be decontaminated between wells. Water-level depths are to be measured and reported to the nearest hundredth of a foot.

1.3 Well Purging

Groundwater monitoring wells may be sampled using either low flow purging , three well volume purging, or an equivalent method as necessary to complete the groundwater sampling event. Groundwater wells will generally be purged with dedicated bladder pumps following low-flow purging protocol. These pumps will remain dedicated to each respective well throughout monitoring unless replacement is necessary due to damage or wear, in which case repairs will be completed or a new pump will be dedicated. Purge procedures for dedicated equipment are described in Section 1.3.1.1.

In the event that a dedicated pump is inoperative, the dedicated pump and tubing apparatus will be pulled for replacement or repair and a portable pump or bailer will be used to purge the well until such time the bladder pump is repaired/replaced and rededicated to the well.

1.3.1.1 Low Flow Purging

Low-flow purging will be employed using dedicated bladder pumps. Well purging will be conducted at a rate less than 1 liter per minute to ensure minimal drawdown. Purging is deemed complete after a minimum of two pump and tubing volumes of water have been removed and stabilization of field parameters is achieved. Field parameters include temperature, specific conductivity, pH, and turbidity.

- Parameter stabilization is defined as:
  - Specific Conductivity = ± 10% for three (3) consecutive measurements
  - pH = ± 0.2 standard pH units for three (3) consecutive measurements
  - Temperature = ± 10% for three (3) consecutive measurements
  - Turbidity = ± 10% for three (3) consecutive measurements

Measurements will be recorded on the field data sheet every three to five minutes. Water level measurement will also be taken every three to five minutes and recorded on the field data sheet.

Equipment:

- Bladder pump
- Bladder pump controller
- Compressed air source
- New disposable gloves of appropriate material (nitrile)
- Graduated pail and/or cylinder

- Field parameter measurement device/s

Installation Instructions:

- Appropriate disposable gloves are to be worn during installation and purging.
- Connect the compressed air source to the pump fitting at the top of the well.
- Start the air compressor/air supply.
- Replace disposable gloves after handling the compressor.
- Turn on the pump controller and adjust the discharge and refill cycles to the appropriate settings.
- Press the start button on the controller, which begins the pumping action.
- Adjust the controller to the desired flow rate.

Continue pumping until the necessary volume of water (two pump and tubing volumes minimum) has been purged from the well and field parameters have stabilized.

1.3.1.2 Three Well Volume Purging

In the event of a non-operative dedicated pump, the pump and tubing apparatus will be removed for repairs or replacement and the well will be purged by means of either a disposable bailer or a portable pump until such time the bladder pump is repaired/replaced and rededicated to the well. Purging will be performed by removing three well-casing volumes of water from the well. Purging will be deemed complete if the well goes dry prior to removal of three well-casing volumes of water. Field parameters will be measured after each well-casing volume of water removed. The volume of water to be purged can be calculated using the following formula:

V = (Total Depth – Depth to Water) x Gallons of Water per Foot (dependent upon well diameter)*

where V = (1) well volume

*Gallons of Water per Foot = 0.163 for a 2" diameter well

0.653 for a 4" diameter well

The pump should be lowered slowly and gently into the water column. The pump should not be allowed to "free fall" down the well. Care should be taken not to agitate the water column to avoid the collection of non-representative groundwater samples. The pump discharge rate used during purging should ensure that groundwater is not removed from the well at a rate much greater than the natural recharge rate. At no time should purge

rates cause the cascading of recharge water inside the well casing, due to the increased possibility of volatile compound vaporization.

Purging will be considered complete once a minimum of three (3) well volumes of water have been removed from the well or until dry. Any monitor well that is purged dry should be allowed to sufficiently recharge prior to the collection of groundwater samples. Well volumes may be measured using a calibrated bucket or drum. All non-dedicated and non-disposable equipment used during purging will be decontaminated in accordance to Section 1.9 of this GWSAP. A new pair of disposable gloves will be donned prior to purging each monitor well to reduce the possibility of cross-contamination between wells.

If the pump is deemed inoperable, monitor wells may be purged using a bailer as an appropriate alternative. Similar to the procedure above, the bailer should be carefully lowered into the water column to avoid agitation

1.4 Sample Collection

The next step after a well has been purged is to collect the sample for subsequent analysis. Sample collection will occur immediately after purging. The samples will be collected by pumping directly into each of the required containers.

Sample containers for various parameter groups are to be filled in a particular order. The order is determined on the basis of parameter sensitivity to volatilization and pH change and the priority for analytical data in cases where the water volume in the well is less than what is required for complete analysis. The order of sample collection is listed as follows:

1. Field Parameters (Temperature, Specific Conductivity, pH, Turbidity)
2. Chemical Oxygen Demand (COD)

1.5 Sample Containers and Labeling

Water samples collected in the field need to be placed into laboratory-cleaned bottles of the appropriate size and construction for the chemical parameters to be analyzed. A list of chemical parameters and recommended types and sizes of sample containers are shown in Table 1. Sample containers must be marked as described below.

Sample Labels: Indelible sample labels are to be affixed to each sample container and must contain the following information:

- Project name and number (includes site name)
- Sample and well number

- Date and time of sample collection
- Type of preservatives added
- Special handling instructions

QA/QC samples, such as trip and field blanks, will be labeled accordingly. Well duplicates, if any, will be labeled with a non-existent well number and will be properly identified only in the field data sheets.

1.6 Sample Preservation and Shipment

Many constituents to be analyzed require chemical additive for preservation. Table 1 shows preservation requirements for organic and inorganic chemical parameters. Groundwater samples collected for organic analysis should be placed in glass bottles, which have been specially prepared with the appropriate type and quantity of chemical additive.

Samples for shipment are to be packed in a hard-sided, insulated shipping container pre-cooled with ice immediately after collection. The sample containers must be packed to prevent breakage. Adequate ice or chemical icepacks are to be added to maintain the temperature at about 4° C during shipment. Dry ice must not be used.

1.7 Quality Assurance and Quality Control

To document that sample collection and handling procedures utilized in the field have not affected the quality of groundwater samples, blanks are to be prepared and analyzed. Blanks consist of one trip blank and one field blank per sampling event.

A trip blank is prepared by filling a water sample container with Type II reagent-grade water, transporting to the site, handling as a sample, and transporting to the laboratory for analysis. A field blank is prepared in the field by filling groundwater sample containers with Type II reagent-grade water in the field at an individual well and transporting to the laboratory for analysis. Blank samples are generally to be tested for identical chemical parameters as those targeted for groundwater samples.

1.8 Chain-of Custody Documentation

A Chain-of-Custody (COC) form must be maintained in order to track possession and handling of samples from field collection through laboratory testing. COC records account for the custody of samples at all times. Samples are in custody of an individual when they are either in the individual's sight or locked securely. When samples are

locked, only the individual retaining custody will have access to the key(s). A typical COC form is provided as Figure 1.

Sample COC is maintained on a Chain-of-Custody Record form. Each sample must be logged onto the COC Record form as it is collected. Information to be included on the COC Record form includes the following:

- Project Name and number (includes site name)
- Site Location
- Sample number
- Sample date and time
- Sample type
- Number and type of sample containers
- Analyses required
- Sample preservative
- Lab destination
- Carrier/shipping number
- Special instructions
- Spaces for signatures of sampler(s) and everyone assuming sample custody

The COC Record must contain the signatures, dates, and times of anyone assuming custody of the samples. Each time custody changes hands, the party releasing the samples should sign under "Relinquished By" and record the date and time. The party receiving the samples should sign under the heading "Received By" and record the date and time. The COC form is typically provided by the analytical laboratory.

Chain-of-Custody Seals: COC seals should be placed over the shipping container lid or sample container lids to deter sample tampering by unauthorized parties.

1.9 Equipment Decontamination

Sampling equipment (except dedicated equipment) and measurement instruments coming in contact with the groundwater are to be decontaminated before use at each well location.

The following decontamination standards or equivalent procedures are to be followed for well purging and sample collection. For inorganic parameters, the equipment should be cleaned with phosphate-free detergent/soap mixture followed by a rinse of organic-free water. For organic constituents, the equipment should be washed with a nonphosphate detergent and rinsed and organic-free water. The sampling equipment should be thoroughly dried before use to ensure that residual cleaning agents are not carried over to the sample.

Disposable bailers and non-dedicated bailer line must be discarded along with disposable health and safety garments. Water and cleaning agents are to be collected and disposed of at an authorized facility.

1.10 Field Documentation

Field activities must be thoroughly documented on the field data sheets. Below is an outline of the information to be documented during field activities.

- Project name and number
- Date and time of all activities
- Weather conditions
- Sampling personnel
- Field instrument calibration methods and remarks
- Initial equipment decontamination remarks
- Well location (identification number)
- Well description, including casing size
- Description of well condition
- Initial air quality monitoring measurements and the time of each (includes background, initial well headspace, and breathing zone)
- Initial air quality monitoring measurements and the time of each (includes background, initial well headspace, and breathing zone)
- Initial water-level measurement with point of reference (top of casing) and time of measurement
- Initial pH, temperature, and conductivity measurements
- Presence and thickness of immiscible layers (if applicable)
- Time series measurements of field parameters
- Sampling equipment and remarks
- Sample time and date
- Description of sample

2 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Any professional laboratory contracted to perform testing on groundwater samples should have in effect a Quality-Assurance/Quality-Control (QA/QC) Program, which adequately documents the accuracy and precision of all analytical results. A report addressing laboratory QA/QC objectives and procedures should be obtained from the testing laboratory. Laboratory QA/QC methods and standard operating procedures should include the following:

- Relative percent difference (RPD) between duplicate samples
- Percent recovery (percent R) of a spiked and/or laboratory control sample
- Method blanks, trip blanks, and calibration blanks
- Sample custody tracking and documentation
- Sample preservation and handling procedures as defined in EPA SW-846
- Operation, maintenance and calibration of all analytical equipment and instruments with appropriate documentation of such procedures
- Quality control checks on calculations and data transcriptions

If the ODEQ has not already reviewed and accepted the laboratory standard operating procedures (LSOP) for the laboratory to be used for analysis of the samples, that LSOP will be submitted for ODEQ review prior to submittal of samples to the laboratory.

The laboratory selected must achieve practical quantitation limits (PQLs) equal to or lower than maximum contaminant levels (MCLs) where established or equal to or lower than PQLs listed in OAC 252:515, Analyses will be performed utilizing the GWSAP Table 2 listed methods or an alternate EPA approved method that provides equivalent or better performance. Detected but non-quantified constituents shall be so noted in the laboratory reports.

3 GROUNDWATER MONITORING REQUIREMENTS

Groundwater monitoring for the proposed monitoring well system should follow the ODEQ requirements for background, detection, assessment, and corrective action monitoring as outlined in OAC 252:515-9-31 through OAC 252:515-9-156, as applicable.

3.1 Detection Monitoring Parameters and Analytical Methods

Chemical Oxygen Demand (COD) is the only constituent that requires laboratory analysis. Additionally, temperature, pH, specific conductance, turbidity will be measured during purging with field instrumentation..

EPA-approved analytical methods will be utilized for testing of inorganic chemical constituents. Analyses will be performed utilizing the GWSAP Table 2 listed methods or an alternate EPA approved method that provides equivalent or better performance.

Groundwater samples are not to be filtered in the field or laboratory per OAC 252:515-9-3(c) except as directed by the ODEQ.

3.2 Monitoring Frequency

Background sampling will commence shortly after installation of the proposed groundwater monitoring wells at the site. Eight background samples will be taken at approximately three-month intervals.

If any new wells are installed or major repairs are made to existing wells, new background sampling, as described in the preceding paragraph, will be implemented for these specific wells not later than the quarter after installation or repair.

Upon completion of the background sampling events, the groundwater monitoring wells will be sampled twice yearly at 6 and 12-month intervals after the last background sampling event. An effort will be made to sample consistently in the same two months each year.

Some of the wells may be dry or have insufficient water for sample collection at some sampling events. Background sampling will be attempted at each subsequent event until

eight background samples have been taken. Wells that are dry or have insufficient water for sampling will be so noted in each report.

3.3 Reporting and Submittals

The results of analysis of groundwater samples collected during detection monitoring, including background samples, will be submitted to the ODEQ not later than 60 calendar days after the end of the sampling event.

All submittals will be made in duplicate to the central office of the ODEQ unless otherwise specified by the ODEQ. At such time as the ODEQ has the capability of receiving electronic submittals and has specified the format, reports may be submitted in that fashion. Copies of all submittals will be maintained in the operating record for the site.

TABLES

TABLE 1 RECOMMENDED CONTAINERIZATION AND PRESERVATION OF SAMPLES					
Measurement	**Volume (mL)**	**Container** [a]	**Preservative**	**Holding Times** [b]	**Reference**
Specific Cond.	100	P,G	Cool, 4 °C	Det. on Site	1
pH	50	P,G	None	Det. on Site	1,2
Temperature	1000	P,G	None	Det. On Site	1
Chemical Oxygen Demand	50	P,G	H_2SO_4 to pH <2	28 days	1

NOTES:

a Plastic (P) or Glass (G). For metals, polyethylene with an all polypropylene cap is preferred.

b Maximum holding time from sampling to extraction.

REFERENCES:

1 Methods for Chemical Analysis of Water and Wastes, March, 1983, USEPA, 600/4-79-020 and additions thereto.

2 Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

TABLE 2 BACKGROUND/DETECTION MONITORING PARAMETERS		
Parameter	**Method[(1) (2)]**	**RL (mg/L)**
pH, Std. Units, Field	Field Measurement	---
Specific Conductivity, uhmos/cm, Field	Field Measurement	10
Temperature, Field	Field Measurement	---
Turbidity, NTU, Field	Field Measurement	0.2
Chemical Oxygen Demand (COD)	410.4[(3)]	10

Notes:

1. Suggested methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised, December 1987, or applicable updates. Analytical details can be found in SW-846 and in documentation on file at the agency.

2. Analyses will be performed using one of the listed methods or an alternative approved method with equivalent or better performance.

3. EPA Manual 600/4-79-020, "Methods for Chemical Analysis of Water and Waste".

APPENDIX A

SAMPLE CHAIN OF CUSTODY

Pace Analytical™
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company:	Report To: Kevin Carel	Attention:
Address:	Copy To:	Company Name:
		Address:
Email To:	Purchase Order No.:	Pace Quote Reference:
Phone: Fax:	Project Name:	Pace Project Manager:
Requested Due Date/TAT: Standard	Project Number:	Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: TX

Section D
Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	Section D Sample ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED Composite Start DATE	COLLECTED Composite Start TIME	COLLECTED Composite End/Grab DATE	COLLECTED Composite End/Grab TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): Barium, Total	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
** FIELD FILTERED										

SAMPLER NAME AND SIGNATURE		Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:					
SIGNATURE of SAMPLER:	DATE Signed (MM/DD/YY):				

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

APPENDIX B

SAMPLE FIELD DATA SHEET

Creek County Landfill
Sapulpa, OK

GROUNDWATER SAMPLING FIELD DATA SHEET

Well Number: MW-_____
Project Number: _____

Project: _____
Personnel: _____

Date: _____
Weather Conditions: _____ Air Temp: _____

WELL DATA:
Casing Diameter: _____ (in) ☐ PVC ☐ Other: .
DEPTH TO: Static Water Level (WL): _____ (ft) Well Bottom: _____ (ft)
DATUM: ☑ Top of Well Casing ☐ Top of Protective Casing
CONDITION: Is well clearly labeled? ☐ Yes ☐ No
Is prot. casing in good cond.? (not bent or corroded) ☐ Yes ☐ No
Is concrete pad intact? (not cracked or frost heaved) ☐ Yes ☐ No
Is padlock functional? ☐ Yes ☐No Is inner casing intact? ☐ Yes ☐ No
Is inner casing properly capped and vented? ☐ Yes ☐ No Is Reference Point Present? ☐ Yes ☐ No

PURGE DATA:
METHOD: ☐ Pump ☐ Bailer ☐ Other: _____
MATERIALS: Type of Pump: _____
Tubing: ☐Teflon® ☐ Polyethylene ☐ Polypropylene ☐ Other: _____
PURGING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned
VOLUME OF WATER: $(d/24)^2$ (23.5)(TD-WL) = One Well Volume (Multipliers: 2"=0.163; 4"=0.653)
Standing in well: _____ gal. To be purged: _____ gal.

CALIBRATION: pH Meter Model: _____ Meter S/N: _____ Time: _____
Cond. Meter Model: _____ Meter S/N: _____ Time: Same

TIME SERIES DATA:

Time:							
Cum. Volume(ml)	Start						
Temperature (®C)							
pH (s.u.):	---						
Spec. Cond. (µmhos/cm):	---						
Turbidity (NTU):	---						

SAMPLING DATA:
Sample Collection Time: _____
Water Level at Time of Sample: _____
METHOD: ☐ Bladder Pump ☐ Bailer ☐ Other: _____
SAMPLING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐Field-Cleaned
APPEARANCE: ☐ Clear Turbid (NTU): _____ Color: _____ ☐ Contains Immiscible Liquid
FIELD DETERMINATIONS: Temp. (°C): _____ pH (s.u.): _____ Spec. Cond. (µmhos/cm): _____
REMARKS: _____

I certify that this sample was collected and handled in accordance with applicable regulatory and project protocols.

Signature: _____ Date: _____

TABLE 1 RECOMMENDED CONTAINERIZATION AND PRESERVATION OF SAMPLES					
Measurement	**Volume (mL)**	**Container** [a]	**Preservative**	**Holding Times** [b]	**Reference**
Specific Cond.	100	P,G	Cool, 4 °C	Det. on Site	1
pH	50	P,G	None	Det. on Site	1,2
Temperature	1000	P,G	None	Det. On Site	1
Chemical Oxygen Demand	50	P,G	H_2SO_4 to pH <2	28 days	1

NOTES:

a Plastic (P) or Glass (G). For metals, polyethylene with an all polypropylene cap is preferred.

b Maximum holding time from sampling to extraction.

REFERENCES:

1 Methods for Chemical Analysis of Water and Wastes, March, 1983, USEPA, 600/4-79-020 and additions thereto.

2 Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

TABLE 2 BACKGROUND/DETECTION MONITORING PARAMETERS		
Parameter	**Method[1] [2]**	**RL (mg/L)**
pH, Std. Units, Field	Field Measurement	---
Specific Conductivity, uhmos/cm, Field	Field Measurement	10
Temperature, Field	Field Measurement	---
Turbidity, NTU, Field	Field Measurement	0.2
Chemical Oxygen Demand (COD)	410.4[3]	10

Notes:

1. Suggested methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised, December 1987, or applicable updates. Analytical details can be found in SW-846 and in documentation on file at the agency.

2. Analyses will be performed using one of the listed methods or an alternative approved method with equivalent or better performance.

3. EPA Manual 600/4-79-020, "Methods for Chemical Analysis of Water and Waste".

APPENDIX G

SOILS REPORT

Pursuant to the requirements set forth in Oklahoma Administrative Code (OAC) 252:515-7-37, this document presents the results of geotechnical laboratory tests conducted on soil samples collected during previous construction projects at the Creek County Landfill. Soils excavated from the site are proposed for use as weekly cover, intermediate cover, compacted clay liner, erosion layer and infiltration layer. In accordance with OAC 252:515-7-36, soils proposed for use as liner, intermediate cover, or final cover material must be tested for the following:

- Soil classification in accordance with Unified Soil Classification System (USCS) (ASTM D 2487);
- Sieve analysis with #4, #10,, #40, and #200 sieves (ASTM D 422 and D 1140);
- Atterberg limits (ASTM D 4318);
- Moisture content (ASTM D 2216 or D 4643);
- Moisture-density relationship (ASTM D 698 or D 1557); and
- Hydraulic conductivity (ASTM D 5064).

In accordance with OAC 252:515-11-33, soil used to construct the compacted clay liner must meet a majority of the following standards:

- Plasticity index (PI) $\geq$ 10%;
- Liquid limit (LL) $\geq$ 24%;
- Percent fines (passing the #200 sieve) $\geq$ 30%;
- Percent gravel $\geq$ 20%;
- Maximum particle size < 1 in.; and
- Saturated hydraulic conductivity $\leq 1 \times 10^{-5}$ cm/sec.

Soil used to construct the infiltration layer of the final cover system must have a hydraulic conductivity that is less than or equal to that specified for the lining system (i.e. 1×10^{-5} cm/sec.) per OAC 252:515-19-53 (1). The intermediate cover and erosion layer of the final cover system must be capable of sustaining plant growth per OAC 252:515-19-52(b) and 252:515-19-53(a)(2), respectively. The results of previous geotechnical tests performed on on-site soils indicate that the site is underlain by clay that is suitable for use as weekly cover, intermediate cover, compacted clay liner, in-situ liner, erosion layer, and infiltration layer.

TABLE 1
SUMMARY OF GEOTECHNICAL ENGINEERING TEST RESULTS

Project	Sample ID	Sample Depth (ft)	USCS	Unit Weight (pcf)	Water Content (%)	Atterbert Limits			Grain Size Distribution			Compaction		Permeability (cm/sec)
						L.L. (%)	P.L. (%)	P.I. (%)	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer 3/8 in.	Max Dry Density (psf)	Opt. Moisture (%)	
Cell 14-I	1A	2.5	---	---	5.9	---	---	---	---	---	---	---	---	2.40E-09
	1C	1.0	---	---	6.3	---	---	---	---	---	---	---	---	5.40E-09
	2B	0.0	---	---	5.8	---	---	---	---	---	---	---	---	5.80E-09
	3B	3.3	---	---	6.3	---	---	---	---	---	---	---	---	4.40E-09
	3C	3.0	---	---	6.5	---	---	---	---	---	---	---	---	4.70E-09
	4A	4.0	---	---	6.6	---	---	---	---	---	---	---	---	4.90E-09
	4B	4.3	---	---	6.8	---	---	---	---	---	---	---	---	5.80E-09
	5A	3.5	---	---	7.0	---	---	---	---	---	---	---	---	7.80E-09
	5C	4.3	---	---	8.4	---	---	---	---	---	---	---	---	3.60E-09
Cell 15-I Phase 1	NW Cell	N/A	CL	---		35	20	15	100	77.9	0.0	114.0	15.0	---
	B15-9	1.0	---	134.5	10.4	---	---	---	---	---	---	---	---	9.50E-09
	B15-8	3.5	---	139.5	8.5	---	---	---	---	---	---	---	---	1.50E-08
	B15-6	0.5	---	140.8	9.4	---	---	---	---	---	---	---	---	1.70E-08
	B15-4	2.0	---	131	11.5	---	---	---	---	---	---	---	---	1.30E-08
	B15-2	1.5	---	135	8.2	---	---	---	---	---	---	---	---	1.30E-08
Cell 15-I Phase 2	NW Cell	N/A	CL	---	---	35	---	15	---	77.9	0	114.0	15.0	---
	B19-2	2.1	---	138.9	8.7	---	---	---	---	---	---	---	---	1.80E-08

MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	1A 2.5 feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	130.24	WET WT, g	187.0		
D & T, g	124.88	DIA, in	1.994	5.06	cm
T, g	33.78	HT, in	1.494	3.79	cm
		AREA		20.15	cm^2
MOIST-		DENSITY:	152.7	PCF WET	
URE, %	5.9	DENSITY:	144.2	PCF DRY	

ADDITIONAL DATA

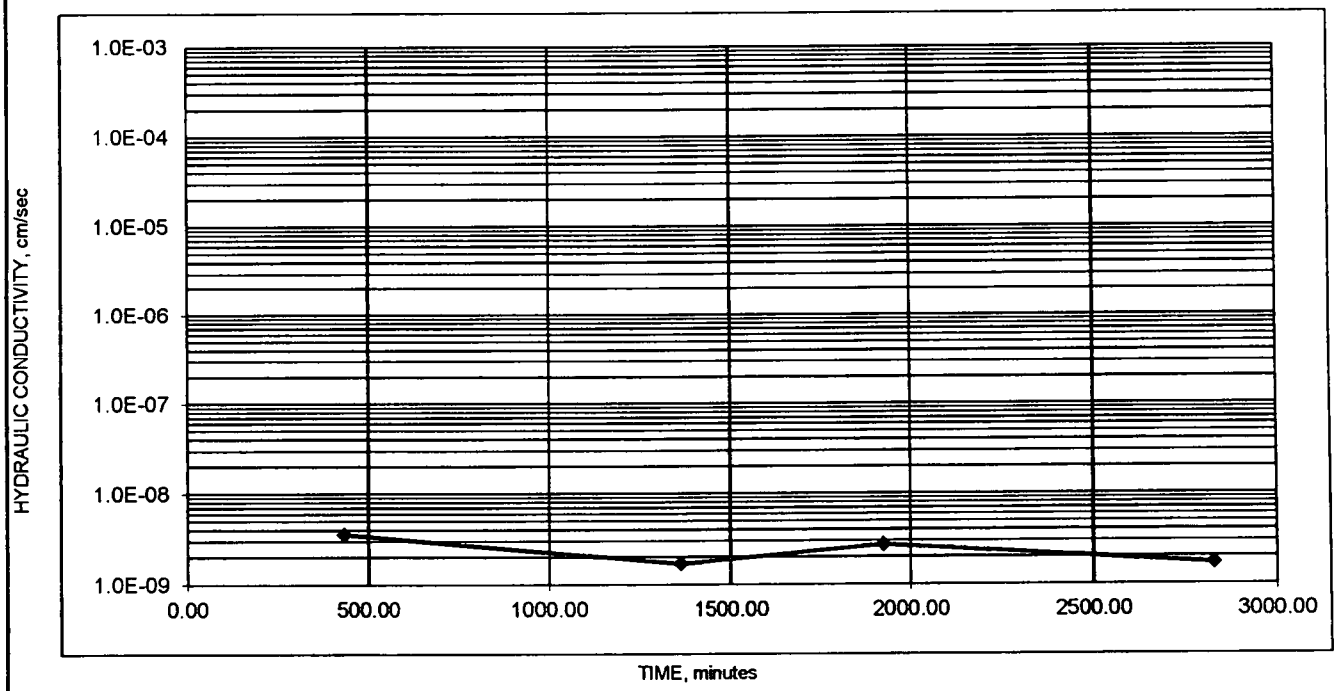
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	14.5	OPTIMUM, %:	NA
SATURATION, %:	93.9	COMPACTION, %:	NA
VOID RATIO:	0.17	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0 psi	BACK PRESSURE (=UPPER=LOWER):	100.0 psi	
DURING TEST:	LATERAL PRESS.:	104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
			BIAS PRESSURE (=H1-H2)	0.0 psi	

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
7.7	65.4	0.00	57.7									
7.8	65.3	431.00	57.5	0.003472	3.60E-09	0.03	0.03	1.00	15.2	48	23.9	0.912
7.9	65.2	1358.00	57.3	0.003484	1.69E-09	0.03	0.03	1.00	15.1	30	23.6	0.918
8.0	65.1	1926.00	57.1	0.003497	2.74E-09	0.03	0.03	1.00	15.0	13	24.1	0.908
8.1	65.0	2830.00	56.9	0.003509	1.70E-09	0.03	0.03	1.00	15.0	30	24.8	0.893

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE 2.4E-09 cm/sec

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	1C 1.0 feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	120.86	WET WT, g	189.0		
D & T, g	115.70	DIA, in	1.995	5.07	cm
T, g	33.75	HT, in	1.509	3.83	cm
		AREA		20.17	cm^2
MOIST-		DENSITY:	152.6	PCF WET	
URE, %	6.3	DENSITY:	143.6	PCF DRY	

ADDITIONAL DATA

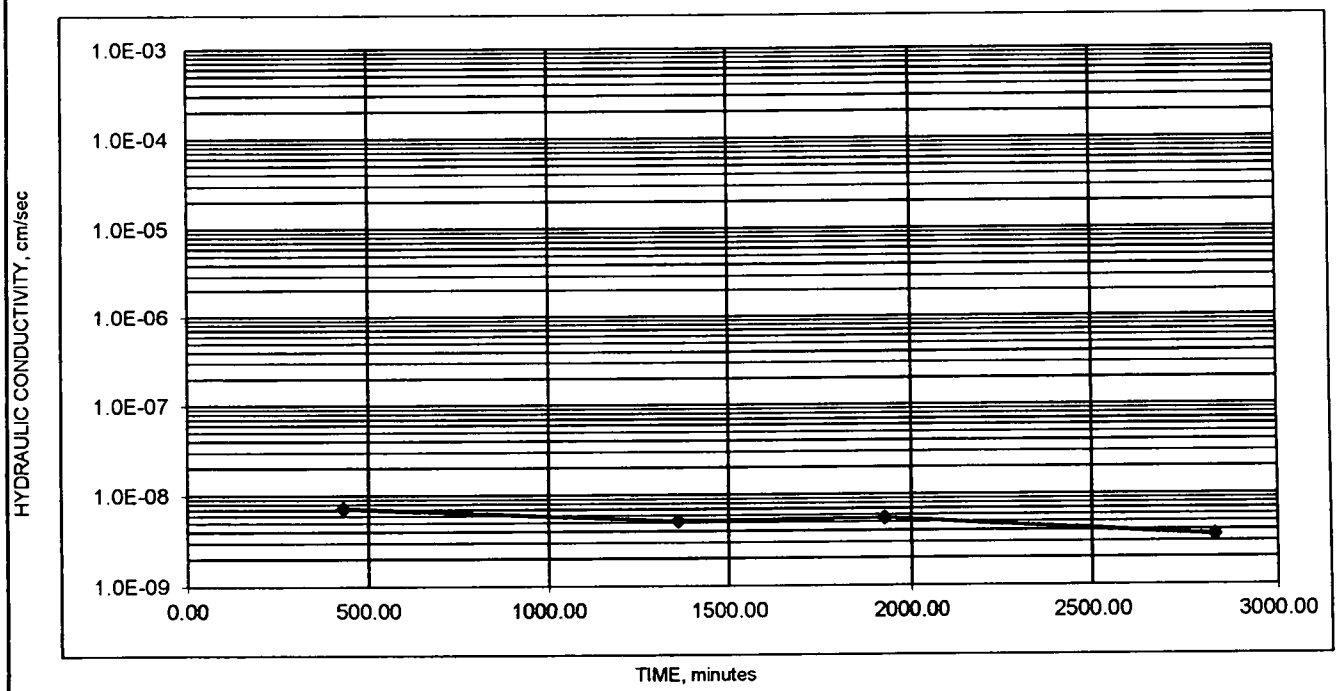
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	14.8	OPTIMUM, %:	NA
SATURATION, %:	97.8	COMPACTION, %:	NA
VOID RATIO:	0.17	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.: 104.0 psi	BACK PRESSURE (=UPPER=LOWER): 100.0 psi		
DURING TEST:	LATERAL PRESS.: 104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
		BIAS PRESSURE (=H1-H2) 0.0 psi		

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
8.1	65.4	0.00	57.3									
8.3	65.2	431.00	56.9	0.007005	7.32E-09	0.06	0.06	1.00	14.8	36	24.0	0.911
8.6	64.9	1358.00	56.3	0.010601	5.19E-09	0.09	0.09	1.00	14.7	4	23.6	0.918
8.8	64.7	1926.00	55.9	0.007130	5.55E-09	0.06	0.06	1.00	14.6	3	24.8	0.893
9.0	64.5	2830.00	55.5	0.007181	3.53E-09	0.06	0.06	1.00	14.5	35	24.6	0.897

HYDRAULIC CONDUCTIVITY (k_{20}) = **AVERAGE 5.4E-09 cm/sec**

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



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MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	2B 0.0feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	116.97	WET WT, g	187.7		
D & T, g	112.40	DIA, in	1.989	5.05	cm
T, g	33.47	HT, in	1.514	3.85	cm
		AREA		20.05	cm^2
MOIST-		DENSITY:	152.0	PCF WET	
URE, %	5.8	DENSITY:	143.7	PCF DRY	

ADDITIONAL DATA

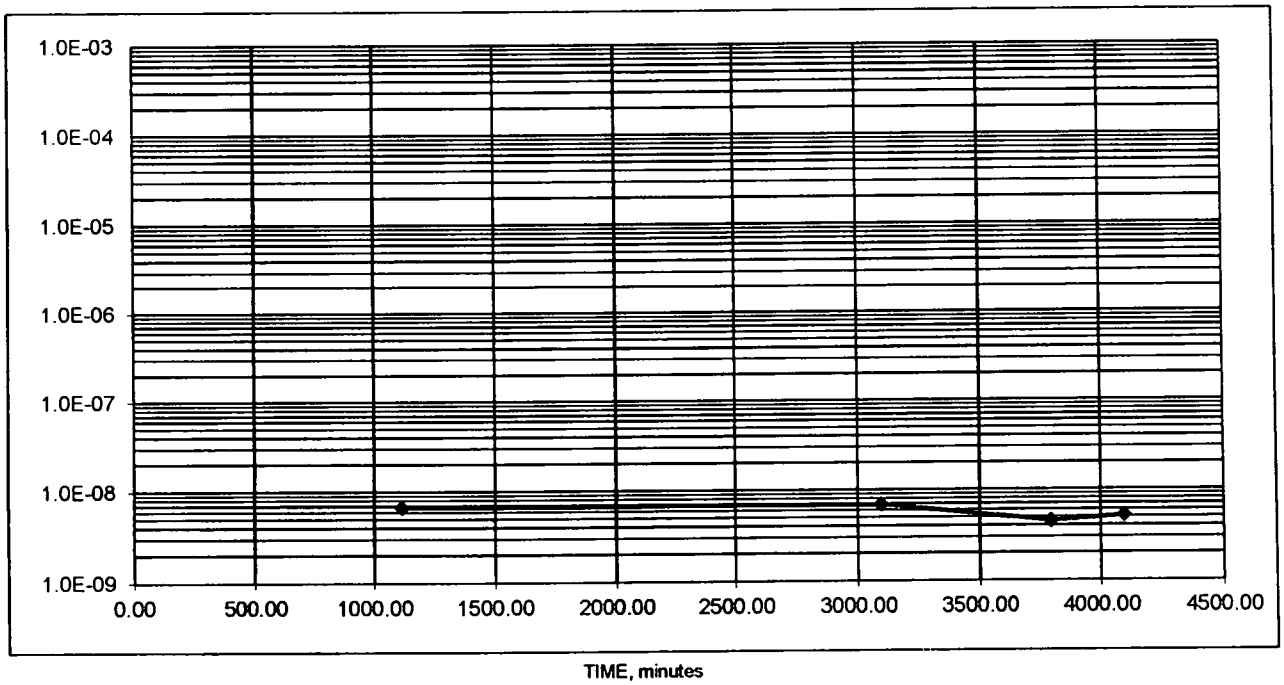
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	14.7	OPTIMUM, %:	NA
SATURATION, %:	90.4	COMPACTION, %:	NA
VOID RATIO:	0.17	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0 psi	BACK PRESSURE (=UPPER=LOWER):	100.0 psi	
DURING TEST:	LATERAL PRESS.:	104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
			BIAS PRESSURE (=H1-H2)	0.0 psi	

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
6.0	68.0	0.00	62.0									
6.5	67.5	1114.00	61.0	0.016261	6.71E-09	0.16	0.16	1.00	15.9	15	23.5	0.920
7.3	66.5	3096.00	59.2	0.029952	6.95E-09	0.25	0.31	0.80	15.4	19	23.5	0.920
7.5	66.3	3795.00	58.8	0.006780	4.50E-09	0.06	0.06	1.00	15.3	23	23.1	0.929
7.6	66.2	4096.00	58.6	0.003407	5.18E-09	0.03	0.03	1.00	15.2	11	23.7	0.916

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE **5.8E-09** cm/sec

MAXIMUM HYDRAULIC GRADIENT	1.0E-03 TO 1.0E-04	2	0.75< RATIO <1.25	30 % < 25 AT MAX > 1.0E-8
	1.0E-04 TO 1.0E-05	5		HYDRAULIC OR
	1.0E-05 TO 1.0E-06	10		GRADIENT % < 50 AT
	1.0E-06 TO 1.0E-07	20		ALLOWED < 1.0E-8
	less than 1.0E-07	30		



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MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	3B 3.25feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	120.86	WET WT, g	189.0		
D & T, g	115.70	DIA, in	1.995	5.07	cm
T, g	33.75	HT, in	1.509	3.83	cm
		AREA		20.17	cm^2
MOIST-		DENSITY:	152.6	PCF WET	
URE, %	6.3	DENSITY:	143.6	PCF DRY	

ADDITIONAL DATA

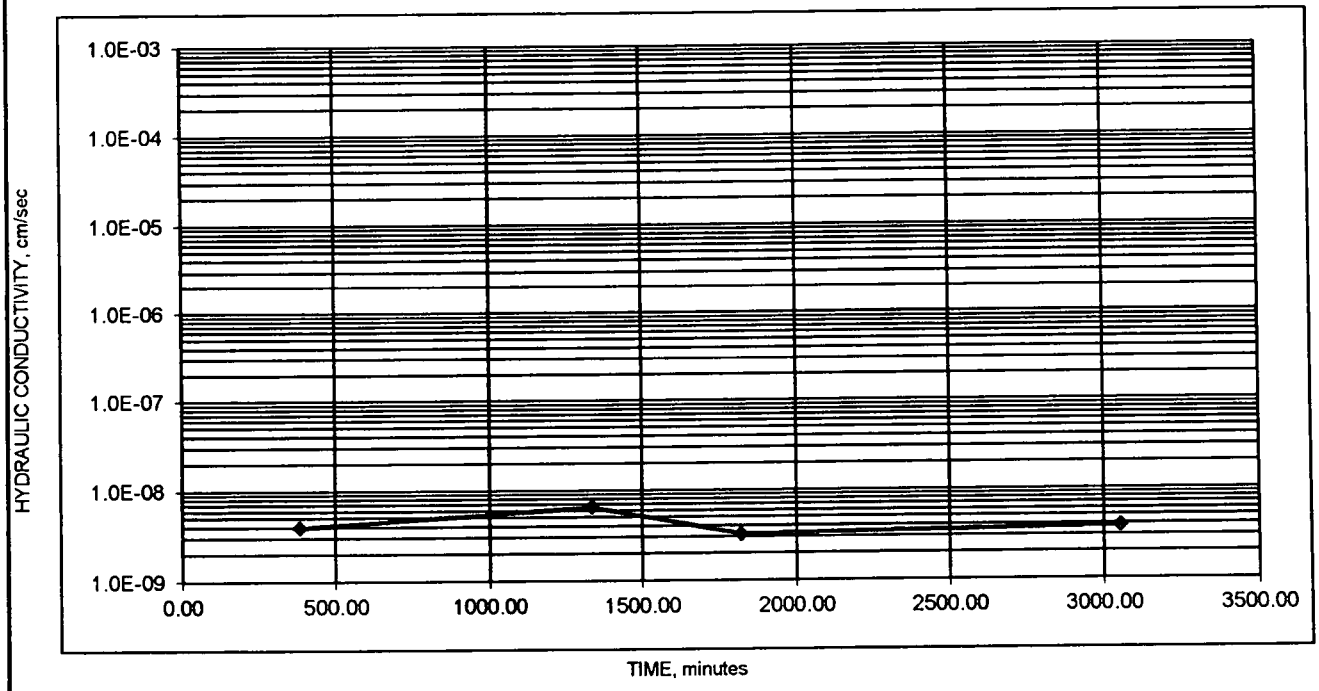
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	14.8	OPTIMUM, %:	NA
SATURATION, %:	97.8	COMPACTION, %:	NA
VOID RATIO:	0.17	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0 psi	BACK PRESSURE (=UPPER=LOWER):	100.0 psi	
DURING TEST:	LATERAL PRESS.:	104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
			BIAS PRESSURE (=H1-H2)	0.0 psi	

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
7.4	65.5	0.00	58.1									
7.5	65.4	385.00	57.9	0.003448	3.93E-09	0.03	0.03	1.00	15.1	10	25.1	0.887
7.9	65.0	1338.00	57.1	0.013913	6.53E-09	0.12	0.12	1.00	14.9	49	24.3	0.904
8.0	64.9	1822.00	56.9	0.003509	3.20E-09	0.03	0.03	1.00	14.8	27	24.8	0.893
8.3	64.6	3054.00	56.3	0.010601	3.81E-09	0.09	0.09	1.00	14.7	13	24.7	0.895

HYDRAULIC CONDUCTIVITY (k_{20}) = **AVERAGE 4.4E-09 cm/sec**

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



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MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	3C 3.0 feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	116.30	WET WT, g	188.7		
D & T, g	111.25	DIA, in	1.993	5.06	cm
T, g	33.97	HT, in	1.507	3.83	cm
		AREA		20.13	cm^2
MOIST-		DENSITY:	152.9	PCF WET	
URE, %	6.5	DENSITY:	143.5	PCF DRY	

ADDITIONAL DATA

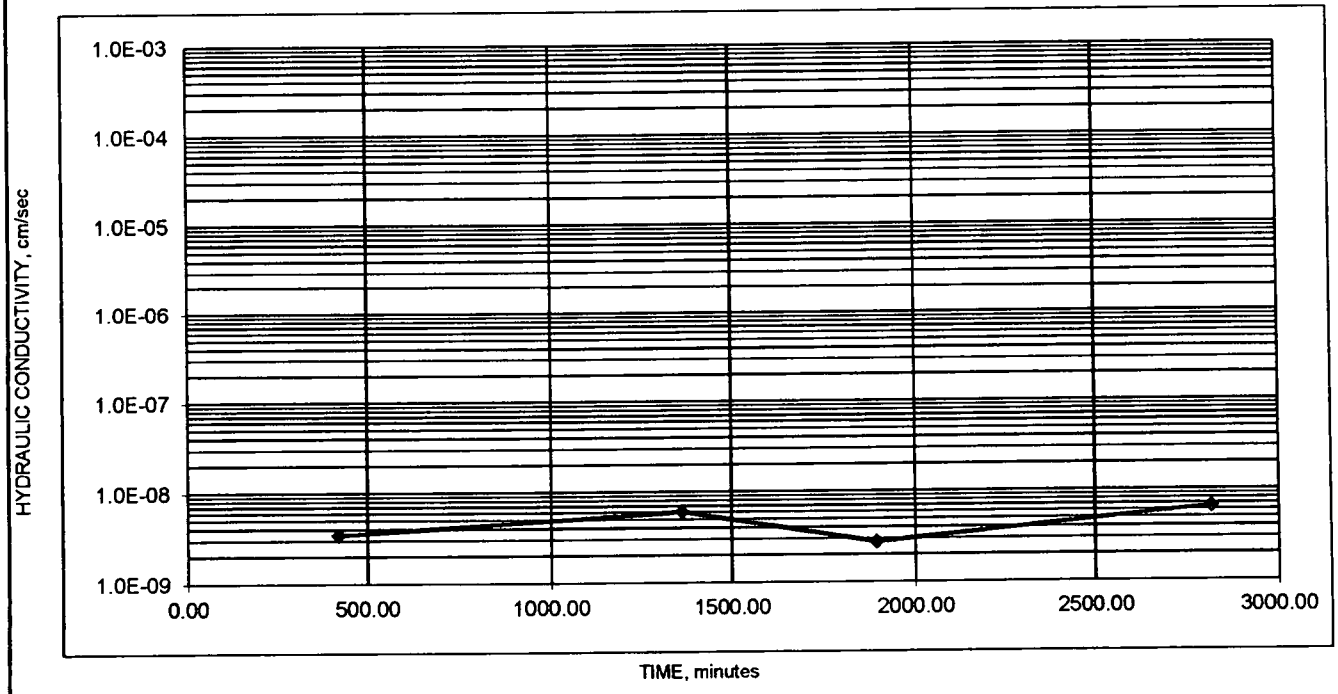
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	14.9	OPTIMUM, %:	NA
SATURATION, %:	101.0	COMPACTION, %:	NA
VOID RATIO:	0.17	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0 psi	BACK PRESSURE (=UPPER=LOWER):	100.0 psi	
DURING TEST:	LATERAL PRESS.:	104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
			BIAS PRESSURE (=H1-H2)	0.0 psi	

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
6.7	68.0	0.00	61.3									
6.8	67.9	420.00	61.1	0.003268	3.48E-09	0.03	0.03	1.00	16.0	26	24.3	0.904
7.2	67.5	1362.00	60.3	0.013180	6.08E-09	0.12	0.12	1.00	15.8	29	25.6	0.877
7.3	67.4	1895.00	60.1	0.003322	2.76E-09	0.03	0.03	1.00	15.7	42	24.8	0.893
7.7	67.0	2817.00	59.3	0.013401	6.55E-09	0.12	0.12	1.00	15.5	39	24.0	0.910

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE **4.7E-09** cm/sec

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



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MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	4A 4.0 feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	114.50	WET WT, g	189.0		
D & T, g	109.50	DIA, in	1.993	5.06	cm
T, g	34.07	HT, in	1.510	3.84	cm
		AREA		20.13	cm^2
MOIST-		DENSITY:	152.8	PCF WET	
URE, %	6.6	DENSITY:	143.3	PCF DRY	

ADDITIONAL DATA

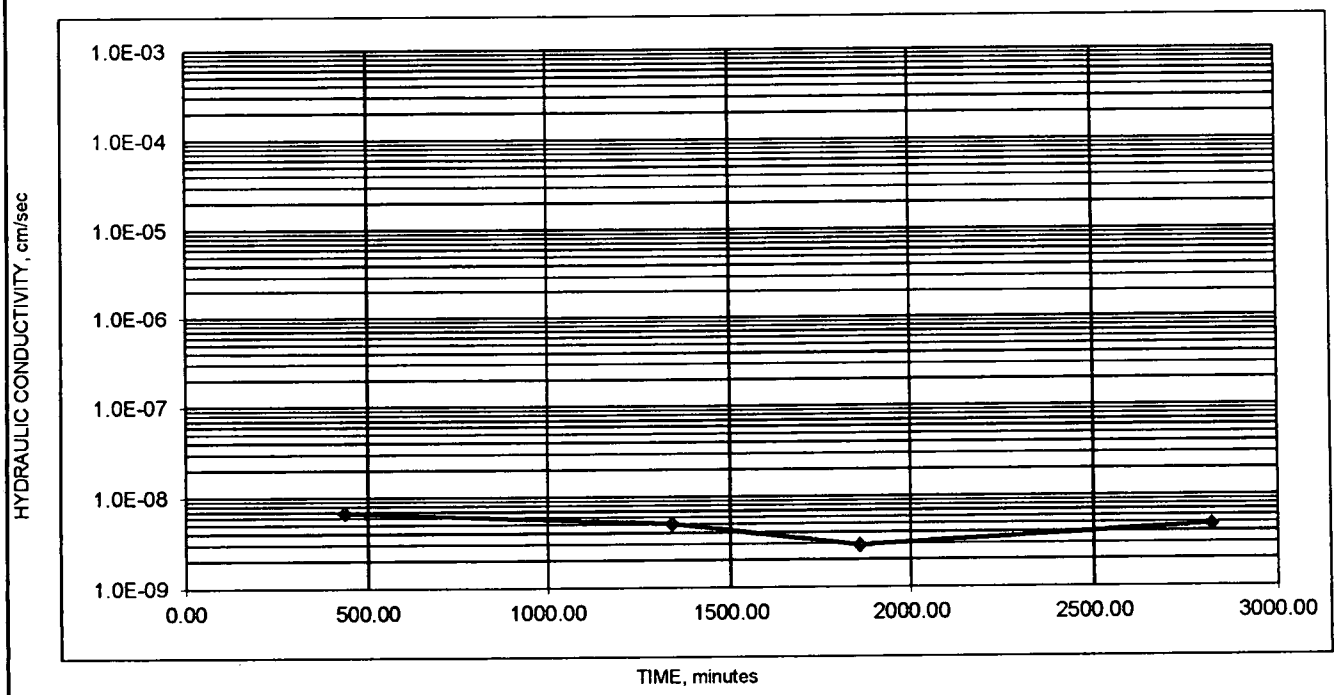
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	15.0	OPTIMUM, %:	NA
SATURATION, %:	101.7	COMPACTION, %:	NA
VOID RATIO:	0.18	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.: 104.0 psi	BACK PRESSURE (=UPPER=LOWER): 100.0 psi		
DURING TEST:	LATERAL PRESS.: 104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
		BIAS PRESSURE (=H1-H2) 0.0 psi		

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.; C	TEMP. CORR.:
8.2	68.4	0.00	60.2									
8.4	68.2	436.00	59.8	0.006667	6.78E-09	0.06	0.06	1.00	15.6	39	24.8	0.893
8.7	67.9	1339.00	59.2	0.010084	5.04E-09	0.09	0.09	1.00	15.4	4	24.0	0.910
8.8	67.8	1859.00	59.0	0.003384	2.88E-09	0.03	0.03	1.00	15.4	41	24.8	0.893
9.1	67.5	2821.00	58.4	0.010222	4.73E-09	0.09	0.09	1.00	15.2	3	24.6	0.897

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE 4.9E-09 cm/sec

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



Terracon

MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	4B 4.25feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	116.46	WET WT, g	188.1		
D & T, g	111.17	DIA, in	1.994	5.06	cm
T, g	33.13	HT, in	1.509	3.83	cm
		AREA		20.15	cm^2
MOIST-		DENSITY:	152.1	PCF WET	
URE, %	6.8	DENSITY:	142.4	PCF DRY	

ADDITIONAL DATA

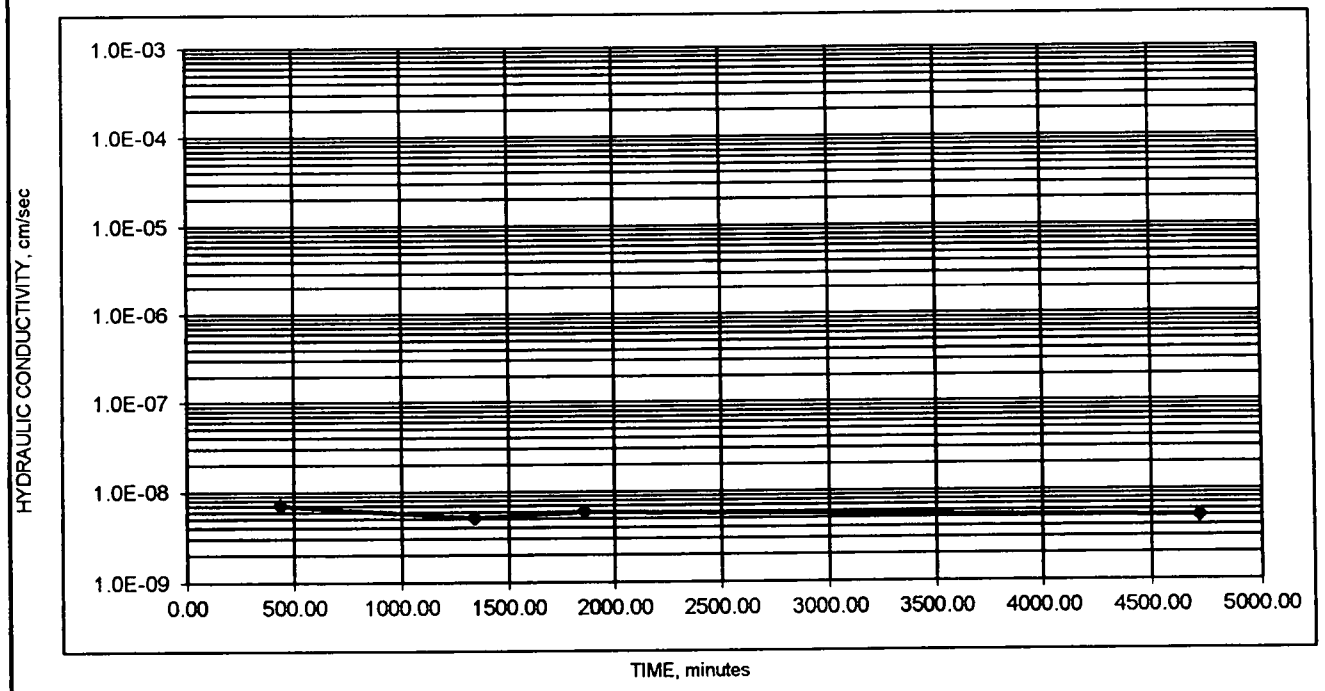
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	15.5	OPTIMUM, %:	NA
SATURATION, %:	99.8	COMPACTION, %:	NA
VOID RATIO:	0.18	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0 psi	BACK PRESSURE (=UPPER=LOWER):	100.0 psi		
DURING TEST:	LATERAL PRESS.:	104.0 psi	H2: 100.0 psi	H1: 100.0 psi		
			BIAS PRESSURE (=H1-H2)	0.0 psi		

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
7.6	66.0	0.00	58.4									
7.8	65.8	437.00	58.0	0.006873	7.05E-09	0.06	0.06	1.00	15.1	22	24.2	0.906
8.1	65.5	1339.00	57.4	0.010399	5.10E-09	0.09	0.09	1.00	15.0	12	24.8	0.893
8.3	65.3	1859.00	57.0	0.006993	5.98E-09	0.06	0.06	1.00	14.9	3	24.6	0.897
9.2	64.4	4719.00	55.2	0.032088	5.03E-09	0.28	0.28	1.00	14.4	13	24.2	0.906

HYDRAULIC CONDUCTIVITY (k_{20}) = **AVERAGE 5.8E-09 cm/sec**

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



Terracon

MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	5A 3.5 feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, DARK GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	121.22	WET WT, g	187.9		
D & T, g	115.49	DIA, in	1.999	5.08	cm
T, g	33.91	HT, in	1.505	3.82	cm
		AREA		20.25	cm^2
MOIST-		DENSITY:	151.6	PCF WET	
URE, %	7.0	DENSITY:	141.6	PCF DRY	

ADDITIONAL DATA

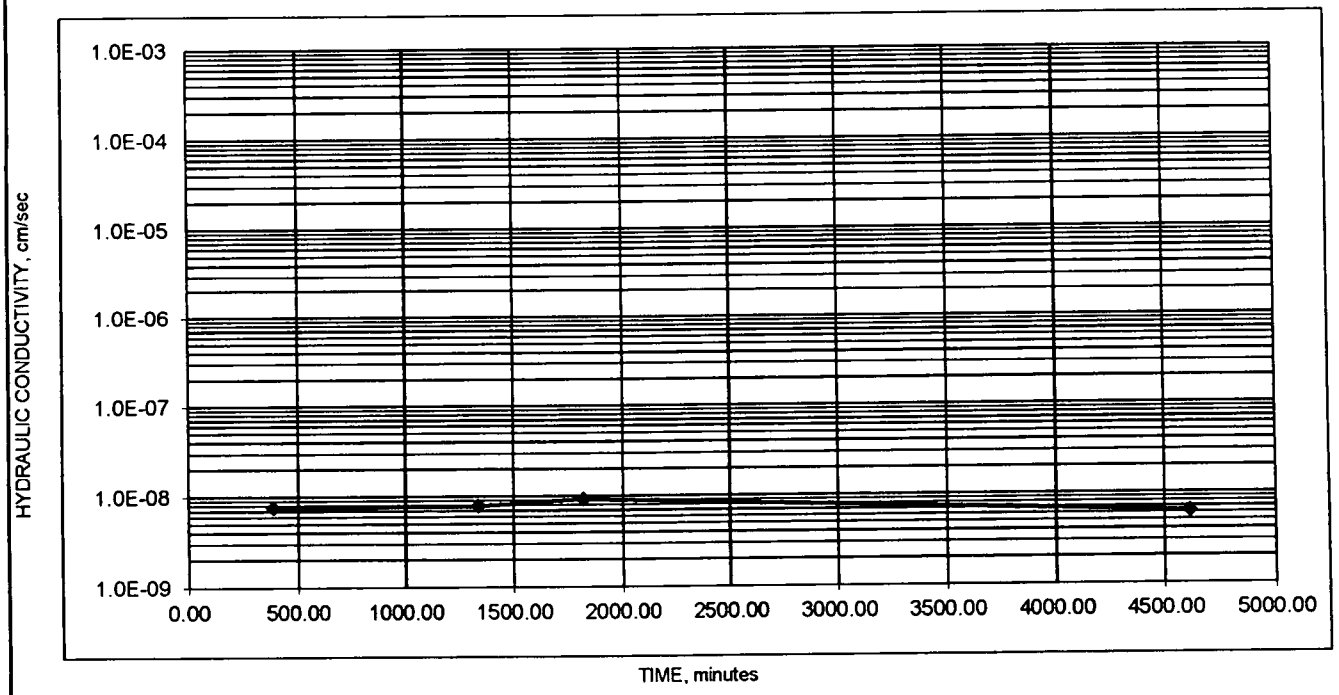
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	16.0	OPTIMUM, %:	NA
SATURATION, %:	99.8	COMPACTION, %:	NA
VOID RATIO:	0.19	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.: 104.0 psi	BACK PRESSURE (=UPPER=LOWER): 100.0 psi		
DURING TEST:	LATERAL PRESS.: 104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
		BIAS PRESSURE (=H1-H2) 0.0 psi		

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP., C	TEMP. CORR.:
7.6	67.0	0.00	59.4									
7.8	66.8	385.00	59.0	0.006757	7.65E-09	0.06	0.06	1.00	15.4	2	25.1	0.887
8.3	66.3	1338.00	58.0	0.017094	7.97E-09	0.16	0.16	1.00	15.2	2	24.3	0.904
8.6	66.0	1820.00	57.4	0.010399	9.30E-09	0.09	0.09	1.00	15.0	19	25.6	0.877
9.7	64.9	4614.00	55.2	0.039806	6.25E-09	0.36	0.34	1.04	14.4	20	24.8	0.893

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE 7.8E-09 cm/sec

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



Terracon

MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	CAREL CORPORATION	PROJECT NUMBER:	02146322
LOCATION:	CREEK COUNTY LANDFILL	DATE:	8/11/2014
		PANEL IDENTIFICATION:	Lenexa Perm Board
SAMPLE ID:	5C 4.25 feet	BURETTE AREA:	0.312 cm^2
SAMPLE DESCR.:	SHALE, DARK GRAY	BURETTE INCREMENT LENGTH:	1.000 cm
		VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g	127.21	WET WT, g	190.0		
D & T, g	119.99	DIA, in	2.006	5.10	cm
T, g	33.73	HT, in	1.532	3.89	cm
		AREA		20.39	cm^2
MOIST-		DENSITY:	149.5	PCF WET	
URE, %	8.4	DENSITY:	138.0	PCF DRY	

ADDITIONAL DATA

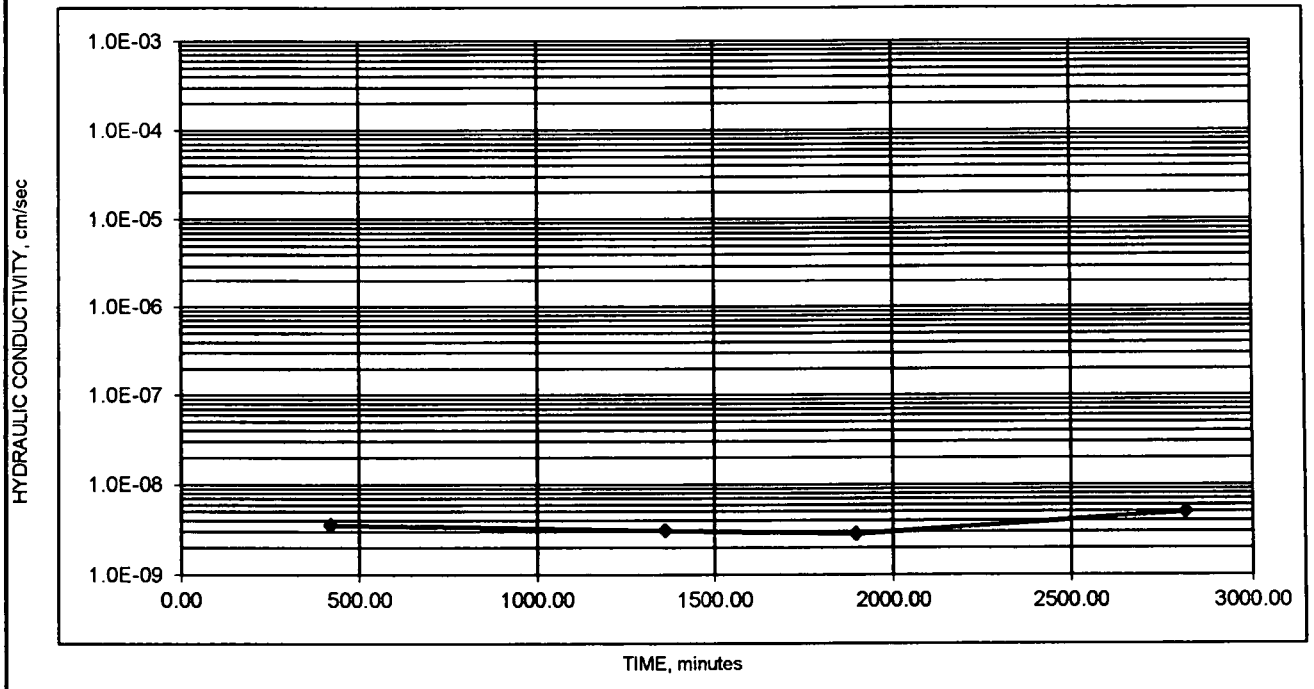
SPECIFIC GRAVITY:	2.70	RECOMPACTED?:	NO
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	18.2	OPTIMUM, %:	NA
SATURATION, %:	101.9	COMPACTION, %:	NA
VOID RATIO:	0.22	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0 psi	BACK PRESSURE (=UPPER=LOWER):	100.0 psi	
DURING TEST:	LATERAL PRESS.:	104.0 psi	H2: 100.0 psi	H1: 100.0 psi	
			BIAS PRESSURE (=H1-H2)	0.0 psi	

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
7.8	68.2	0.00	60.4									
7.9	68.1	420.00	60.2	0.003317	3.54E-09	0.03	0.03	1.00	15.5	2	24.3	0.904
8.1	67.9	1362.00	59.8	0.006667	3.08E-09	0.06	0.06	1.00	15.4	14	25.6	0.877
8.2	67.8	1894.00	59.6	0.003350	2.83E-09	0.03	0.03	1.00	15.3	22	24.3	0.904
8.5	67.5	2817.00	59.0	0.010118	4.95E-09	0.09	0.09	1.00	15.2	38	24.0	0.910

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE 3.6E-09 cm/sec

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	30	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



AIMRIGHT
TESTING & ENGINEERING

Construction Materials Testing • Special Inspections • Geotechnical Engineering

Report of Nuclear Method for In-place Density and Moisture Content Testing

Report Date: 10/22/2018
Project: Creek County Landfill
Client: Creek County Landfill
Contractor: Creek County Landfill

Test Date: 10/16/2018
Project No.: 2264-18
Report No.: 2264101618FDT

Performed by: J. Rock

Proctor Lab No.	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Test Method	Material Description
2975	114.0	15.0	ASTM D698	Gray Lean Clay w/ Shale Fragments

ASTM D 6938

Area Tested: NW Cell

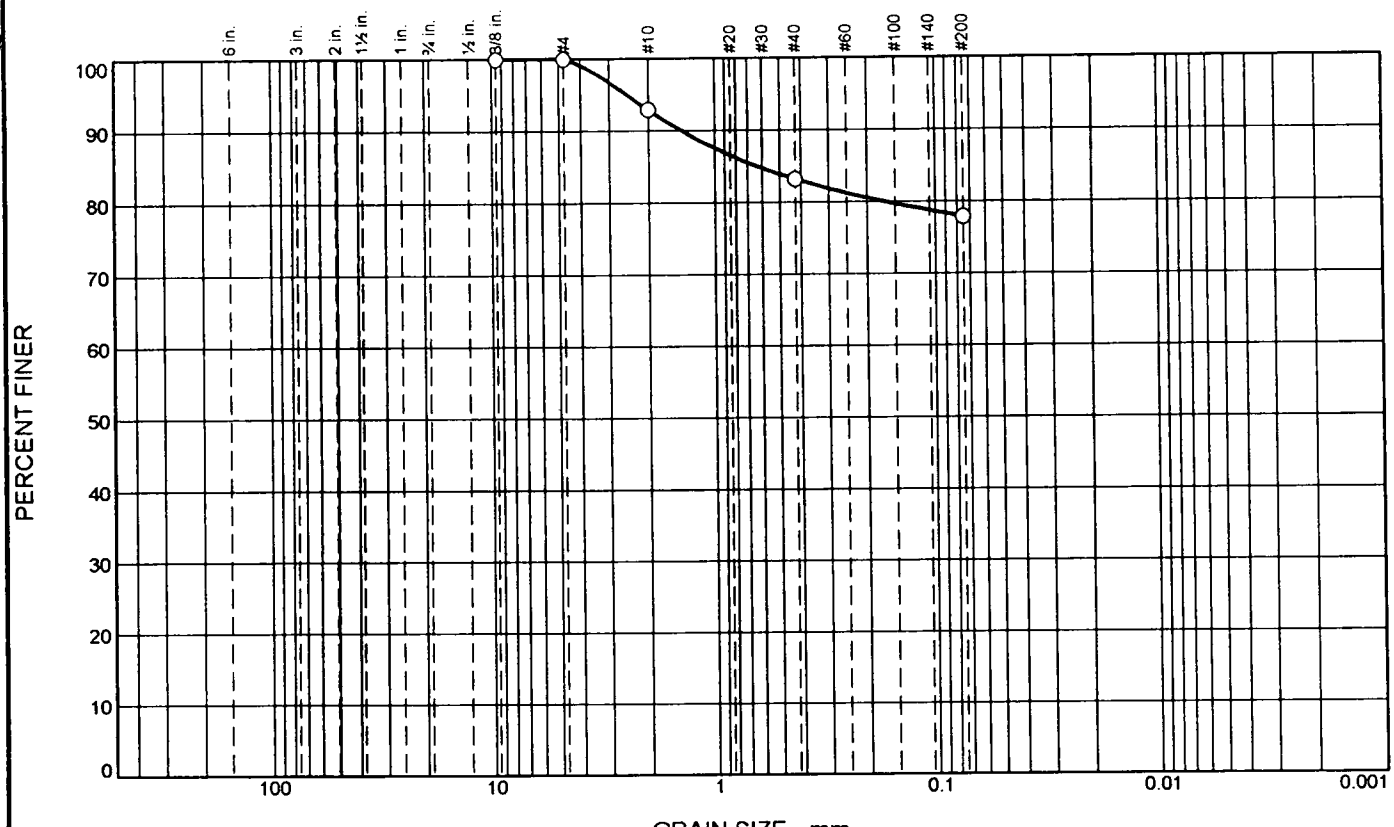
Test No.	Lift	Moisture Content (%)	Dry Density (pcf)	Percent Compaction (%)	Test Location
1	SG	11.9	117.3	103	see attached Test Location Plan
2	SG	11.2	118.6	104	see attached Test Location Plan
3	SG	13.7	115.3	101	see attached Test Location Plan
4	SG	12.6	116.8	102	see attached Test Location Plan
5	SG	11.6	117.3	103	see attached Test Location Plan
6	SG	11.7	119.3	105	see attached Test Location Plan

**Percent compaction did not meet project requirements.*
***Moisture content does not meet project requirements. R - Re-Test*

Remarks: N/A

Reviewed by: Justin Boyd, PE

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	7.1	9.7	5.3	77.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	100.0		
#10	92.9		
#40	83.2		
#200	77.9		

* (no specification provided)

Material Description

Gray Lean Clay w/ Shale Fragments

Atterberg Limits

PL= 20 LL= 35 PI= 15

Classification

USCS= CL AASHTO= A-6(11)

Remarks

Date Sampled: 10/16/2018

Location: Native Subgrade - NW Cell
Sample Number: 2975 **Depth:** N/A

Date: 10/17/2018

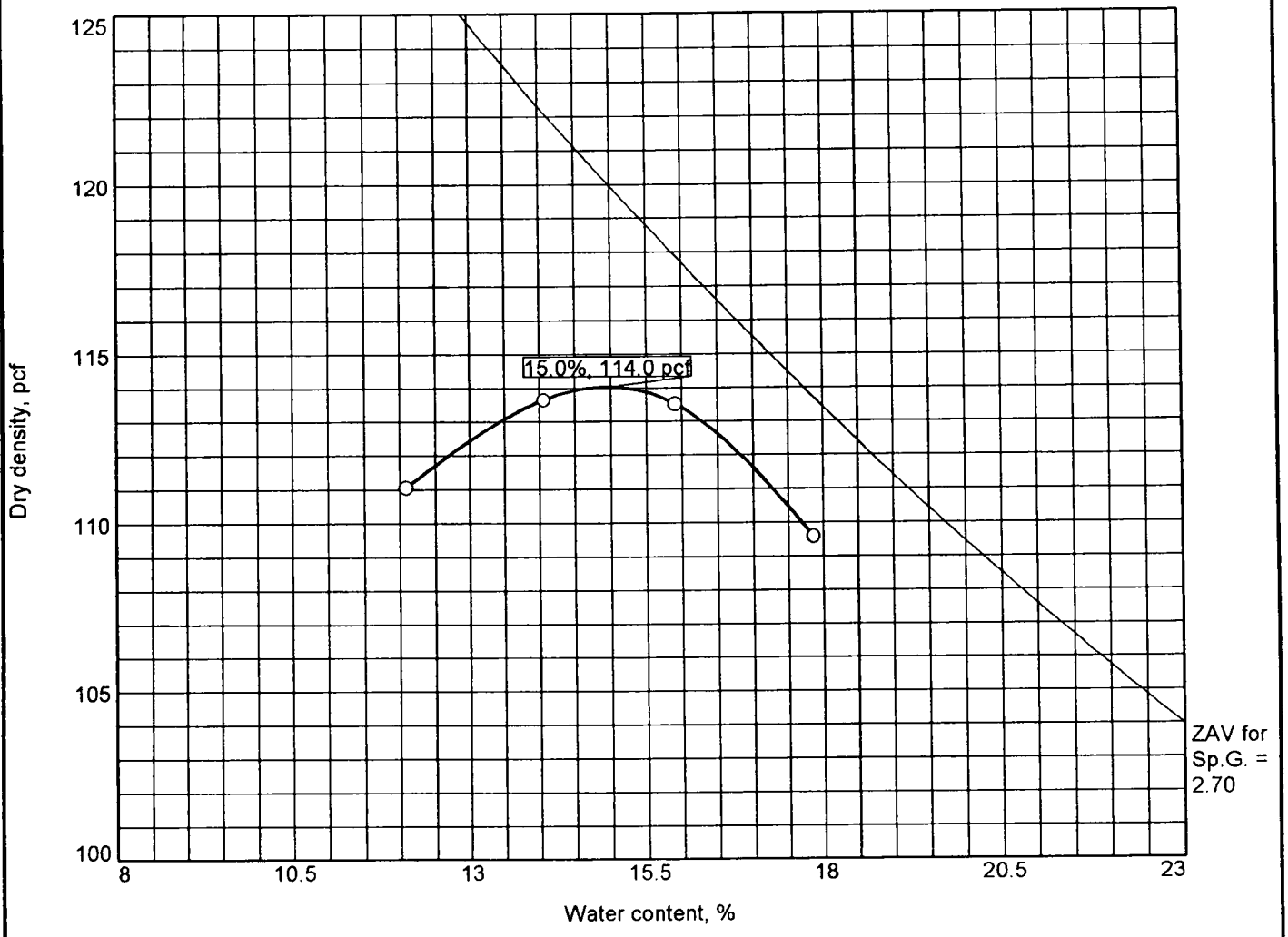
ALMRIGHT TESTING & ENGINEERING

Client: Creek County Landfill
Project: Creek County Landfill

Project No: 2264-18

Tested By: R. Biggs **Checked By:** J. Boyd

PROCTOR TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
N/A	CL	A-6(11)	10.8	N/A	35	15	0.0	77.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 114.0 pcf Optimum moisture = 15.0 %	Gray Lean Clay w/ Shale Fragments

Project No. 2264-18 **Client:** Creek County Landfill
Project: Creek County Landfill

○ **Location:** Native Subgrade - NW Cell **Sample Number:** 2975

Remarks:
Date Sampled: 10/16/2018

AIMRIGHT TESTING & ENGINEERING

Tested By: R. Biggs **Checked By:** J. Rock

CLIENT: Creek County Landfill

REPORT DATE: 10/22/2018

PROJECT NO.: 18-10-18

PROJECT: Cell 15-1 - Phase 1

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: B15-9
PROCTOR # :
SAMPLE ORIENTATION: Vertical
Remold _____

LAB START DATE: 10/18/2018
LAB RPT. DATE: 10/22/2018
TECHNICIAN: MLT
DEPTH/LIFT: 1.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.25 in
c. Sample Volume ($\pi b^2 / 4 * a$): 3.73 cu in

b. Avg. Diameter of Specimen: 1.95 in
d. Wet Unit Weight: [(e * 3.8095) / c)]: 148.5 pcf

INITIAL CONDITIONS

e. Wet Weight Soil: 145.5 gms
f. Wet Weight Soil + Tare: 244.1 gms
g. Dry Weight Soil + Tare: 230.4 gms
h. Tare Weight: 98.6 gms
i. Moisture Content [(f-g)/(g-h)]*100: 10.4 %
j. Unit Dry Weight [d/(1+(i/100))]: 134.5 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 246.4 gms
l. Dry Weight Soil + Tare: 230.4 gms
m. Tare Weight: 98.6 gms
n. Moisture Content [(k-l)/(l-m)]*100: 12.1 %

Specific Gravity of Mercury, d_{Hg}: 13.55
Specific Gravity of Water, d_w: 1.00

Equilibrium Head, R_{eq}: 2.0 cm
Maximum Pipet Head, R_p: 9.29 cm
Maximum Gradient, i: 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P3	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	P3 cp	Inflow ha, in	Outflow ha, out
		10							
		10							
		10							
21-Aug	50	10	45	54.5	0.95	1	50	45	45

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss Dz_p, cm	Temp C	Rt	k @ 20C cm/sec
10/21/2018	16:08		9.20				
10/21/2018	16:19	660	8.90	0.30	22	0.953	2.4E-08
10/21/2018	16:35	1620	8.70	0.50	22	0.953	1.7E-08
10/21/2018	16:51	2580	8.60	0.60	22	0.953	1.3E-08
10/21/2018	17:03	3300	8.50	0.70	22	0.953	1.2E-08
10/21/2018	17:15	4020	8.50	0.70	22	0.953	9.5E-09

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm
Annulus Area = 0.767120 sq cm

CLIENT: Creek County Landfill

REPORT DATE: 10/22/2018

PROJECT NO.: 18-10-18

PROJECT: Cell 15-1 - Phase 1

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: B15-8
PROCTOR # :
SAMPLE ORIENTATION: Vertical
Remold _____

LAB START DATE: 10/18/2018
LAB RPT. DATE: 10/22/2018
TECHNICIAN: MLT
DEPTH/LIFT: 3.5'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.05 in
b. Avg. Diameter of Specimen: 1.95 in
c. Sample Volume ($\pi b^2 / 4 * a$): 3.14 cu in
d. Wet Unit Weight: [(e * 3.8095) / c)]: 151.4 pcf

INITIAL CONDITIONS

e. Wet Weight Soil: 124.6 gms
f. Wet Weight Soil + Tare: 217.7 gms
g. Dry Weight Soil + Tare: 207.9 gms
h. Tare Weight: 93.1 gms
i. Moisture Content [(f-g)/(g-h)]*100: 8.5 %
j. Unit Dry Weight [d/(1+(i/100))]: 139.5 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 219.5 gms
l. Dry Weight Soil + Tare: 207.9 gms
m. Tare Weight: 93.1 gms
n. Moisture Content [(k-l)/(l-m)]*100: 10.1 %

Specific Gravity of Mercury, d_{Hg}: 13.55
Specific Gravity of Water, d_w: 1.00

Equilibrium Head, R_{eq}: 2.0 cm
Maximum Pipet Head, R_p: 8.12 cm
Maximum Gradient, i: 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P3	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	P3 cp	Inflow ha, in	Outflow ha, out
		10							
		10							
		10							
21-Aug	50	10	45	54.5	0.95	1	50	45	45

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss Dz_p, cm	Temp C	Rt	k @ 20C cm/sec
10/21/2018	15:00		8.10				
10/21/2018	15:15	900	7.40	0.70	22	0.953	4.3E-08
10/21/2018	15:28	1680	7.30	0.80	22	0.953	2.6E-08
10/21/2018	15:39	2340	7.20	0.90	22	0.953	2.2E-08
10/21/2018	15:50	3000	7.10	1.00	22	0.953	1.9E-08
10/21/2018	16:02	3720	7.10	1.00	22	0.953	1.5E-08

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm
Annulus Area = 0.767120 sq cm

CLIENT: Creek County Landfill Cell

REPORT DATE: 10/22/2018

PROJECT NO.: 18-10-18

PROJECT: Cell 15-1 - Phase 1

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: B15-6
PROCTOR # :
SAMPLE ORIENTATION: Vertical
Remold _____

LAB START DATE: 10/18/2018
LAB RPT. DATE: 10/22/2018
TECHNICIAN: MLT
DEPTH/LIFT: 0.5'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1 in
b. Avg. Diameter of Specimen: 1.95 in
c. Sample Volume ($\pi b^2 / 4 * a$): 2.99 cu in
d. Wet Unit Weight: [(e * 3.8095) / c)]: 154.1 pcf

INITIAL CONDITIONS

e. Wet Weight Soil: 120.8 gms
f. Wet Weight Soil + Tare: 211.0 gms
g. Dry Weight Soil + Tare: 200.6 gms
h. Tare Weight: 90.2 gms
i. Moisture Content [(f-g)/(g-h)]*100: 9.4 %
j. Unit Dry Weight [d/(1+(i/100))]: 140.8 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 212.6 gms
l. Dry Weight Soil + Tare: 200.6 gms
m. Tare Weight: 90.2 gms
n. Moisture Content [(k-l)/(l-m)]*100: 10.9 %

Specific Gravity of Mercury, d_{Hg}: 13.55
Specific Gravity of Water, d_w: 1.00

Equilibrium Head, R_{eq}: 2.0 cm
Maximum Pipet Head, R_p: 7.83 cm
Maximum Gradient, i: 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P3	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	P3 cp	Inflow ha, in	Outflow ha, out
		10							
		10							
		10							
21-Aug	50	10	45	54.5	0.95	1	50	45	45

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss Dz_p, cm	Temp C	Rt	k @ 20C cm/sec
10/21/2018	14:05		7.80				
10/21/2018	14:16	660	7.20	0.60	22	0.953	5.0E-08
10/21/2018	14:25	1200	7.10	0.70	22	0.953	3.2E-08
10/21/2018	14:35	1800	7.10	0.70	22	0.953	2.1E-08
10/21/2018	14:45	2400	7.00	0.80	22	0.953	1.9E-08
10/21/2018	14:55	3000	6.90	0.90	22	0.953	1.7E-08

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm
Annulus Area = 0.767120 sq cm

CLIENT: Creek County Landfill

REPORT DATE: 10/22/2018

PROJECT NO.: 18-10-18

PROJECT: Cell 15-1 - Phase 1

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: B15-4
PROCTOR # :
SAMPLE ORIENTATION: Vertical
Remold _____

LAB START DATE: 10/18/2018
LAB RPT. DATE: 10/22/2018
TECHNICIAN: MLT
DEPTH/LIFT: 2.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.1 in
b. Avg. Diameter of Specimen: 1.95 in
c. Sample Volume ($\pi b^2 / 4 * a$): 3.29 cu in
d. Wet Unit Weight: [(e * 3.8095) / c)]: 146.1 pcf

INITIAL CONDITIONS

e. Wet Weight Soil: 126.0 gms
f. Wet Weight Soil + Tare: 223.3 gms
g. Dry Weight Soil + Tare: 210.3 gms
h. Tare Weight: 97.3 gms
i. Moisture Content [(f-g)/(g-h)]*100: 11.5 %
j. Unit Dry Weight [d/(1+(i/100))]: 131.0 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 225.8 gms
l. Dry Weight Soil + Tare: 210.3 gms
m. Tare Weight: 97.3 gms
n. Moisture Content [(k-l)/(l-m)]*100: 13.7 %

Specific Gravity of Mercury, d_{Hg}: 13.55
Specific Gravity of Water, d_w: 1.00

Equilibrium Head, R_{eq}: 2.0 cm
Maximum Pipet Head, R_p: 8.42 cm
Maximum Gradient, i: 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P3	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	P3 cp	Inflow ha, in	Outflow ha, out
		10							
		10							
		10							
21-Aug	50	10	45	54.5	0.95	1	50	45	45

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss Dz_p, cm	Temp C	Rt	k @ 20C cm/sec
10/21/2018	13:04		8.40				
10/21/2018	13:13	540	8.10	0.30	22	0.953	2.9E-08
10/21/2018	13:26	1320	7.90	0.50	22	0.953	2.0E-08
10/21/2018	13:37	1980	7.80	0.60	22	0.953	1.6E-08
10/21/2018	13:48	2640	7.70	0.70	22	0.953	1.5E-08
10/21/2018	14:00	3360	7.60	0.80	22	0.953	1.3E-08

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm
Annulus Area = 0.767120 sq cm

CLIENT: Creek County Landfill

REPORT DATE: 10/22/2018

PROJECT NO.: 18-10-18

PROJECT: Cell 15-1 - Phase 1

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: B15-2
PROCTOR # :
SAMPLE ORIENTATION: Vertical
Remold _____

LAB START DATE: 10/18/2018
LAB RPT. DATE: 10/22/2018
TECHNICIAN: MLT
DEPTH/LIFT: 1.5'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.1 in
b. Avg. Diameter of Specimen: 2.00 in
c. Sample Volume ($\pi b^2 / 4 * a$): 3.46 cu in
d. Wet Unit Weight: [(e * 3.8095) / c)]: 146.2 pcf

INITIAL CONDITIONS

e. Wet Weight Soil: 132.6 gms
f. Wet Weight Soil + Tare: 223.7 gms
g. Dry Weight Soil + Tare: 213.6 gms
h. Tare Weight: 91.1 gms
i. Moisture Content [(f-g)/(g-h)]*100: 8.2 %
j. Unit Dry Weight [d/(1+(i/100))]: 135.0 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 225.0 gms
l. Dry Weight Soil + Tare: 213.6 gms
m. Tare Weight: 91.1 gms
n. Moisture Content [(k-l)/(l-m)]*100: 9.3 %

Specific Gravity of Mercury, d_{Hg}: 13.55
Specific Gravity of Water, d_w: 1.00

Equilibrium Head, R_{eq}: 2.0 cm
Maximum Pipet Head, R_p: 8.42 cm
Maximum Gradient, i: 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P3	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	P3 cp	Inflow hs, in	Outflow hs, out
		10							
		10							
		10							
21-Aug	50	10	45	54.5	0.95	1	50	45	45

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss Dz_p, cm	Temp C	Rt	k @ 20C cm/sec
10/21/2018	12:06		8.40				
10/21/2018	12:15	540	8.00	0.40	22	0.953	3.8E-08
10/21/2018	12:27	1260	7.90	0.50	22	0.953	2.0E-08
10/21/2018	12:39	1980	7.80	0.60	22	0.953	1.6E-08
10/21/2018	12:50	2640	7.70	0.70	22	0.953	1.4E-08
10/21/2018	13:00	3240	7.60	0.80	22	0.953	1.3E-08

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm
Annulus Area = 0.767120 sq cm

FIELD DENSITY TEST REPORT

Report Number: 04191187.0001
Service Date: 08/07/19
Report Date: 08/09/19
Task:

Terracon
9522 E 47th Pl, Ste D
Tulsa, OK 74145-7211
918-250-0461

Client

Carel Corporation
Attn: Kevin Carel
136 Pecan St
Keller, TX 76248-2215

Project

Creek County Landfill - New Cell
10250 South 33rd West Avenue
Jenks, OK 74037

Project Number: 04191187

Material Information

Mat. No.	Proctor Ref. No.	Classification and Description	Laboratory Test Method	Lab Test Data: Optimum Water Content (%)	Lab Test Data: Max. Lab Density (pcf)	Project Requirements: Water Content (%)	Project Requirements: Compaction (%)
1	Aimright Proctor	Gray Lean Clay with Shale Fragments	ASTM D698	15.0	114.0		Min 95.0

Field Test Data

Test No.	Test Location	Lift / Elev.	Mat. No.	Probe Depth (in)	Wet Density (pcf)	Water Content (pcf)	Water Content (%)	Dry Density (pcf)	Percent Compaction (%)
	Landfill base section 15-1 phase 2								
1	250 feet east of the west end of section at approximate center	Subgrade	1	8	132.6	16.5	14.2	116.1	100+
2	200 feet east of the west end of section at approximate center	Subgrade	1	8	132.6	16.8	14.5	115.8	100+
3	150 feet east of the west end of section at approximate center	Subgrade	1	8	135.0	17.8	15.2	117.2	100+
4	100 feet east of the west end of section at approximate center	Subgrade	1	8	132.6	17.1	14.8	115.5	100+
5	50 feet east of the west end of section at approximate center	Subgrade	1	8	133.0	16.4	14.1	116.6	100+
	Landfill north embankment of section 15-1 phase 2								
6	175 feet east of the west end of section and 50 feet north of toe of embankment	Subgrade	1	8	134.1	18.0	15.5	116.1	100+
7	100 feet east of the west end of section and 50 feet north of toe of embankment	Subgrade	1	8	133.2	16.6	14.2	116.6	100+

Datum: Landfill Section 15-1 Phase 2
S/N: 68713 **Make:** Troxler **Model:** 3430 **Last Cal. Date:** 12/03/2018

Comments: **Test and/or retest results on this report meet project requirements as noted above.**
Carel Corporation provided the attached Aimright Proctor results used to determine percent compaction.

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

FIELD DENSITY TEST REPORT

Report Number: 04191187.0001
Service Date: 08/07/19
Report Date: 08/09/19
Task:

Terracon
9522 E 47th Pl, Ste D
Tulsa, OK 74145-7211
918-250-0461

Client

Carel Corporation
Attn: Kevin Carel
136 Pecan St
Keller, TX 76248-2215

Project

Creek County Landfill - New Cell
10250 South 33rd West Avenue
Jenks, OK 74037

Project Number: 04191187

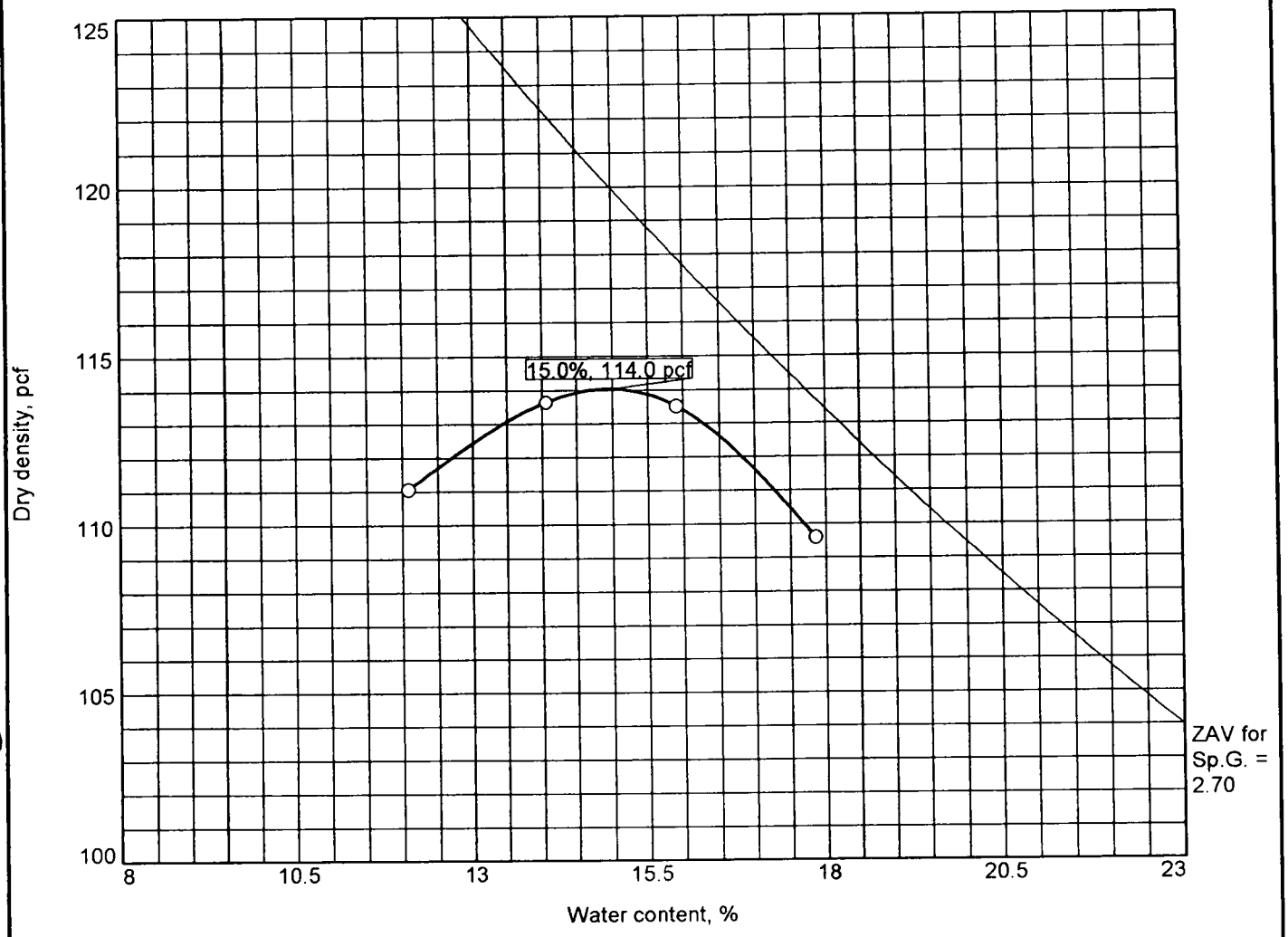
Services:
Terracon Rep.: Warren Naranjo
Reported To: Chris Torres with Carel Corp
Contractor:
Report Distribution:
(1) Carel Corporation, Kevin Carel

Reviewed By: Justin D. Cox
Department Manager II (MAT)

Test Methods: *, ASTM D6938

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client only for the use indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the samples only actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

PROCTOR TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
N/A	CL	A-6(11)	10.8	N/A	35	15	0.0	77.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 114.0 pcf Optimum moisture = 15.0 %	Gray Lean Clay w/ Shale Fragments

Project No. 2264-18 **Client:** Creek County Landfill
Project: Creek County Landfill
○ **Location:** Native Subgrade - NW Cell **Sample Number:** 2975

Remarks:
Date Sampled: 10/16/2018

AIMRIGHT TESTING & ENGINEERING

Tested By: R. Biggs **Checked By:** J. Rock

CLIENT:

REPORT DATE: 8/12/2019

PROJECT NO.:

PROJECT: Creek County Cell 15-1 Phase II

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: B19-2
PROCTOR # :
SAMPLE ORIENTATION: Vertical
Remold _____

LAB START DATE: 8/9/2019
LAB RPT. DATE: 8/12/2019
TECHNICIAN: MLT
DEPTH/LIFT: 1.8'-2.35'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.1 in
c. Sample Volume
(π b^2 / 4 * a): 3.46 cu in

b. Avg. Diameter of Specimen: 2.00 in
d. Wet Unit Weight:
[(e * 3.8095) / c)]: 151.0 pcf

INITIAL CONDITIONS

e. Wet Weight Soil: 137.0 gms
f. Wet Weight Soil + Tare: 226.6 gms
g. Dry Weight Soil + Tare: 215.6 gms
h. Tare Weight: 89.6 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 8.7 %
j. Unit Dry Weight
[d/(1+(i/100))]: 138.9 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 228.7 gms
l. Dry Weight Soil + Tare: 215.6 gms
m. Tare Weight: 89.6 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 10.4 %

Specific Gravity of Mercury, d_{Hg}: 13.55
Specific Gravity of Water, d_w: 1.00

Equilibrium Head, R_{eq}: 2.0 cm
Maximum Pipet Head, R_p: 8.42 cm
Maximum Gradient, i: 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P3	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	P3 cp	Inflow ha, in	Outflow ha, out
		10							
		10							
		10							
12-Aug	50	10	45	54.5	0.95	1	50	45	45

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss Dz_p, cm	Temp C	Rt	k @ 20C cm/sec
8/12/2019	08:07		8.40				
8/12/2019	08:23	960	7.70	0.70	22	0.953	3.8E-08
8/12/2019	08:35	1680	7.40	1.00	22	0.953	3.2E-08
8/12/2019	08:47	2400	7.20	1.20	22	0.953	2.7E-08
8/12/2019	08:59	3120	7.10	1.30	22	0.953	2.3E-08
8/12/2019	09:13	3960	7.10	1.30	22	0.953	1.8E-08

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm
Annulus Area = 0.767120 sq cm

APPENDIX H

QUALITY ASSURANCE/QUALITY CONTROL PLAN

QUALITY ASSURANCE/QUALITY CONTROL PLAN

FOR IN-SITU LINER TESTING

CREEK COUNTY LANDFILL
CREEK COUNTY, OKLAHOMA

Prepared for:

THE CREEK COUNTY LANDFILL
P.O. BOX 1597
SAPULPA, OK 74067

Prepared by:

The CAREL CORPORATION

136 Pecan Street
Keller, Texas 76248
(817) 337-0112

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1 INTRODUCTION

1.1 Purpose

The purpose of this Quality Assurance/Quality Control (QA/QC) Plan is to describe the quality assurance procedures to be used during construction of the in-situ liner components at the Creek County Landfill in accordance with Oklahoma Administrative Code (OAC) 252:515 Subchapter 11 (Liner Design). The primary goals of the quality assurance program are to identify problems and provide a mechanism for resolution.

Upon completion of construction, information generated through the quality assurance program will be used to prepare an In-Situ Liner Installation and Testing (LIT) Report. All parties involved in the construction of the liner should be thoroughly familiar with this document, and the construction specifications.

1.2 Definitions

Whenever the terms listed below are used, the intent and meaning will be interpreted as indicated.

1.2.1 ASTM

American Society for Testing and Materials.

1.2.2 Construction Quality Assurance (CQA)

A planned and systematic series of observations and tests designed to provide adequate confidence that materials and services meet contractual and regulatory requirements.

1.2.3 Construction Quality Assurance Professional of Record (POR)

The POR is an authorized representative of the Owner and has responsibility for construction quality assurance reporting and confirming that the facility was constructed in general accordance with construction drawings and specifications. The POR shall be a qualified soils scientist, engineer or geologist.

1.2.4 Construction Specifications

The qualitative requirements for products, materials, and workmanship upon which the construction is based. Construction specifications are also referred to as "specifications."

1.2.5 Earthwork

A construction activity involving the use of soil materials.

1.2.6 Excavation

Excavation of materials from areas identified on the construction drawings. The process may require exclusion of unsuitable materials.

1.2.7 Nonconformance

A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. Examples of nonconformance include, but are not limited to, physical defects, test failures, and inadequate documentation.

1.2.8 Procedure

A document that specifies or describes how an activity is to be performed.

1.2.9 Project Documents

Construction drawings, record drawings, specifications, shop drawings, construction quality control and quality assurance plans, safety plan, and project schedule.

1.2.10 Quality Assurance

A planned and systematic pattern of procedures and documentation designed to provide adequate confidence that materials or services meet contractual and regulatory requirements, and that these materials will perform satisfactorily in service.

1.2.11 Quality Control

Those actions that provide a means of measuring and regulating the characteristics of a material or service to comply with the requirements of the construction documents. Quality control will be performed by the Contractor, Manufacturers, suppliers, and subcontractors.

1.2.12 Record Drawings

Drawings recording the constructed dimensions, details, and coordinates of the project (also referred to as "as-builts").

1.2.13 Surveyor

The individual or firm responsible for grade staking to establish required elevations to construct the project in accordance with the drawings and specifications.

1.2.14 Testing

Verification that materials meet specified requirements by subjecting that material to a set of physical, chemical, environmental, or operating conditions.

1.2.15 Testing Laboratory

A laboratory capable of conducting the tests required by this QA/QC Plan and the specifications. Testing may be done by the same laboratory or by a separate soils testing laboratory and a geosynthetics testing laboratory.

1.2.16 USCS

Unified Soil Classification System (ASTM D2487).

2 GENERAL REQUIREMENTS

This section of the QA/QC Plan describes general requirements of the project. It includes general requirements for meetings, responsibilities of the project team, control of project records, and documentation and control of nonconforming work.

2.1 Meetings

In accordance with OAC 252:515-11-5(b), a pre-construction meeting shall be held at The Creek County Landfill with the project personnel before liner construction begins. The ODEQ shall be notified at least 48 hours in advance of the meeting.

Progress meetings will also be held in order to facilitate construction, clearly define construction goals and activities, and coordinate communication between the Owner and project personnel.

2.1.1 **Preconstruction Meeting**

A meeting between the Creek County Landfill and the ODEQ was held on January 21, 2014, prior to commencing construction. The purpose of the preconstruction meeting is typically to:

- Identify key personnel;
- Review the specifications, work area security, safety procedures, and related issues;
- Define lines of communication and authority;
- Establish reporting and documentation procedures;
- Review testing equipment and procedures;
- Establish testing protocols and procedures for correcting and documenting construction or nonconformance;
- Conduct a site inspection to discuss work areas, stockpile areas, laydown areas, access roads, haul roads, and related items; and
- Review the project schedule.

2.1.2 Weekly Construction

Weekly Construction meetings are recommended throughout the project. This meeting will be attended by the Owner and/or Representative and project staff. The purpose of these meetings is to:

- Discuss progress, problems and resolutions, and schedule;
- Review test data;

- Discuss the Contractor's personnel and equipment assignments for the day;
- Review the previous day's activities and accomplishments; and
- Resolve any outstanding problems or disputes.

2.1.3 Other Meetings

As required, special meetings will be held to discuss problems or nonconformance. Persons attending will be determined or on as-needed basis.

2.2 Responsibilities of Project Personnel

2.2.1 Responsibilities of the Project Manager

The Project Manager (PM) is the Owner or the Owner's primary representative for the project. The P M defines the overall project scope and has the authority to make changes to that scope, if needed (with proper regulatory coordination).

2.2.2 Responsibilities of the Operations Supervisor

The Operations Supervisor will be on-site full time as the Owner Representative for the project. In most cases, the Operations Manager may be the Site Manager.

2.2.3 Responsibilities of the Surveyor

The Surveyor will work at the direction of the Owner, as the case may be, to provide grade staking for establishing required elevations to construct the project in accordance with the design intent.

2.3 Control of Documents, Records, and Forms

2.3.1 Project Control of As-Built Information

As-built information is controlled by the Surveyor. During the progress of the work, the PM and project personnel obtain as-built information provided by the Surveyor, or others. At the completion of the project, this information is presented to the PM for use in preparing record drawings of the construction. Final as-built drawings are included with the LIT Report.

2.3.2 Processing Test Reports

A test report must be completed whenever testing is performed. The test reports must be peer-reviewed. The review includes a check for mathematical accuracy, conformance to test requirements, conformance to specifications, and a check for clarity, legibility, traceability, and completeness. Copies of all test reports are transmitted to the PM.

2.3.3 Processing Project Records

Project records are completed as needed. Use of the project records is limited to the scope for which they are intended. The record must be completed by filling in all the blanks provided on the form and followed by the signature of the individual completing the form. All project records must be maintained by the Owner.

2.4 Documentation and Control of Nonconformance

2.4.1 Observation of Nonconformance

Whenever a nonconformance is discovered or observed in the construction process, product, job-related materials, documentation, or elsewhere, the PM must notify the Owner as soon as possible.

2.4.2 Determining Extent of Nonconformance

Whenever a nonconformance is discovered or observed in the construction process, product, job related materials, documentation, or elsewhere, the PM will determine the extent of the nonconformance. The extent of the deficiency may be determined by additional sampling, testing, observations, review of records, or any other means deemed appropriate.

2.4.3 Documenting Nonconformance

All nonconformance must be documented in writing on the daily records, logs, and elsewhere, as appropriate. The documentation must occur immediately upon determining the extent of the nonconformance. For those nonconformances that are considered serious or complex in nature, or that require an engineering evaluation, a nonconformance report will be initiated and issued to the Project Manager.

2.4.4 Corrective Measures

For a simple or routine nonconformance, corrective measures will be determined by specification direction, or if none exists, PM will discuss standard construction methods to correct the deficiency. For those nonconformances requiring a nonconformance report, the PM must determine corrective measures. A copy of the nonconformance report, with the corrective measure determination, is forwarded to the Owner for implementation of the corrective action.

3 CONSTRUCTION QUALITY ASSURANCE FOR EARTHWORK

3.1 Introduction

The overall goal of the earthwork Quality Assurance program is to assure that proper procedures are used and that the project is built in accord with the regulations. Another function of the quality assurance program is to identify problems that may occur during construction and to verify that these problems are avoided or corrected before construction is completed.

Construction must be conducted consistent with the regulations and specifications. To monitor conformance, a quality assurance testing program will be implemented that includes (1) material testing, and (4) visual observation.

3.2 Construction Standards

The following construction standards are per OAC Subchapter 7 – In-Situ Liner.

3.2.1 Thickness and Permeability

The in-situ liner at Creek County C&D Landfill will be at least five (5) feet thick with a hydraulic conductivity no greater than 1.0×10^{-5} cm/sec. A sufficient number of borings, excavations, and tests shall be conducted to assure that the in-situ materials meet the thickness and permeability requirements of OAC 252:515-11-71(a)(1).

3.2.2 Soil Classification Tests

Soil classification tests include soil testing and hydraulic conductivity.

3.2.2.1 Soil Testing

Soils for the in-situ liner material will be tested in accordance with OAC 252:515-11-32.

(1) Soil classification (ASTM D2487);

(2) Particle size analysis of soil (ASTM D422);

(3) Sieve analysis for the following screens: #4, #10, #40, #200;

(4) Percent fines (#200 sieve)(ASTM D1140)

(5) Atterberg Limits (ASTM D4318)

(6) Moisture content using:

(A) the oven drying method (ASTM D2216); or

(B) the microwave drying method (ASTM D4643);

(7) Moisture-density relationship, using either:

(A) The standard proctor density (ASTM D698); or

(B) The modified proctor density (ASTM D1557);

(8) Hydraulic conductivity using ASTM D5084 or any other method approved by the ODEQ.

One composite sample shall be taken for the project or more frequently if visual observations indicate a change in material characteristics.

All laboratory test results shall state the type of tests used, the method of testing and the condition, preparation, and orientation of each sample. Laboratory results will be included in the LIT Report.

3.2.2.2 Hydraulic conductivity

At least three (3) hydraulic conductivity tests shall be performed per acre on soil samples for each classified soil/rock layer that will form the sides and bottom of the proposed disposal area.

3.2.3 Post Excavation and Pre-Disposal Tests

Post excavation and pre-disposal tests include visual inspections, thickness and integrity testing, and top of liner tests.

3.2.3.1 Visual Inspections

After excavation and prior to disposal, a qualified soils scientist, engineer, or geologist shall perform a visual inspection of the disposal area floor to:

(1) locate any cracks, joints, fractures, roots, exposures or other physical phenomena that might indicate areas more permeable than allowed; and

(2) locate areas for the post excavation tests that follow.

3.2.3.2 Thickness and Integrity Testing

A minimum of five (5) continuous core samples per acre will be collected to a depth of five feet below the top of the in-situ liner.

(1) A qualified soil scientist, engineer, or geologist will describe the soil types and check for uniformity.

(2) If variations are noted in the core samples, permeability testing must be performed on undisturbed samples of each soil type. Shelby Tubes will be used to collect undisturbed soil samples for laboratory analysis of permeability. If the sediments are too hard to allow Shelby Tube advancement, samples will be collected using a split spoon sampler or core barrel.

3.2.3.3 Top of Liner Tests

The ODEQ regulations request following tests will be performed on the top of the proposed liner:

(1) At least five (5) natural or in-place moisture and density tests per acre; and

(2) In locations approved by the ODEQ, at least three (3) density tests per acre on the sides and bottom of the liner on samples of each soil layer.

In-place moisture and density tests are used for quality control and acceptance of *compacted* soil and soil-aggregate mixtures used in construction. These tests provide no relevant information regarding in-situ soil or rock materials. Hence, these tests will only be applied to compacted soils that are associated with the project and not the in-situ materials.

3.2.4 Plugging Boreholes

All boreholes must be plugged with pelletized or chipped bentonite and rehydrated after the core sampling is complete.

3.2.5 Protective Layer

Upon completion of construction or excavation, the in-situ liner must be covered with a 12-inch soil protective layer and maintained to minimize desiccation. The QA officer shall certify that the moisture content of OAC 252:515-11-33(6) was maintained in the liner until placement of the protective cover.

3.2.6 Failure

If any areas fail to meet the permeability requirements, a reconstructed clay liner, or an alternative liner meeting the requirements meeting the requirements of OAC 252:515 Subchapter 11 (Liner Design) must be installed.

4 DOCUMENTATION

4.1 In-Situ Liner Testing and Certification Report

At the completion of the project, an In-Situ Liner Installation and Testing Report will be submitted documenting the liner system to the ODEQ for approval. The document will contain a certification that the liner system meets the requirements of OAC 252:515 Subchapter 11 Part 7. The In-Situ Liner Certification Report must be approved by the ODEQ and a copy of the approved In-Situ Liner Installation and Testing Report placed in the facility operating record.

APPENDIX I

EXPLOSIVE GAS MONITORING PLAN

EXPLOSIVE GAS MONITORING AND ANALYSIS PLAN

THE CREEK COUNTY LANDFILL

CREEK COUNTY, OKLAHOMA
ODEQ PERMIT NO. 3519020

Project No: 10-10-45

Prepared for:

The Creek County Landfill

December 2010

Revised July 2020

Prepared by

136 Pecan Street
Keller, Texas 76248
(817) 337-0112

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2 Typical Gas Probe Design

1 INTRODUCTION

The Creek County Landfill is located north of the Creek Turnpike and west of S 33rd W Avenue in Tulsa, Oklahoma. The facility is classified as a construction and demolition (C&D) landfill and only accepts waste classified as construction and demolition waste by OAC 252:515-1-2.

The following Explosive Gas Monitoring and Analysis Plan covers the procedures on demonstrating how compliance with the Explosive Gas concentrations of Oklahoma Administrative Code (OAC) 252:515-15-2 will be ensured at the Creek County Landfill. The plan is a requirement for explosive gas monitoring per OAC 252:515-15-3.

2 GAS MONITORING PROBES

2.1 Site Features

Existing natural and constructed site features were considered during the design of the landfill gas monitoring network. The site features include but are not limited to the lining system, topography, drainage features, site geology and depth to groundwater.

2.1.1 Topography and Drainage Features

The topography surrounding the site is characterized by rolling hills on the south and west sides. A broad alluvial valley exists on the north and north east sides of the site along Pole Cat Creek. An unnamed tributary to Pole Cat Creek is present on the east side of the site that flows to the north. Another minor ephemeral stream is located on the south side of the site. This stream is eroded approximately 10-feet into the ground surface and at least 10-feet below the base of the landfill. Thus it functions as natural barrier to landfill gas migration by allowing any potential landfill gas to be vented into the atmosphere.

2.1.2 Site Geology

The Creek County Landfill is excavated into an outcrop of the Pennsylvanian Aged Coffeeville and Seminole Formations. Both formations are mainly composed of shale with interbedded fine-grained sandstone and locally containing beds of limestone. The Checkerboard Limestone exist in the western portion of the site. The shale at the site is dark gray and weathers to clay.

2.1.3 Groundwater

Seven groundwater monitoring wells are located at the facility. Two of the wells exist or are proposed in proximal to the 2020 lateral expansion area. Review of groundwater level measurements indicates that groundwater occurs at depths ranging from 11feet bgs in most wells except for BPZ-1 which is about 53 feet bgs

2.2 Gas Monitoring Probe Spacing and Locations

The spacing and locations of facility gas probes were determined from OAC 252:515-15-4(b). Details are as follows: Perimeter gas monitoring probes must be installed at a spacing of 1,000 feet unless off site structures are located within one-half mile of the facility. If off site structures are located within one-half mile of the facility a spacing of 500 feet along the permit boundary is required. A 500 foot gas monitoring probe spacing is applicable to the east and portions of the west sides based on a review of available information. A 1,000 foot spacing is proposed for the north side due to the absence of offsite structures and to the south side due to the presence of natural gas migration barriers. A map illustrating the perimeter gas monitoring network is provided as Figure 1.

2.3 Gas Monitoring Probe Construction Details

In accordance with OAC 252:515-15-4(a), gas monitoring probes shall be constructed in accordance with the requirements of the Oklahoma Water Resources Board (OWRB). Gas probes will be a minimum one-inch diameter schedule 40 or 80 polyvinylchloride (PVC), stainless steel, Teflon or high density polyethylene pipe with factory slotted screen. The annular space will be filled with filter pack to one foot above the top of the screen, two feet of hydrated bentonite seal, and concrete to surface. Surface completions shall consist of a lockable protective casing, a reinforced concrete pad, and bollards. A drawing of a typical gas monitoring probe is presented as Figure 2.

The gas monitoring probes will be installed to a minimum depth equivalent to the deepest placement of waste and be screened for the entire depth of waste per OAC 252:515-15-4(c). Each gas monitoring probes is proposed to be constructed to a depth of 10-feet bgs given that all existing portions of the landfill have been constructed above natural ground level and that the average depth to water is approximately 11.33-feet bgs.

3 EXPLOSIVE GAS MONITORING

3.1 Monitoring Frequency

Explosive gas monitoring will be performed quarterly at the Creek County Landfill. Structures and the gas monitoring probes located at the permit boundary will be monitored.

3.2 Equipment Preparation

Explosive gas concentrations are measured using a portable explosive gas indicator. Prior to each monitoring event, a portable explosive gas meter will be calibrated. Calibration of the portable explosive gas meter will be as per the manufacturers' instructions. Improper operating meters must be replaced prior to continuing explosive gas monitoring.

3.3 Monitoring Procedures

3.3.1 Facility Structures

Buildings located within the permit boundary of the Creek County Landfill may include, but are not limited to a scale-house/office and a maintenance building. On-site buildings and structures designed for human occupation are monitored at a minimum every quarter with either a portable explosive gas indicator or a continuous monitor/alarm that provides an audible warning if methane concentrations exceed 1.25% by volume for methane (i.e. 25 percent of the LEL). If methane concentrations exceed 1.25% by volume within facility structures, the building will be immediately evacuated and ventilated by opening doors and windows.

3.3.2 Gas Monitoring Probes

As previously noted, explosive gas monitoring will be performed quarterly at the Creek County Landfill. Representative gas samples will be obtained by purging the gas monitoring probe until steady-state meter readings are achieved, typically within 30 seconds after purging begins. Gas concentrations in the perimeter probes will be measured by using an explosive gas indicator with a suction sampling line which draws gas directly into the instrument without diluting it until the reading stabilizes. If methane concentrations exceed 5% by volume (i.e. 100 percent of the LEL) within a gas monitoring probe appropriate response actions will occur. Prior to monitoring the next gas monitoring probe, the explosive gas indicator will be purged with ambient air.

3.4 Record Keeping

Monitoring results and calibration information for the instruments used to monitor explosive gas concentrations are kept on site with the monitoring records. The results are

recorded on the Explosive Gas Log Sheet (Appendix A), or similar form, and maintained in the site operating record. All entries should be legible and made in indelible ink. Entry errors will be crossed out with a single line, dated, and initialed by the person making the corrections.

3.5 Maintenance Procedures

Each time explosive gas monitoring is conducted, the integrity of each gas monitoring probe will be inspected by monitoring personnel. Pertinent information will be recorded on the Explosive Gas Log Sheet (Appendix A) or similar form. Monitoring personnel will perform the following at each monitoring event:

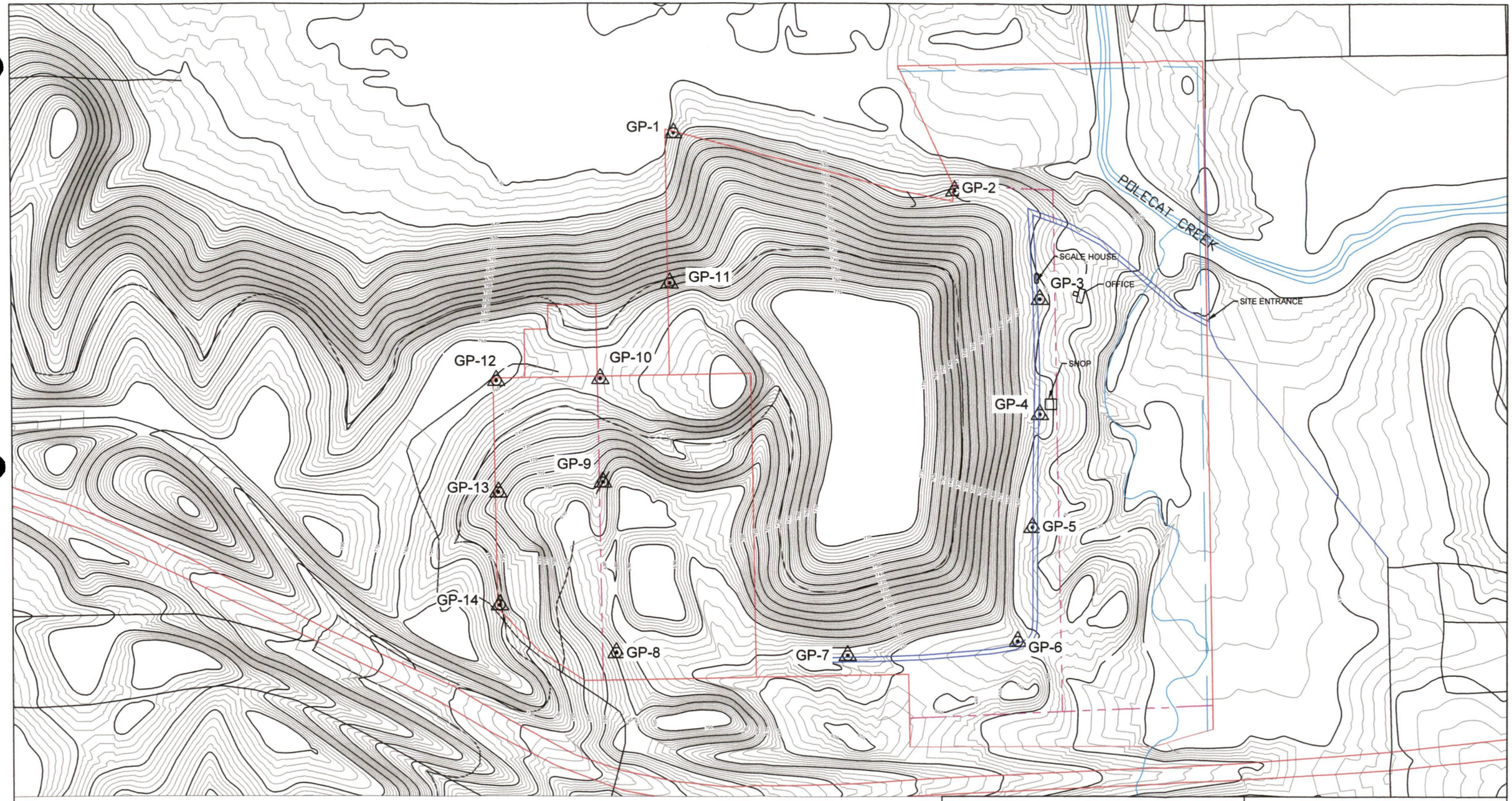
- Verify that the gas monitoring probe is clearly labeled on the outer casing or lid;
- Verify that protective casing is intact and is not bent or excessively corroded;
- Verify that the concrete pad is intact (no evidence of cracking or heaving);
- Verify that the padlock is functional; and,
- Verify that the inner casing is intact.

If damage or excessive wear to the gas monitoring probe is observed, it will be reported to the Landfill Site Manager. If it is not possible to repair the gas monitoring probe and the damage can potentially affect the accuracy of future monitoring results, the gas monitoring probe will be decommissioned (i.e. plugged and abandoned) and replaced with a new gas monitoring probe.

4 EXPLOSIVE GAS REMEDIATION PLAN

If explosive gas concentrations exceed the regulatory limit of 25% of the LEL in facility structures or 100% of the LEL in gas monitoring probes, steps will immediately be taken to protect human health and the ODEQ will be notified per OAC 252-515-15-5. Within seven days of the exceedence the explosive gas levels will be submitted, in writing, to the ODEQ along with a description of the steps taken to protect human health. Within 30 days of the exceedence, submittal of a remediation plan to the ODEQ for approval, describing the nature and extent of the problem and the proposed remedy will occur. Within 60 days of the exceedence, the remediation plan will be implemented and the ODEQ will be notified in writing. A copy of the notification will be placed in the operating record.

FIGURES



N

SCALE:

0 200 400
FEET

LEGEND:

- PROPTERY BOUNDARY
- PERMIT BOUNDARY
- ACCESS ROAD
- GAS MONITORING PROBE

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .
3. GP-9 To be decommissioned

The CAREL CORPORATION

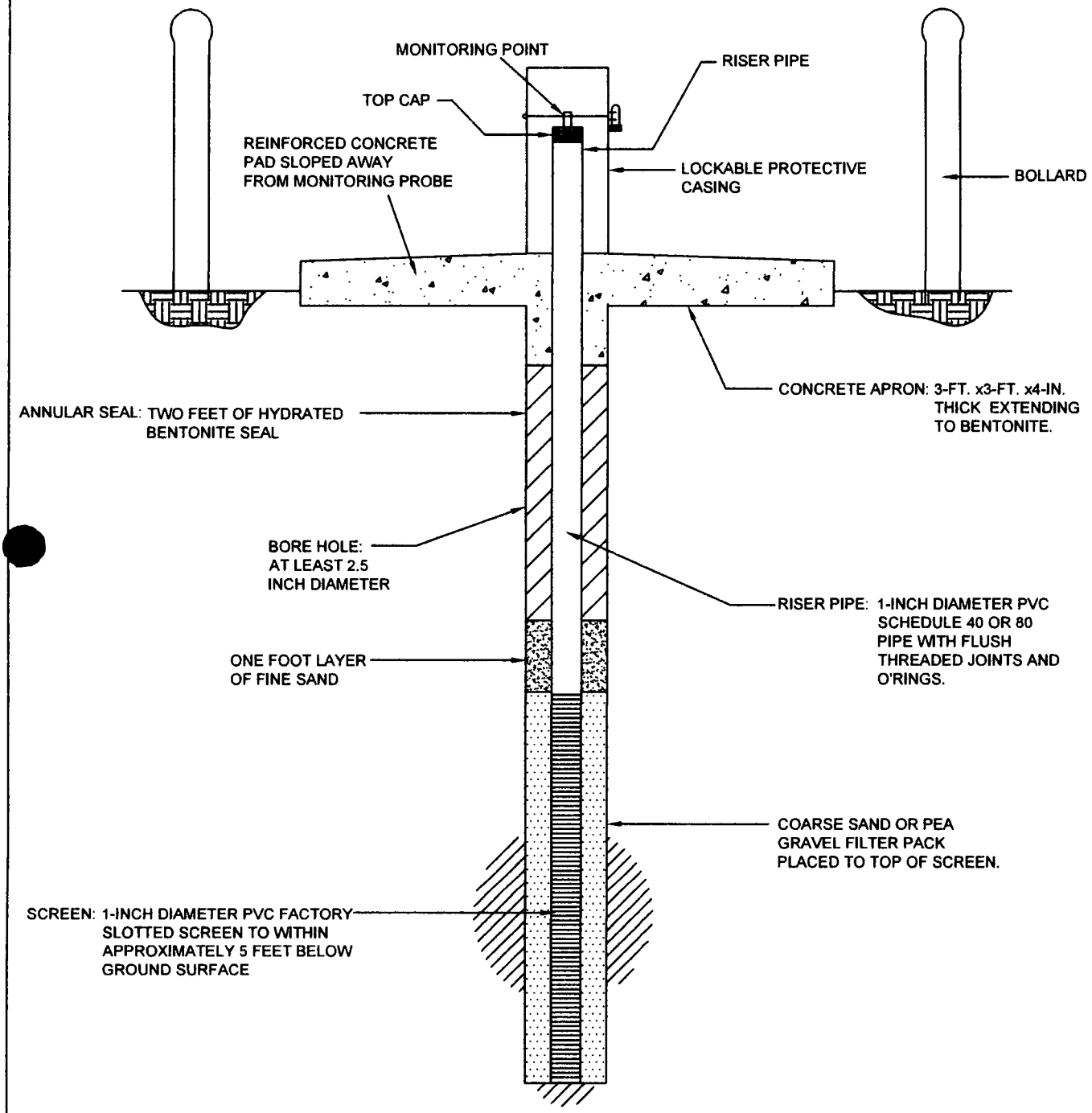
136 Pecan Street, Keller, TX 76248

GAS MONITORING NETWORK

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: JUNE 26, 2020

FIGURE 1



NOT TO SCALE

The CAREL CORPORATION
136 Pecan Street, Keller, TX 76248

TYPICAL GAS PROBE DESIGN

THE CREEK COUNTY LANDFILL
CREEK COUNTY, OKLAHOMA

DATE: December 14, 2010
FILENAME: R:\OK\Northeast\Gas Monitoring\Figure 2.dwg
DRAWN BY: SJW
DRAFTED BY: SJW
FIGURE 2

APPENDIX A

EXPLOSIVE GAS MONITORING LOG SHEET

GAS MONITORING FIELD DATA SHEET

FACILITY Creek County

TEMPERATURE ____ °F

WEATHER ____

EQUIPMENT ____

MONITORED BY: ____

DATE ____

CALIBRATION

Standard Concentration: ____ % by vol.

Instrument Reading: ____ %

Standard Concentration: ____ % LEL

Instrument Reading: ____ %

PROBE ID	METHANE CONCENTRATION % by volume Initial	Stabilized	PROBE INTEGRITY ISSUES
GP-1			
GP-2			
GP-3			
GP-4			
GP-5			
GP-6			
GP-7			
GP-8			
GP-9			
GP-10			
GP-11			
Onsite Structures			
Scale House			
Maint. Shed			
Other			

APPENDIX J

STORM WATER MANAGEMENT

SCOTT A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

MARY FALLIN
Governor

May 31, 2018

Danny Rosencutter
Rosencutter Bros, Inc.
PO Box 1597
Sapulpa, OK 74067

Re: Authorization to Discharge Stormwater Associated with Industrial Activity
DEQ Authorization Number: OKR052776

Dear Mr. Rosencutter:

The Oklahoma Department of Environmental Quality (DEQ) processed your Notice of Intent that was received on September 11, 2017. Your authorization is enclosed with this letter, which allows you to discharge stormwater associated with industrial activity under the terms and conditions of OPDES General Permit OKR05 from the following site located in Creek County.

Facility:
Creek County Landfill
10250 S 33rd W Ave
Sapulpa, OK 74067

All applicable fees associated with this authorization have been paid. Sites that remain active one year from the effective date of this authorization will be invoiced for the next full permit year. You must submit an ***Annual Comprehensive Site Compliance Evaluation Report (ACSCER)*** to DEQ using the Form 606-005 each year by March 1. Your first report is due on March 1, 2018.

If you have any question regarding this Authorization or the Stormwater Program, please call me at (405)702-8212.

Sincerely,

Alexandria Mills
Industrial Permits Section
Water Quality Division

Oklahoma Department of Environmental Quality
Authorization to Discharge Under the OPDES Stormwater Industrial General Permit OKR05

Authorization No. OKR052776

In compliance with the Oklahoma Pollution Discharge Elimination System (OPDES) Act, 27A O.S. §2-6-201, the Rules of the Oklahoma Department of Environmental Quality (DEQ), and in reliance on the certified statements and representations heretofore made in its application,

Rosencutter Bros, Inc.
PO Box 1597
Sapulpa, OK 74067

is authorized to discharge stormwater from an industrial site located in **Creek** County at

Creek County Landfill
10250 S 33rd W Ave
Sapulpa, OK 74067

The receiving body of water is an unnamed tributary to the Polecat Creek.

The OPDES permit requires permittees to have a Stormwater Pollution Prevention Plan (SWP3) which includes a description of appropriate control measures. These are applicable to your industrial site, which is subject to inspection.
Proof of this authorization must be available at the facility.
The authorization shall become effective May 31, 2018 and will expire at midnight July 4, 2022.

All terms and conditions of the OPDES Stormwater Industrial General Permit OKR05, as published on July 5, 2017, shall apply to the recipient of this authorization.

Michael B. Moe, P.E., Engineering Manager
Wastewater Group
Water Quality Division

2019

National Pollutant Discharge Elimination System *(NPDES)*
Oklahoma Department of Environmental Quality Discharge Monitoring Report *(DMR)*

PERMITTEE NAME: Rosencutter Bros, Inc.
MAILING ADDRESS: PO Box 1597, Sapulpa, OK 74067
FACILITY: CREEK COUNTY LANDFILL
LOCATION: 10250 S 33rd W Ave, Sapulpa, OK 74067

PERMIT NUMBER: *OKR052776*
MONITORING POINT: 001Y
COUNTY: Creek
Monitoring Period: 2019-01-01 To: 2019-12-31
NO DISCHARGE FROM SITE: (X)

Parameter		Quantity or Loading Average	Quantity or Loading Maximum	Units	Quality or Concentration Minimum	Quality or Concentration Average	Quality or Concentration Maximum	Units	No. Ex.	Frequency of Analysis	Sample Type
BOD, 5-DAY (20 DEG. C) PARAM CODE: 00310 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	19 mg/l			
	Permit Requirement	*****	*****		*****	37 Monthly Average	140 Maximum Daily			Annual	GRAB
PH PARAM CODE: 00400 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	12 S.U.			
	Permit Requirement	*****	*****		6.5 Minimum	*****	9.0 Maximum 7-Day Average			Annual	GRAB
SOLIDS, TOTAL SUSPENDED PARAM CODE: 00530 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	19 mg/l			
	Permit Requirement	*****	*****		*****	37 Monthly Average	88 Maximum Daily			Annual	GRAB
NITROGEN, AMMONIA TOTAL (AS N) PARAM CODE: 00610 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	19 mg/l			
	Permit Requirement	*****	*****		*****	4.9 Monthly Average	10 Maximum Daily			Annual	GRAB
PHENOLS PARAM CODE: 46000 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	19 mg/l			
	Permit Requirement	*****	*****		*****	0.015 Monthly Average	0.026 Maximum Daily			Annual	GRAB
ALPHA-TERPINEOL PARAM CODE: 51045 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	19 mg/l			
	Permit Requirement	*****	*****		*****	0.016 Monthly Average	0.033 Maximum Daily			Annual	GRAB
P-CRESOL PARAM CODE: 77146 Stage Code: SW Stormwater	Sample Measurement	*****	*****		*****	*****	*****	19 mg/l			
	Permit Requirement	*****	*****		*****	0.014 Monthly Average	0.025 Maximum Daily			Annual	GRAB

Name/Title of Principal Executive Officer Or Authorized Agent	I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.	Signature of Principal Executive Officer Or Authorized Agent	Telephone No
Manager		Eva Rosencutter	918-706-6014

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

National Pollutant Discharge Elimination System *(NPDES)*
Oklahoma Department of Environmental Quality Discharge Monitoring Report *(DMR)*

PERMITTEE NAME: Rosencutter Bros, Inc.
MAILING ADDRESS: PO Box 1597, Sapulpa, OK 74067
FACILITY: CREEK COUNTY LANDFILL
LOCATION: 10250 S 33rd W Ave, Sapulpa, OK 74067

PERMIT NUMBER: *OKR052776*
MONITORING POINT: 001Y
COUNTY: Creek
Monitoring Period: 2019-01-01 To: 2019-12-31
NO DISCHARGE FROM SITE: (X)

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
		Average	Maximum		Minimum	Average	Maximum				
BENZOIC ACIDS-TOTAL	Sample Measurement	*****	*****		*****	*****	*****				
PARAM CODE: 77247 Stage Code: SW Stormwater	Permit Requirement	*****	*****		*****	0.071 Monthly Average	0.12 Maximum Daily	mg/l		Annual	GRAB

Name/Title of Principal Executive Officer Or Authorized Agent		Signature of Principal Executive Officer Or Authorized Agent	Telephone No
Manager	I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.	Eva Rosencutter	918-706-6014

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

APPENDIX K

VEGETATION PLAN

CREEK COUNTY LANDFILL VEGETATION PLAN

These methods have been used at Creek County Landfill and are proven to be successful in establishing and maintaining vegetation. With the help of the Creek County Extension Agent, these programs were implemented many years ago and approved by the DEQ. Our permanent vegetation has provided good erosion and dust control. The interim vegetation has been effective in controlling dust and is adequate in preventing erosion.

PERMANENT VEGETATION

When the final cover is in place, the process of establishing permanent vegetation begins. Using a Viacon spreader, 10-20-10 fertilizer is applied at the rate of 400 lbs per acre. Some fertilizer is mixed with the seed and spread when the seed is sowed. Each acre receives approximately 10 lbs of Bermuda, 35 lbs of Fescue and 40 lbs of Vetch. Discs mounted to the rear of the seeder covers the seed and a Culti Packer is run over the entire area to pack the soil and insure that the seed is covered. Unless rain is imminent, water is applied utilizing water from Pole Cat Creek and our water truck. A six inch electric submersible pump fills the truck providing water for irrigation and dust control. This truck is used to water the seeded area and to water the vegetation after germination if no rain is eminent. During the germination period, water is applied every other day and more often in extremely dry conditions. Germination normally takes place within in ten days to fourteen day. Heavy vegetation to help prevent dust usually takes thirty to forty-five days to mature. Developing a root system that will prevent erosion usually takes ninety to one hundred twenty days. To maintain good vegetation, one hundred pounds of fertilizer per acre is applied in the spring of the year and watering is done as needed.

INTERIM VEGETATION

Black soil is moved to the site to be seeded utilizing two CAT scrappers. To prepare the soil for interim vegetation, a disc is run over the entire area to pulverize the soil. The area to be seeded is then fertilized and sowed. 10-20-10 fertilizer is applied at the rate of 300 lbs per acre. If the soil is in poor condition, 400 lbs of fertilizer per acre will be used. Wheat is sowed at the rate of 100 lbs per acre. These are applied using a Drop Seeder. Small spots are hand-raked and a Culti Packer used on larger areas. The seeded areas are watered every other day. Germination usually takes place in 12 to 15 days. Dust control is achieved in 30 to 45 days.

EROSION PREVENTION

The slopes present a special challenge in preventing erosion. Creek County Landfill erects terraces as the filial cover is being put in place. These prove to be effective in channeling the water let-down channels on the slopes minimizing the erosion. Even with this it is imperative that vegetation be established as soon as possible.

EROSION REPAIR

If successful, vegetation is established in time to prevent erosion from occurring. However, erosion can occur. Severe erosion demands the same process discussed under the heading of Permanent Vegetation, which includes replacing any displaced soil, fertilizing and seeding. If the erosion is minor, any dirt that is missing will be replaced with a pull scraper purchased specifically for this purpose. The dirt is leveled with a dozer or a box blade tractor. Small areas can be leveled with hand tools. Grass seed and fertilizer are applied using the formula of 10 lbs of Bermuda, 35 lbs of Fescue, 40 lbs of Vetch and 400 lbs and10-20-10 fertilizer per acre in the repaired sections. These are applied at the same time using a Drop Seeder. Water is then applied with the water truck if rain is not in the forecast.

ACTIVE AREAS

The area where the trash is being disposed of and the portion of the borrow area where dirt is being taken are the only areas that will not remain undisturbed for more than 90 days. At the disposal site, the trash is packed away from the working face by the dozers. Scrapers haul the dirt for intermediate and final cover as well as the clay liner. When a new disposal area is prepared, the topsoil, and clay suitable for liner material, are hauled away and stored until needed. The topsoil will be used for final cover and the clay stored would be used for the liner material. The dirt for intermediate cover will be hauled from the borrow area.

FINAL COVER VERIFICATION

Creek County Landfill welcomes the DEQ to inspect this procedure. The inspectors are welcome at anytime to inspect the process as there is portions of the landfill being covered most of the time as we move forward in the business of accepting waste.

APPENDIX L

CLOSURE/POST-CLOSURE PLAN

THE CREEK COUNTY LANDFILL
CREEK COUNTY, OKLAHOMA
ODEQ PERMIT NO. 3519020

CLOSURE PLAN

Prepared for:
THE CREEK COUNTY, OK

January 2015

Revised July 2020

Prepared by:

Joe B. Ramey P.E.

and

The CAREL CORPORATION

136 Pecan Street
Keller, Texas 76248
(817) 337-0112

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
7/17/2020
OKLAHOMA

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FIGURE

1 Landfill Completion Plan

1 INTRODUCTION

The Creek County Landfill is located at 10250 South 33rd West Avenue, Sapulpa, Oklahoma. The site is permitted under Permit No. 3519020 and is independently owned and operated.

This Closure and Post-Closure Plan has been prepared in accordance with 252:515-25.

2 REGULATORY FRAME WORK

This Closure/Post-Closure Plan has been prepared pursuant to OAC 252:515-25, as promulgated by the Oklahoma Department of Environmental Quality (ODEQ).

2.1 Closure Requirements

OAC 252:515-25 requires that Construction and Demolition (C&D) Landfills install a final cover system that is designed to minimize infiltration and erosion. The final cover system will consist of an erosion layer underlain by an infiltration layer or other ODEQ approved final cover system components.

Prior to beginning final closure of the landfill or of a disposal cell, the owner/operator is required to give notice of intent to close the site. ODEQ regulations require closure to begin a minimum of 90 days after final receipt of waste at the facility or for the disposal area, as applicable. The ODEQ requires completion of all closure activities within 180 days following the beginning of closure unless otherwise approved.

The ODEQ also requires a Certification of Final Closure be prepared and sealed by an independent professional engineer licensed in the State of Oklahoma and signed by the site owner/operator.

The ODEQ requires that upon approval of final closure, a notice shall be recorded in the property deed stating that the land has been used as a solid waste disposal facility. The notice shall specify the type, location, and quantity of wastes disposed of at the facility. In addition, the notice shall state that a survey plat and a record of disposal area locations and elevations has been filed with the ODEQ and county, and that future uses may be restricted per OAC 252:515-25-57. A file stamped copy of the notice shall be provided to the ODEQ. The notice is only required for final closure of the landfill and not of a disposal cell.

The ODEQ further requires third party Closure/Post-Closure cost estimates to be updated if additional active areas are constructed, if final cover is constructed.

2.2 Post-Closure Requirements

For current active Construction and Demolitian Landfills, OAC 252:515-25-51 requires an 8-year post-closure maintenance period including maintenance of the integrity and effectiveness of the final cover, monitoring of groundwater, collection, or monitoring systems. OAC 252:515-25-53 requires submittal of a post-closure monitoring and maintenance plan for the final cover and groundwater monitoring system.

The ODEQ requires that a Certification of Post-Closure Performance be prepared and sealed by an independent professional engineer licensed in the State of Oklahoma.

3 FINAL COVER DESIGN

3.1 Cover System Design

The final cover system that will be constructed at the Creek County Landfill is in accordance with OAC 252:515-19-53. Components of the composite final cover system from top to bottom are listed below.

Final Cover System:

- An erosion layer consisting of an 12-inch layer of earthen material capable of sustaining plant growth;
- An infiltration layer consisting of 24-inches of earthen material with a coefficient of permeability less than or equal to the permeability of the bottom liner system.

The final cover system will be installed over the entire area of the Creek County Landfill, which consists of approximately 75.24 acres. The Landfill Completion Plan is illustrated on Figure 1.

3.2 Cover System Installation

3.2.1 Construction Procedures

In general, appropriate field survey controls will be implemented to control the final lift of solid waste as well as the successive soil layers of the final cover system. The infiltration layer will consist of relatively homogeneous clayey soil, placed and compacted under controlled moisture-density conditions with appropriate compaction equipment. The lift thickness will be controlled so there is penetration through the loose lift under compaction into the top of the previously compacted lift. The finished surface of the infiltration layer will be a hard and uniform surface. The erosion layer will be seeded with native grasses or grass recommended by the local soil conservation service.

3.2.2 Final Cover Testing Procedures

Prior to construction, a Quality Assurance/Quality Control (QA/QC) Plan will be prepared for final cover installation and verification for each of the final cover components. The QA/QC will be submitted to the ODEQ for approval.

4 PROCEDURES FOR CLOSURE

4.1 Closure Sequence

The Creek County Landfill will conduct closure of the landfill as phases of the facility reaches the end of its active life.

4.2 Closure During Active Life

As described above, the final cover will be constructed as portions of the facility achieves the design grades. Should closure of the landfill become necessary at any time during the active life of the landfill, the following steps will be taken:

- Engineering plans will be developed to address site closure at the time of discontinued waste filling;
- The final waste received will be placed and properly compacted;
- Excavations will be filled with suitable material, and the site will be graded to promote runoff and prevent ponding;
- The final cover system will be constructed according to specifications;
- The top of the landfill will be re-graded and reshaped as needed to provide the proper slope for positive drainage;
- During the first growing season following application of final cover, the site will be vegetated with permanent vegetation;
- Additional soil will be added to the side slopes, as needed, and the soil will be processed using a disc to prepare the soil for seeding;
- A surface water management system will be constructed to minimize erosion;
- A closure certification report will be prepared by an independent registered professional engineer in the State of Oklahoma and submitted to the ODEQ for approval; and
- All proper notices and documentation will be filed with the appropriate agencies.

4.3 Additional Closure Information

The permitted area for refuse disposal encompasses approximately 95.9-acres excluding the buffer zones, drainage areas, and unsuitable areas. The estimated maximum capacity of the landfill is 6,069,360 cubic yards.

There are two permanent on-site structures, the scale house, which also serves the facility's office and a maintenance building. The access roads will be maintained throughout the active life and post-closure period of the landfill.

Final wastes or affected soils remaining on-site at the time final closure has been completed will be transported to a facility permitted to handle the wastes and/or affected soils. Currently, no formal closure activities have occurred at the site and, therefore, a plan for remedying all former improper closure at the site is not applicable.

All groundwater, gas and surface water monitoring will be conducted through the closure period in accordance with the facility's permit as required by the ODEQ. Any groundwater monitoring wells or gas monitoring probes found to be defective during closure will be repaired or replaced in accordance ODEQ regulations.

5 SCHEDULE OF CLOSURE TASKS

The site will be closed in an orderly fashion, consistent with OAC 252:515-25-33. The final closure schedule is as follows:

- The ODEQ shall be notified in writing prior to beginning final closure of the Creek County Landfill or closure of a disposal cell at the facility;
- Closure activities shall begin no later than 90 days after final receipt of wastes at the Creek County Landfill;
- Closure activities shall be completed according to the approved closure plan within 180 days after closure activities are initiated;
- Extensions of the closure period may be granted by the ODEQ if the Creek County Landfill demonstrates that closure will, of necessity, take longer than 180 days and that all steps have been taken, and will continue to be taken, to prevent threats to human health or the environment from the unclosed cell or facility;
- A certification of final closure shall be submitted to the ODEQ after completion of final closure; and
- Submit certified copies of the modified deed to the ODEQ.

6 POST CLOSURE TASKS

6.1 Monitoring and Maintenance

In accordance with OAC 252:515-25 part 5, post-closure care maintenance will commence immediately upon ODEQ approval of final closure. Post-closure activities will continue for a period of eight (8) years, unless the ODEQ approves a post-closure period of a different duration.

Post-closure inspections shall be performed on a annual basis during the post-closure period. Additional inspections may be conducted to observe repairs or evaluate problem areas discovered during prior inspections.

The annual post-closure inspections will consist of the inspection and evaluation of the final cover system and vegetative cover, the drainage and erosion control structures, and the security system. The frequency and specific inspections associated with the groundwater monitoring and gas monitoring programs are addressed in the permit for the Creek County Landfill and ODEQ regulations.

6.1.1 Final Cover

Post-closure care will verify the integrity of the final cover system and its ability to minimize infiltration and erosion. The following conditions should be examined during the inspection:

- Settlement;
- Cracking;
- Erosion;
- Animal burrows; and
- Other disturbances affecting either the thickness or configuration of the final cover.

Maintenance and repairs should be conducted as soon as practical and may consist of filling in areas of settlement, re-grading, and slope re-stabilization. In areas of substantial settlement or displacement of the final cover, the integrity of the cap should be re-evaluated and any necessary repairs made. The final cover should be maintained to provide the proper slope to promote surface water runoff and to assure continuity of the clay and synthetic liner components to minimize infiltration and leachate production.

Included as part of the final cover system inspection, the integrity of the vegetation and its ability to minimize infiltration and erosion will be determined. The following conditions should be examined during the inspection:

- Erosion;
- Overgrowth of shrubs, trees, and other deep-rooted vegetation; and
- Patches of dead vegetation.

Maintenance and repairs of the vegetative cover may consist of the following activities:

- Reseeding, fertilizing, liming, and mulching of washed out areas;
- Brush removal; and
- Mowing.

Reseeding should be conducted as necessary to assure proper vegetative growth over all areas of the final cover. Mowing and removal of deep-rooted brush and vegetation should be performed at least twice per growing season.

6.1.2 Drainage and Erosion Controls Structures

Per the approved permit, the proposed site lies at the crest of a ridge that slopes to the north and to the south. Surface runoff will be controlled by means of a surface water let-down at the southeast corner of the facility and perimeter diversion ditches. The landfill completion plan is illustrated on Figure 1.

Drainage will be inspected throughout the post-closure period. Additional surface drainage and erosion control measures will be implemented if significant erosion is observed during post closure inspections in accordance with OAC 252:515:-25-32(b)(3)(B). Items or conditions to be examined include the following:

- Erosion;
- Settlement;
- Structural integrity of the final cover, diversion ditches and other drainage and erosion controls; and
- Silt and sediment buildup.

Maintenance and repairs should be conducted as soon as practical, and may consist of the following activities:

- Installation of riprap, gabions, or other structural lining installed for erosion protection;
- Removal of obstructions to permit conveyance of surface water;
- Placement of fill and re-grading;
- Removal of silt and sediment;
- Installation of berms, letdown structures, or other drainage and erosion control structures; and
- Repair or replacement of stacked hay bales or silt fencing.

6.1.4 Groundwater Monitoring System

The permit for the Creek County Landfill includes a discussion of the procedures for monitoring the groundwater monitoring wells. At a minimum, groundwater sampling will be performed semi-annually in accordance with OAC 252:515-25-54.

6.1.5 Surface Water Monitoring Program

The post-closure monitoring activities will adhere to the requirements of the Oklahoma Pollution Discharge Elimination System (OPDES) General Permit for the site.

6.1.6 Landfill Gas Monitoring System

The facility's Explosive Gas Monitoring and Analysis Plan provides a description of the procedures to be followed for monitoring the perimeter probes. At a minimum, landfill gas monitoring probes will be sampled quarterly in accordance with OAC 252:515-25-54.

6.1.7 Site Security and Access Control

Post-closure care of the security system is necessary to control unauthorized access and prevent illegal dumping of wastes. Inspection of the security system at the site should be performed during the post-closure inspections. The closed facility will be maintained as necessary to provide access to the closed areas throughout the post-closure period. Maintenance and repairs should be implemented as soon as practical and may include the repair of access roads and repairs or replacement of fencing and locks.

7 POST CLOSURE LAND USE

There are no current planned uses for the Creek County Landfill after closure. Should use of the closed landfill, not associated with solid waste activities be considered, plans will be prepared and submitted to the ODEQ for review and approval.

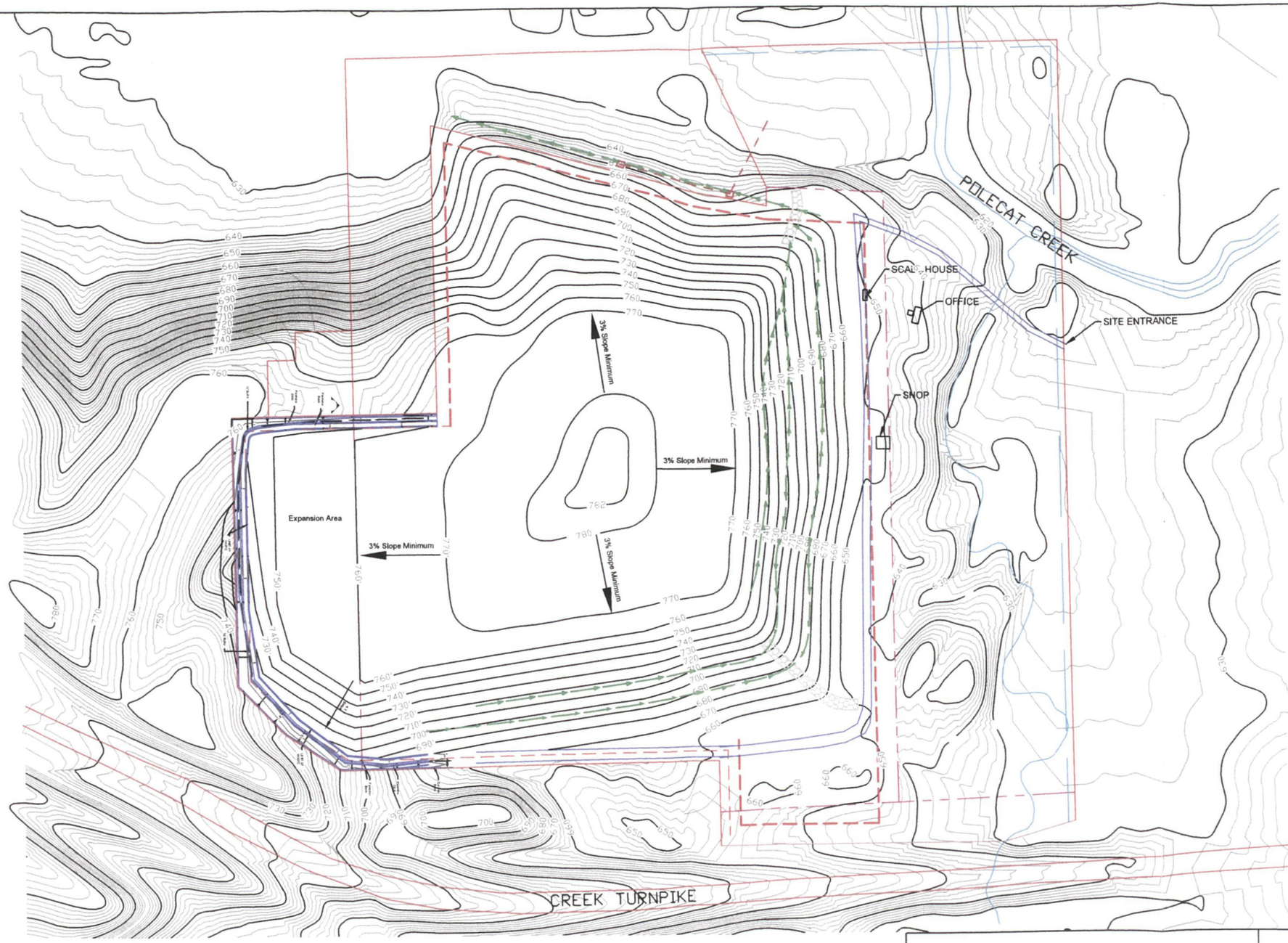
8 POST CLOSURE REPORTING REQUIREMENTS

8.1 Annual Post-Closure Report

Beginning one year after the ODEQ's approval of the certification of final closure, the Creek County will submit an annual post-closure maintenance and monitoring report to the ODEQ until the post-closure period ends. This report will document the maintenance performed at the site and summarize all monitoring data for the previous year. The report shall be submitted by April 1st of each year after the ODEQ's certification of final closure.

8.2 Certification of Post-Closure Performance

At the conclusion of the post-closure period, Creek County will submit, in lieu of the annual post-closure report, a certification of post-closure performance, prepared and sealed by a professional engineer registered in the State of Oklahoma certification, indicating that the facility was maintained and monitored in accordance with the approved post-closure plan, the permit, and applicable regulations. This certification will also indicate whether monitoring throughout the post-closure period has shown the presence of elevated levels of any constituent or if any evidence of contamination related to site operations has been found and, if so, what corrective measures were taken. The certification will be maintained in the site operating record.



LEGEND:

- PROPTERY BOUNDARY
- PERMIT BOUNDARY
- DROP INLET
- DRAINAGE PIPE
- DRAINAGE SWALE
- STORMWATER LETDOWN

NOTES:

1. Survey information provided by Pennco Engineering & Surveying
2. Topography provided by U.S. Geological Survey, National Geospatial Technical Operations Center, 2012 .

N

SCALE:

0 50 100 FEET

REGISTERED PROFESSIONAL ENGINEER
JOE B. RAMEY
14597
OKLAHOMA

7/17/2020

JOE B. RAMEY, P.E.

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LANDFILL COMPLETION PLAN

CREEK COUNTY LANDFILL
SAPULPA, OKLAHOMA

DATE DRAFTED: May 13, 2020

FIGURE 1

APPENDIX M

CLOSURE/POST-CLOSURE COST ESTIMATES

SCOTT A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

KEVIN STITT
Governor

March 16, 2020

Mr. Danny Rosencutter
Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74067

Re: Updated Closure/Post-Closure Cost Estimates 2020
Creek County Landfill
Permit Number 3519020
Creek County

Dear Mr. Rosencutter:

The Oklahoma Department of Environmental Quality (DEQ) received your updated closure and post closure cost estimate on March 4, 2020 for the above referenced landfill. The 2020 closure and post closure costs are approved as follows:

Closure Cost	$440,044.48
Post Closure Cost	$203,639.14
Total	$643,683.62

Please adjust the financial assurance mechanism to reflect the new approved costs. If there are any questions concerning this letter, please contact Martha Grafton at (405) 702-5144.

Sincerely,

Hillary Young

Hillary Young, P.E.
Chief Engineer
Land Protection Division

HY/mg

Table H.1 Site Data 2020

Facility Name: Creek County Landfill

Permit Number: 3519020

Description	Quantity	Units	
Total Permitted Area	63	acres	
Active Portion			
Composite Lined		acres	
Soil Lined	3.85	acres	2+ 1.85 = 3.85
Area of Largest Cell/Phase Requiring Final Cap			
Composite Lined		acres	
Soil Lined	11.95	acres	10.1+1.85=11.95
Perimeter Fencing	2,000	linear feet	
Groundwater Monitoring Wells	150	VLF	
Methane Gas Probes	110	VLF	
Terraces	1000	linear feet	
Letdown channels	100	linear feet	
Perimeter drainage ditches	1000	linear feet	
Average Daily Flow	200	tons/day	
Landfill Disposal Cost	1.25	$/ton	

VLF = Vertical linear feet. The sum of the depths of all monitoring wells.

Table H.2 Closure Cost Estimate 2020

Facility Name: Creek County Landfill

	Task/Service	Quantity	Units	Multiplier[a]	Unit Cost[b]	Subtotal
a	**Preliminary Site Work**					
b	Conduct Site Evaluation	1	Lump sum	1	$3,744.68	$3,745
	Dispose Final Wastes					
	Average Daily Flow	200	tons/day			
c	Disposal Cost	200	tons/day	5	$1.25	$1,250
d	Remove Temporary Building(s)	1	lump sum	1	$3,433.89	$3,434
e	Remove Equipment	1	lump sum	1	$2,803.05	$2,803
f	Repair/Replace Perimeter Fencing	2000	linear feet	0.25	$3.68	$1,840
2	Clean Leachate Line(s)	NA	lump sum	1	$1,696.07	NA
a	**Monitoring Equipment**					
b	Rework/Replace Monitoring Well(s)	150	VLF	0.25	$78.74	$2,953
c	Plug Abandoned Monitoring Well(s)	150	VLF	0.25	$31.52	$1,182
d	Rework/Replace Methane Probe(s)	110	VLF	0.25	$68.01	$1,870
e	Plug Abandoned Methane Probe(s)	110	VLF	0.25	$24.85	$683
3	Rework/Replace Remediation and/or Gas Control Equipment	NA	lump sum	0.05	NA	NA
a	**Construction**					
b	Complete Site Grading to include on- and off-site borrow areas	12.35	acres	1	$1,484.67	$18,336
	Construct Final Cap					
	Compacted On-site Clay Cap or	39,849	cubic yards	1	$5.34	$212,795
	Compacted Off-site Clay Cap or		cubic yards	1	$8.67	NA
c	Install Geosynthetic Clay Liner Cap	NA	square feet	1	$0.56	NA
	Construct Landfill Gas Venting Layer					NA
	Place Sand or		acres	1	$39,698.53	NA
d	Install Net and Geotextile		square feet	1	$0.39	NA
e	Install Passive Landfill Gas Vents		acres	1	$951.03	NA
f	Install Flexible Membrane Liner		square feet	1	$0.43	NA
	Drainage Layer					
	Place Sand or		acres	1	$39,698.53	NA
g	Install Net and Geonet		square feet	1	$0.39	NA
	Place On-site Topsoil	19,925	cubic yards	1	$2.29	$45,627
h	Place Off-site Topsoil		cubic yards	1	$18.35	NA
4	Establish vegetative cover, including on- and off-site borrow areas	12.35	acres	1	$1,058.09	$13,067
a	**Drainage/erosion control**					
b	Construct Terraces	1000	linear feet	1	$9.61	$9,610
c	Construct Letdown Channels	100	linear feet	1	$105.11	$10,511
5	Clean Perimeter Drainage Ditches	1000	linear feet	0.5	$7.32	$3,660
6	**Tasks Not Identified**					
7	**Subtotal**					$333,367
8	**Administrative Services**	1	lump sum	0.1	$333,367.03	$33,337
9	**Technical and Professional Services**	1	lump sum	0.12	$333,367.03	$40,004
10	**Closure Contingency**	1	lump sum	0.1	$333,367.03	$33,337
	Total Final Closure					$440,044.48

Table I.1 Post-closure Cost Estimate 2020

Facility Name: Creek County Landfill

	Task/Service	Quantity	Units	Multiplier[a]	Unit Cost[b]	Subtotal
	Site maintenance					
a	Site Inspections	4	per year	8	$681.20	$21,798
b	General Maintenance	1	per year	8	$2,042.28	$16,338
c	Remediation and/or Gas Control Equipment	NA				NA
2		1	lump sum	0.3[c]	[d]	
a	**Monitoring equipment**					
b	Rework/Replace Monitoring Well(s)	150	VLF	0.25	$78.74	$2,953
c	Plug Abandoned Monitoring Well(s)	150	VLF	0.25	$31.52	$1,182
d	Final Plugging of Monitoring Wells	150	VLF	1	$31.52	$4,728
e	Rework/Replace Methane Probe(s)	110	VLF	0.25	$68.01	$1,870
f	Plug Abandoned Methane Probe(s)	110	VLF	0.25	$24.85	$683
g	Final Plugging of Methane Probes	110	VLF	1	$24.85	$2,734
3	Final Plugging of Piezometer(s)	NA	VLF	1	$24.85	NA
	Sampling and analysis					
a	Groundwater Monitoring Wells	5	wells	16	$181.31	$14,505
b						
c	Methane Gas Probes	11	probes	60	$47.66	$31,456
d	Surface Water Monitoring Points	1	points	60	$88.52	$5,311
4	Leachate		sample	60	$142.64	NA
	Final cover maintenance					
a	Mow and Fertilize Vegetative Cover	30	acres	8	$225.35	$54,084
b	Repair Erosion, Settlement, and Subsidence for On-site Soils	30	acres	16	$3.27	$1,570
c	Repair Erosion, Settlement, and Subsidence for Off-site Soils	NA	acres	8	$19.54	NA
5	Reseed Vegetative Cover	30	acres	0.2	$1,058.09	$6,349
a	**Leachate management**	NA				
b	Clean Leachate Line(s)	NA	per year	30	$1,746.78	NA
c	Maintain Leachate Collection System and Equipment	NA	per year	30	$2,713.69	NA
6	Collect, Treat, Transport, and Dispose of Leachate	NA	gal/yr	30	$0.35	NA
7	**Tasks not identified**					
	Subtotal					$165,560
8	**Administrative Services**	1	lump sum	0.06	$165,560.28	$9,934
9	**Technical and Professional Services**	1	lump sum	0.07	$165,560.28	$11,589
10	**Post-closure Contingency**	1	lump sum	0.1	$165,560.28	$16,556
	Total Post-closure					$203,639.14

APPENDIX N

WASTE EXCLUSION PLAN

STEVEN A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

MARY FALLIN
Governor

March 29, 2011

Mr. M. L. O'Brien
Creek County Landfill
P.O. Box 1597
Sapulpa, OK 74067

Subject: Creek County Landfill
Waste Exclusion Plan (WEP)
Creek County, Permit #3519020

Dear Mr. O'Brien:

The Department received an application on March 15, 2011 for a WEP plan from Creek County Landfill. The Department reviewed the submitted application and found it to be technically complete.

Pursuant to Oklahoma Administrative Code (OAC) 252:4-7-58(2) the submittal was processed as a Tier I Application. The Department approves the permit modification, which is effective on the date that it was signed. Please contact Wesley Squyres at (405) 702-5197, if there are any questions concerning the permit modification.

Sincerely,

Saba Tahmassebi, Ph. D., P. E.
Chief Engineer
Land Protection Division

ST/WS

cc: Creek County ECLS

Creek County Landfill (ODEQ Permit #3519020)

WASTE EXCLUSION PLAN

(Effective: January 1, 2011)

Introduction

The following Waste Exclusion Plan (WEP) is submitted in accordance with the provisions and requirements of the Oklahoma Administrative Code, Title 252, and Chapter 515 – Management of Solid Waste. Specific references are made to Subchapter 29 – Exclusion of Prohibited Wastes.

Creek County Landfill will not accept hazardous waste as defined in Title 40 of the Code of Federal Regulations Part 261.3, radioactive waste, regulated polychlorinated biphenyls ("PCB") waste, regulated medical wastes, friable asbestos, nonhazardous industrial wastes, and sewage sludge. In addition, containerized liquid wastes, will be prohibited. Putrescible waste will not be accepted. Haulers using the facility will be notified of all such restrictions via facility signage.

This Waste Exclusion Plan is to ensure that the Creek County Landfill appropriately screens incoming waste prior to acceptance in order to detect and prevent the disposal of prohibited wastes as specified per Oklahoma Department of Environmental Quality (DEQ) regulation and pursuant to the facility permit. Upon a change in the conditions of the approved WEP, the Landfill will submit within 30 days of any such change an amended WEP to DEQ for approval.

Incoming Waste Inspections :

Routine Screening. Incoming loads will be screened routinely by gate / scale staff and the facility's loading operator. These trained staff will observe incoming loads for indications of prohibited wastes. Should the staff person encounter suspect loads, such as a commercial vehicle with signage that might indicate a prohibited waste, the staff person will summon the facility supervisor for further evaluation of the load. If inspection is warranted, the transporter will be notified that the load has been selected for inspection. The transporter will have the option of participating in the inspection or leaving-the site without unloading.

Random Inspections. The following process will be used to provide random inspections of incoming loads to the landfill to ensure that such loads do not contain prohibited wastes.

1. Random inspections of selected incoming waste loads is based on a schedule of two, weekly load inspections with the day of week and incoming waste load designated for inspections identified by a table of randomly generated numbers. This inspection schedule will be developed prior to the beginning of each calendar year and used as a planning tool for inspections by facility personnel. A sample inspection schedule for January – December, 2011 is provided in Appendix A. The procedural description is as follows:

    A. For each of the 52 weeks during the calendar year, two of the five work days each week will be selected randomly for load inspections.

B. On each randomly-selected inspection day, one load will be designated for inspection by the gate / scale attendant. Load selection is based on the generation of non-repetitive, random numbers between one and 30 (the average total incoming daily loads at the facility). In the event that the number relating to the incoming load targeted for inspection is not attained, then another load in close proximity to the target load will be randomly selected by the gate / scale attendant for inspection.

Inspection Procedure. Transporters of loads to be inspected will be directed to discharge their load in a designated inspection area. The inspection area will be an area away from the primary waste off-loading area to prevent the commingling of the inspection load with other working loads.

The designated load inspector will pick through the discharged waste using a rake or shovel working all sides of waste pile. The inspector will carefully observe the material for any prohibited waste and will complete the Waste Inspection Report described below in further detail. Load inspections may occur at any time during the facility operating hours.

The major elements of the load inspections are as follows:

1. Spread, break up, and visually examine wastes;
2. Flag suspicious wastes;
3. Identify or classify suspicious wastes;
4. Have any prohibited materials removed from the site by the transporter; and
5. Maintain proper records in the site operating record.

Designated load inspectors will be trained and equipped with the appropriate personal protective equipment. Health and safety procedures are discussed in the Health & Safety Plan section of this WEP.

Identifying Prohibited Wastes. The load inspector will use a variety of methods to detect prohibited wastes including:

1. Question the driver about the source of the load and the nature of the contributing generators;
2. Examine product labels, especially warning labels;
3. Inspect containers to ensure that they are empty and do not contain prohibited wastes;
4. Flag liquids in containers for removal
5. Flag sludge, powders, granular material or material with unusual color for removal
6. Search for non-household waste items that have a high probability of containing prohibited wastes such as:

* Transformers
* Lead acid batteries
* Oil filters
* Compressors, refrigerators, freezers (with chlorinated fluorocarbons (CFCs)
* Yellow bags (asbestos)
* Red bags (medical waste)

If prohibited wastes are inadvertently unloaded, and the owner or transporter cannot be identified, Creel County Landfill will be responsible for the proper treatment. handling, disposal. record keeping, and manifesting, as necessary. The facility manager will direct staff to properly handle and dispose of all prohibited wastes in accordance with appropriate state and federal regulations. If the waste may be hazardous. or handling, transport, and disposal requires characterization before corrective action activities can proceed, then a certified, hazardous waste contractor will be engaged to fully characterize the waste prior to disposal. Manifests and certifications of proper disposal will be obtained from the contractor and maintained in the operating records of the landfill.

If the generator or transporter of a deposited prohibited waste can be readily identified, then it will be the responsibility of the generator or transporter to immediately treat, remove, transport, and dispose of the prohibited waste as necessary. If the waste is hazardous, it will be the responsibility of the transporter to handle the hazardous waste in accordance with all applicable state and federal regulations.

In cases where it is necessary to temporarily store prohibited wastes until arrangements can be made to properly dispose of them, the waste will be immediately isolated and secured within a protected area of the landfill. Appropriate measures will be taken to minimize any leakage of materials and ensure that none migrate from the area. The temporary waste storage area will be flagged with "CAUTION" tape, and a sign will be posted that identifies the nature of the prohibited waste. Any such temporary storage shall not exceed 30 days.

Inspection Records. For all waste loads inspected, the following information will be recorded: date, time, name of load inspector, name of the hauling firm or vehicle owner, name of the driver. vehicle license tag, truck number if available, telephone contact number, and source of the waste as stated by the driver All such information will be recorded on the Waste Inspection Report shown in Appendix B. The Waste Inspection Report and copies of all any analytical tests will be kept on file as part of the site operating record.

Rejected Waste. If prohibited wastes are identified during any inspection of an incoming load, the prohibited portion will be rejected and not allowed into the disposal area. If hazardous, radioactive, PCB, or regulated medical wastes are detected, the entire load will be rejected.

DEQ Notification of Rejected Waste. The DEQ will be notified by the end of the next working day of:

1. Any waste identified and rejected prior to receipt as a prohibited waste; or
2. Any load identified and rejected as a prohibited waste at the gate, during random inspections. or upon disposal in the landfill.

The notification will provide the reason for the rejection and include the:

1. Date
2. Name, address, phone number and contact person of the waste generator when such data can be obtained; and/or
3. The name of the driver, tag number of the vehicle, carrier name, address, telephone number and contact person when such data can be obtained.

Health and Safety Plan. At a minimum, the designated load inspectors will be provided with the following protective equipment:

1. Eye protection (safety glasses or goggles)
2. Chemical resistant steel-toe boots with puncture resistant soles
3. Chemical resistant gloves
4. Liquid repellent, disposable coveralls, and
5. Hard hat

Clean water for emergency flushing of eyes or skin, a fire extinguisher, and a first aid kit will be readily accessible in the proximity of the load inspection area. Additional first aid supplies, fire extinguishers, and water will be maintained on the premises.

Personnel Training. Creek County Landfill personnel including the general manager, gate / scale attendant, and loading operators / inspectors shall receive an initial eight hours of basic WEP training, in accordance with OAC 252:515-29-3(c). This training seminar shall be facilitated by DEQ staff and certificates of completion will be obtained for attendees. These certificates will be retained on site in fulfillment of WEP documentation requirements.

Four or more hours of annual refresher training will be obtained for facility personnel via DEQ-offered training or other outside formal training course meeting the applicable training / refresher requirements. Personnel will also be offered periodic reviews of the required material during quarterly staff safety meetings. Trained personnel shall be on-site during all hours the landfill is open to accept wastes. Annual refresher training for facility staff shall be certified by training providers and retained in the facility operating record.

Appendix A:
Weekly Random Load Inspection Schedule
January thru December, 2011

	Day[1] & Inspection Load[2]		Day[1] & Inspection Load[2]	
WEEK 1:	2	8	3	21
WEEK 2:	4	6	5	15
WEEK 3:	1	17	2	6
WEEK 4:	1	10	3	18
WEEK 5:	1	5	2	20
WEEK 6:	1	5	3	22
WEEK 7:	2	3	4	7
WEEK 8:	2	2	4	6
WEEK 9:	2	9	5	10
WEEK 10:	1	4	5	25
WEEK 11:	3	12	4	23
WEEK 12:	3	2	4	14
WEEK 13:	2	2	3	19
WEEK 14:	2	2	5	23
WEEK 15:	1	5	3	30
WEEK 16:	4	3	5	2
WEEK 17:	2	21	3	27
WEEK 18:	1	9	3	16
WEEK 19:	2	13	3	8
WEEK 20:	1	4	3	29
WEEK 21:	4	11	5	27
WEEK 22:	3	13	5	15
WEEK 23:	2	23	32	2
WEEK 24:	4	22	5	7
WEEK 25:	1	1	4	18
WEEK 26:	2	8	3	10
WEEK 27:	1	20	3	22
WEEK 28:	3	15	4	23
WEEK 29:	1	14	3	4
WEEK 30:	1	7	3	6
WEEK 31:	2	28	3	2
WEEK 32:	2	3	4	26

	Day[1] & Inspection Load[2]		Day[1] & Inspection Load[2]	
WEEK 33:	4	12	5	14
WEEK 34:	3	6	5	3
WEEK 35:	1	15	4	19
WEEK 36:	1	16	4	23
WEEK 37:	2	3	3	12
WEEK 38:	4	26	5	14
WEEK 39:	2	1	5	30
WEEK 40:	1	18	5	11
WEEK 41:	1	24	5	15
WEEK 42:	2	26	5	6
WEEK 43:	3	6	4	21
WEEK 44:	1	14	2	5
WEEK 45:	3	14	5	30
WEEK 46:	1	16	4	18
WEEK 47:	2	22	5	21
WEEK 48:	1	12	5	20
WEEK 49:	1	7	4	9
WEEK 50:	2	30	3	11
WEEK 51:	2	13	5	17
WEEK 52:	3	11	4	4

Footnotes:

1 - Assumes 5-day work week: 1=Monday; 5=Friday. Use 6-day week as appropriate. For any day selected that is a holiday, select the first following work day for inspections.

2 - Incoming load as designated by scale/gate attendant. Use average daily total number of loads as maximum for random number generation.

NOTE: Multiple sources of random number generators available on world wide web (internet). Source for random numbers above was www.Random.org.

Appendix B:

Creek County Landfill
WASTE INSPECTION REPORT

Date: _____ - _____ - 20____ Time: _____ ☐*AM* ☐*PM*

Inspector's Name: _____

Transporter / Hauler's Name: _____

- *If commercial vehicle, record company / owner's name:* _____

Vehicle License Tag No#: _____ Truck No# (if applicable): _____

Telephone Contact Number: (Area Code) _____ - _____-_____

Source of Waste (transporter / hauler reported):
- ☐ Household / Residential
- ☐ Commercial
- ☐ Construction / Demolition
- ☐ Other (describe): _____

WASTE INSPECTION RESULTS:

Prohibited wastes identified or suspected?

☐ NO (***Inspection PASSES, OK for disposal***)

☐ YES (***Inspection FAILS, record action taken below***)

List Prohibited Materials: _____

☐ Prohibited materials rejected to transporter /owner (contact names & numbers for proper disposal services provided)

☐ Transporter / Owner Unknown -- prohibited materials retained or processed for disposal

- **Note:** Attach all handling manifests and certificates of disposal for processed or retained prohibited wastes identified above.
- **Note:** ***Report by next working day to Okla. Dept. of Environmental Quality, Land Protection Div., Compliance / Inspection Section (Ph: 405-702-5100)*** **ALL rejected, prohibited wastes**

* * * *